

SCIENTIFIC COMMUNICATION

FIRST REPORT OF *AUSTRODIPLOSTOMUM COMPACTUM* AND *ITHYOCLINOSTOMUM DIMORPHUM* IN TRAHIRA (*HOPLIAS MALABARICUS*) FROM THE MIDDLE COURSE OF THE RIO DOCE, MINAS GERAIS, BRAZIL

F. Belei¹, S.R. Ferreira², L.M. Perin², F.R. Braga²,
W.M.S. Sampaio¹, J.V. de Araújo², J.A. Dergam¹, R.M. Takemoto³

¹Universidade Federal de Viçosa, Departamento de Biologia Animal, Av. Ph Rolfs, s/nº, CEP 36570-000, MG, Brasil. E-mail: ferreirasr2008@hotmail.com

ABSTRACT

Austrodiplostomum compactum and *Ithyoclinostomum dimorphum* are two trematodes commonly found in trahira, but these parasites were never reported in trahiras from Rio Doce. Thus, the aim of this study is to describe the occurrence of *A. compactum* and *I. dimorphum* metacercariae in trahira from the middle course of the Rio Doce and to record the presence of eggs in *I. dimorphum* metacercariae. The parasites were identified and analyzed using methods described previously. There were found 10 *A. compactum* metacercariae in the aqueous humor of eyes in four of the trahiras and 12 *I. dimorphum* metacercariae encysted in the peritoneal cavity in five of the trahiras. Maceration of the *I. dimorphum* metacercariae revealed the presence of eggs. These results demonstrate the broad distribution of these parasites and the first report of these parasites in trahira from Rio Doce.

KEYWORDS: Metacercariae, *Austrodiplostomum compactum*, *Ithyoclinostomum dimorphum*, Rio Doce.

RESUMO

PRIMEIRO RELATO DE *AUSTRODIPLOSTOMUM COMPACTUM* E *ITHYOCLINOSTOMUM DIMORPHUM* EM TRAÍRAS (*HOPLIAS MALABARICUS*) PROVENIENTES DO MÉDIO CURSO DO RIO DOCE, MINAS GERAIS, BRASIL. *Austrodiplostomum compactum* e *Ithyoclinostomum dimorphum* são dois trematódeos comumente encontrados em traíras, contudo, esses parasitas nunca foram relatados em traíras do Rio Doce. O objetivo do estudo é descrever a ocorrência de metacercárias de *A. compactum* e *I. dimorphum*, e presença de ovos em metacercárias de *I. dimorphum* em traíras provenientes do médio curso do Rio Doce. Os parasitas foram analisados e identificados utilizando métodos descritos anteriormente. Foram encontradas 10 metacercárias de *A. compactum* no humor aquoso dos olhos em quatro traíras e 12 metacercárias de *I. dimorphum* encistadas na cavidade peritoneal de cinco traíras. A maceração de metacercárias de *I. dimorphum* revelou a presença de ovos nestes parasitos. Esses resultados demonstram a ampla distribuição desses trematódeos e este é o primeiro relato destes parasitos em traíra do Rio Doce.

PALAVRAS-CHAVE: Metacercárias, *Austrodiplostomum compactum*, *Ithyoclinostomum dimorphum*, Rio Doce.

Our current knowledge of Brazilian ichthyoparasites indicates that there are approximately 1050 species from 620 different host species (EIRAS et al., 2010). This number may be underestimated, since most studies on ichthyoparasitology are concentrated in southern Brazil (PAVANELLI et al., 1990; GALLIO et al., 2007; YAMADA et al., 2008). In southeast Brazil the ichthyoparasite fauna has not been well explored (MARTINS et al., 1999; BRASIL-SATO, 2002; PARAGUASSÚ; LUQUE, 2007). Thus, the data obtained

to date are not sufficient to elucidate the parasite fauna of Neotropical fishes.

The trahira, *Hoplias malabaricus* Bloch, 1794, has a wide distribution in Central and South America. This fish has nocturnal habits, tolerate low dissolved oxygen concentrations and its abundance is correlated with aquatic vegetation and shallow waters (SHIBATA et al., 2002; REIS et al., 2003). According to LUQUE; POULIN (2007), there are currently 67 species of parasites recorded in *H. malabaricus*. Due to their

²Universidade Federal de Viçosa, Departamento de Medicina Veterinária, Viçosa, MG, Brasil.

³Universidade Estadual de Maringá, Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura, Maringá, PR, Brasil.

feeding habits these species may act as definitive, intermediate and paratenic hosts to helminths (BARROS et al., 2007). *Austrodiplostomum compactum* (Lutz, 1928) and *Ithyoclinostomum dimorphum* (Diesing, 1850) are trematodes commonly found in trahira. *A. compactum* is a digenetic trematode belonging to the order Diplostomida, whose metacercariae parasitise the eyes, brain, pericardium, muscle and peritoneal cavity of many Neotropical fishes (EIRAS et al., 2010). *A. compactum* metacercariae have dorsoventrally flattened bodies, small subterminal oral suckers and two pseudosuckers in the anterior region, an acetabulum and short esophagus (KOHN et al., 1995). *I. dimorphum* is also a diplostomidae digenetic trematode whose metacercariae are found encysted in the muscle, gills, pericardium, peritoneal cavity and oesophagus of fish bodies and have very elongate, narrow, flat bodies with varying length and width (PAVANELLI et al., 1990).

