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# Metazoan parasites of *Mugil curema* (Osteichthyes: Mugilidae) from the coastal Rio de Janeiro

## *Metazoários parasitos do* Mugil curema *(Osteichthyes: Mugilidae) do litoral do Rio de Janeiro.*

**Artigo Original**

***Original Paper***

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**Abstract**

From May to August 2011, 55 specimens of white mullet *Mugil curema* Valenciennes, 1836 (Osteichthyes: Mugilidae) collected from coast of the State of Rio de Janeiro (21-23° S, 41-45° W), were necropsied to study their communities of metazoan parasites. Two species of metazoan parasites were collected: *Floridosentis mugilis* Machado, 1951 (Acantocephala: Neoechinorhynchidae) and *Metamicrocotyla macracantha* Alexander, 1954 (Monogenea: Microcotylidae). The majority of the fishes (n = 41; 74.5%) were parasitized by at least one metazoan species. Three hundred twenty-four specimens, with an average of 5.8 ± 7.6 per host, were collected. *Floridosentis mugilis* constituted the majority of specimens collected (n = 319), was the dominant species, with highest prevalence, abundance, intensity and mean intensity. The parasites species showed a typical over-dispersed pattern of distribution. The abundance of the species *F. mugilis* and total parasites collected showed negative correlation with host total length. The metazoan parasites community of *M. curema* showed dominance of endoparasites, no correlation between parasite abundance and the lack of relationship between the sex of host and parasite rates. *Mugil curema* showed low parasite species richness when compared with studies on the parasitic fauna of mugilids of the Brazilian coast.

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***Resumo***

*Entre maio e agosto de 2011, foram coletados 55 espécimes do parati,* Mugil curema *Valenciennes, 1836 (Osteichthyes: Mugilidae) provenientes do litoral do Estado do Rio de Janeiro (21-23°S, 41-45°O), sendo necropsiados para estudo de sua comunidade de metazoários parasitos. Foram coletadas duas espécies de metazoários parasitos:* Floridosentis *mugilis Machado, 1951 (Acantocephala: Neoechinorhynchidae) e* Metamicrocotyla macracantha *Alexander, 1954 (Monogenea: Microcotylidae). A maioria dos peixes examinados (n = 41; 74,5%) estavam parasitados por pelo menos uma espécie de metazoário. Trezentos e vinte e quatro espécimes de parasitos foram coletados, com média de 5,8 ± 7,6 por hospedeiro. Floridosentis mugilis constituiu a maioria dos espécimes coletados (n = 319), sendo a espécie dominante, com os maiores valores de prevalência, abundância, intensidade e intensidade média. Os parasitos apresentaram típico padrão de distribuição agregada. A abundância de* F. mugilis *e o total de parasitos coletados apresentaram correlação negativa com o comprimento total do hospedeiro. A comunidade de metazoários parasitos do M. curema apresentou dominância de endoparasitos, correlação negativa entre a abundância parasitária e ausência de relação entre o sexo do hospedeiro e os índices parasitários.* Mugil curema *apresentou baixa riqueza parasitária ao compararmos com estudos sobre a fauna parasitária de mugilídeos da costa brasileira.*

***Palavras-chave***

*Mugil curema*

Mugilidae

Metazoários Parasitos

## 1. Introduction

Mugilids are widely distributed in tropical and sub-tropical regions around the world, especially in the costal estuarine. Three mullets species are very common in the southern Brazil and are a comercially important: *Mugil curema* Valenciennes, 1836, *M. liza* Valenciennes, 1836 and *M. platanus* Günther, 1880 (MENEZES, 1983; MENEZES; FIGUEIREDO, 1985; SILVA; ARAÚJO, 2000; NELSON, 2006). The white mullet *Mugil curema*, is a pelagic fish, inhabit sandy coasts and littoral pools but also occurs in muddy bottoms of brackish lagoons and estuaries, adults form schools and feed on microscopic or filamentous algae and planktonic organisms. This specie occurs in Western Atlantic from Nova Scotia to Argentina (MENEZES, 1983; MENEZES; FIGUEIREDO, 1985; LOWE-MCCONNEL, 1999).

From Brazil, some records of metazoan parasites of mullets were made by Kohn et al. (1994), Diniz et al. (2005), Abdallah et al. (2009) and Eiras et al. (2010) on Monogenea; Travassos et al. (1965, 1967, 1969), Conroy and Conroy (1984, 1986), Conroy et al. (1985), Oliveira et al. (1988), Fernandes and Goulart (1989, 1992), Knoff and Amato (1991a, b; 1992), Kohn et al. (2007) and Oliveira et al. (2007) on Digenea; Noronha et al. (1973) on Acanthocephala and Knoff and Boeger (1994), Knoff et al. (1994), Boxshall and Montú (1997) and Cavalcanti et al. (2011) on Crustacea. Quantitative aspects of the parasites of mullets were studied by Knoff et al. (1997), Luque et al. (2004), Luque and Poulin (2004, 2007), Ranzani-Paiva and Silva-Souza (2004) and Poulin et al. (2011).

In this report, we studied the metazoan parasite community of *M. curema* from the costal zone of the State of Rio de Janeiro, at component and infracommunity levels.

## 2. Material and methods

From May to August 2011, 55 specimens of white mullet *M. curema* were examined. Local fishermen collected fish from coastal zone of the State of Rio de Janeiro (21-23°S, 41-45°W), Brazil. These fish were identified according Menezes (1983) and Menezes and Figueiredo (1985). The parasites were collected, fixed, and processed according to Eiras et al. (2000).

Our analysis included only species with prevalence higher than 10% (BUSH et al., 1990). The frequencies of dominance and of relative dominance (number of individuals of one species/total number of individuals of all species in each infracommunity) were calculated according to Rohde et al. (1995). The coefficient

between variance and mean parasitic abundance (dispersion index, ID) was calculated for each infracommunity, aiming to determine distribution patterns. Its significance was tested using the *d* statistics (LUDWIG; REYNOLDS, 1988). The ecological terminology used is that indicated by Bush et al. (1997).

Values were considered significant when $P \leq 0.05$. Data on the length of the host, total number of parasites, and parasitic abundance were transformed into logarithms (log x + 1) for an approximation to the normal distribution (ZAR, 1996). Next, the data were analyzed using the Pearson (*r*) correlation to check for potential correlations with the total length of the host. The Pearson coefficient was also used to investigate the existence of a correlation between the host length and the prevalence of infection/parasitic infestations, in which previous angle correction of the data on prevalence was done (ZAR, 1996) and partition of host samples into five 2.5cm length intervals. The possible influence of host sex on abundance and prevalence of parasites was using Z normal approximation to the Mann-Whitney test and chi-square test, respectively.

## 3. Results

The *M. curema* measured on average 31.4 ± 2.4 (24.5 - 37) cm of total body length. The average total length of male (32 ± 2.3 cm; n = 28) and female (30.7 ± 2.4 cm; n = 27) fishes in the study sample were not significantly different ($t = 2.071$; $P = 0.786$).

Two species of metazoan parasites were collected: *Floridosentis mugilis* Machado, 1951 (Acantocephala: Neoechinorhynchidae) and *Metamicrocotyla macracantha* Alexander, 1954 (Monogenea: Microcotylidae) (Table 1).

**Table 1 – Prevalence, mean abundance, intensity, mean intensity and site of infections of the metazoan parasites of *Mugil curema* from the coastal zone of the State of Rio de Janeiro, Brazil.**

| Parasite | Prevalence (%) | Mean abundance | Intensity | Mean intensity | Site of infection |
|---|---|---|---|---|---|
| **Monogenea** | | | | | |
| *Metamicrocotyla macracantha* | 3.6 | 0.1 ± 0.55 | 1 - 4 | 2.5 ± 2.1 | Gills |
| **Acanthocephala** | | | | | |
| *Floridosentis mugilis* | 74.5 | 5.8 ± 7.6 | 1 - 37 | 7.8 ± 7.9 | Intestine |

The majority of the parasites specimens collected were acantocephalan. *Floridosentis mugilis* was the predominant species, with 319 specimens collected (98.4% of all parasites); and showed highest values of mean relative dominance and frequency of dominance (0.72 ± 0.44; n = 39). The majority of the fishes (n = 41; 74.5%) were parasitized by at least one metazoan species. Three hundred twenty-four specimens, with an average of 5.8 ± 7.6 per host, were collected. *Floridosentis mugilis* showed a typical over-dispersed pattern of distribution (ID = 10.072; $d = 15.390$). Negative relationships between the total parasites abundance ($r_s = - 0.344$; $P = 0.010$) and abundance of *F. mugilis* ($r_s = - 0.368$; $P = 0.005$) and the host's total body length of fish were observed. No significant correlation was found between the total body length of the host and parasitic prevalence.

Host sex did not influence parasite prevalence ($\chi^2 = 0.008$; $P = 0.477$) or mean abundance ($U = - 1.470$; $P = 0.136$) of any species.

## 4. Discussion

Parasites communities of the white mullet *Mugil curema* study are characterized by acanthocephala dominance (*Floridosentis mugilis*) and low parasite species richness. Most studies of marine fishes in southeastern Brazil has demonstrated endoparasite dominance, digeneans and nematodes predominantly (LUQUE et al., 1996; TAKEMOTO et al., 1996; KNOFF et al., 1997; LUQUE; CHAVES, 1999; SILVA et al., 2000; ALVES; LUQUE, 2001; ALVES et al., 2002a, b; ALVES et al., 2004; TAVARES et al.,

2004; LUQUE et al., 2008; MARQUES; ALVES, 2011). However, in this case, showed dominance of an acanthocephala in parasite community. According Marcogliese (2002) dominance of a particular taxon or an inframommunities parasite can vary due to the density and the ontogenic development of the definitive hosts, the availability of intermediate hosts and/or environmental variations. Furthermore, factors such as dietary habits, the trophic level and geographic distribution of the host may influence the composition of parasite community structure (LUQUE et al., 1996; MUÑOZ et al., 2002; LUQUE; POULIN, 2007). The mugilids Brazilian coast have broad food spectrum and are primarily scavengers, herbivores and omnivores (MENEZES; FIGUEIREDO, 1985; FRANCO; BASHIRULLAH, 1992; OLIVEIRA; SOARES, 1996; HARRISON; SENOU, 1999; COSTA-NETO; MARQUES, 2000; HARRISON, 2002); feeding mainly nematodes, mollusks and crustaceans (OLIVEIRA; SOARES, 1996). Among these items, and compared with results obtained in the present study, we highlight the crustacean, possible intermediate hosts and/or paratenic of Acanthocephala (HADEL; MEDEIROS, 1998; LUQUE; POULIN, 2004; 2007).

The community of metazoan parasites of *M. curema* consisted of only two species-specific host: *Metamicrocotyla macracantha* e *F. mugilis*. Both were recorded in several species of mullet's Neotropical (ARMAS, 1979; FERNANDEZ, 1987; JUAREZ-ARROYO; MALDONADO, 1989; LUQUE, 1994; KNOFF et al., 1997; SURIANO et al., 2000; ALARCOS; ETCHEGOIN, 2010). Thus, the low parasite richness is a hallmark in the community of metazoan parasites of *M. curema*. This fact clearly differs from the study by Knoff et al. (1997), with *M. platanus* where they were found 25 species of parasites. Another relevant factor was the absence of helminth larval stages in *M. curema*, which are common in fish from the coast of the State of Rio de Janeiro (LUQUE; POULIN, 2004). In *M. platanus*, Knoff et al. (1997) recorded three species of helminth larval stage, two species of tetraphyllidean cestodes and the digenean *Ascocotyle (Phagicola) longa* Ransom, 1920. The latter being often found in mugilids of the South American coast (CONROY, 1979; 1986; DIAS; WOICIECHOVSKI, 1994, OLIVEIRA et al., 2007; VIOLANTE-GONZALEZ et al., 2007) and responsible for fagicolose (CHIEFFI et al., 1990; OKOMURA et al., 1999). *Mugil curema* showed low parasite species richness when compared with studies on the parasitic fauna of mugilids of the Brazilian coast.

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