The aim of this study was to describe for the first time the occurrence of *A. compactum* and *I. dimorphum* metacercariae in trahiras from the middle course of the Doce River, and to record the occurrence of eggs in *I. dimorphum* metacercariae.

The seven specimens of *H. malabaricus* Bloch, 1794, were collected in Lago Carioca, a complex of lagoons in the Parque Estadual do Rio Doce (PERD) (19S 46' 53" and 42W 35' 57"). The specimens were collected using gillnets, standardized in various mesh sizes, mounted in the evening and removed the following morning.

The fishes were sedated with clove oil, euthanized and then fixed in formalin at 10% concentration and stored at the Museu de Zoologia "João Moojen" - Universidade Federal de Viçosa (MZUFV) until the analysis.

The specimens eyes were removed and the abdominal cavity was opened to search for and collect the internal parasites. The parasites were identified and analyzed using methods described by PAVANELLI et al. (1990), KOHN et al. (1995) and EIRAS et al. (2010). Moreover, the parasites were subjected to maceration and observed under a stereomicroscope.

There were found a total of 10 *A. compactum*, metacercariae (Fig. 1) in the aqueous humor of eyes in four of the trahiras and 12 *I. dimorphum*, metacercariae (Fig. 2) encysted in the peritoneal cavity in five of the trahiras. The occurrence of these parasites were previously reported in other fish species in different geographic regions (PAVANELLI et al., 1990; KOHN et al., 1995; MACHADO et al., 1996; SILVA - SOUZA, 1998; GALLIO et al., 2007; PARAGUASSÚ; LUQUE, 2007; YAMADA et al., 2008; ZICA et al., 2009; PAES et al., 2010), but this is the first report of the presence of these parasites in trahira from middle course of the Rio Doce.

Based on analysis by stereomicroscope, the metacercariae of *A. compactum* presented a dorsoventrally flattened body, subterminal oral

sucker, two pseudosuckers in the anterior region, an acetabulum and a short esophagus. The average length of the specimens was 1,121 µm (645-1,227 µm) and the average width measured in the midline of the body was 656 µm (312-987 µm). These morphological characteristics are consistent with other studies (KOHN et al., 1995).

The metacercariae is capable to penetrate in different structures such as body surface, fins, gills and mouth cavity, and the larvae migrate to the eye, and can cause exophthalmoses, retinal detachment, cataract, blindness, lesions and haemorrhages in various tissues, as well as obstruction of blood vessels (SZIDAT; NANI, 1951). Also these phenomena can lead to fish deaths in cases of high rates of infection (OVERSTREET; CURRAN, 2004).

I. dimorphum presented elongate, narrow, flat body. Morphological characteristics in according to PAVANELLI et al. (1990). It was not possible to compress the metacercariae between slides because their body was hardened due to their fixation in formalin. These digeneans occur preferentially in the south of Brazil (GALLIO et al., 2007), but their distribution extends into southeast Brazil, namely Rio Doce, as described in the present study.

According to DIAS et al. (2003) and PINTO et al. (2004), *I. dimorphum* adults are found in the bird *Ardea cocoi*, a species found in the upper Parana region, and in birds belonging to the order *Ciconiiformes* from central-west Brazil. These birds distributed from Panama to Chile, Argentina and Brazil (SICK, 1997). *A. cocoi* has been reported in Parque do Rio Doce (PERD). This species occurs occasionally and is migratory (MACHADO; FONSECA, 2000; LINS, 2001; FARIA et al., 2006) and may be acting as a disseminator of the parasite. However, there are no reports in the literature regarding the occurrence of *I. dimorphum* in birds from this region.

The macerate of the *I. dimorphum* metacercariae revealed the presence of eggs (Fig. 3). The occurrence of eggs in trematode metacercariae is not uncommon, for example, *Coitocaecum parvum* (POULIN; CRIBB, 2002) and *Microphallus papillorobustus* (WANG; THOMAS, 2002). The temporary or permanent absence of a definitive host may be responsible for the shortening of the parasite life cycle (POULIN; CRIBB, 2002). *I. dimorphum* has a complex life cycle, where molluscs, fish and birds act as hosts at different life stages of the parasite (DIAS et al., 2003). However, the role of each host is not yet fully understood. Thus, this first report on the occurrence of eggs in *I. dimorphum* metacercariae from fish may help to explain the cycle of trematodes.

This is the first report of the occurrence of *A. compactum* and *I. dimorphum* metacercariae in trahiras from the middle course of the Rio Doce. Fish infection by these parasites can cause major economic losses, related to pisciculture and fishing activities, due to

the reduction of fish stock and products of lower quality. This report is also important as it contributes to the knowledge of parasite distribution in Brazil.

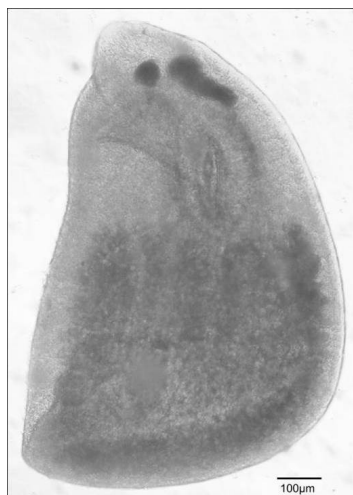


Fig. 1 - (10x Objective lenses): *Austrodiplostomum compactum* metacercariae found in aqueous humor collected in *Hoplias malabaricus* from Rio Doce, MG.

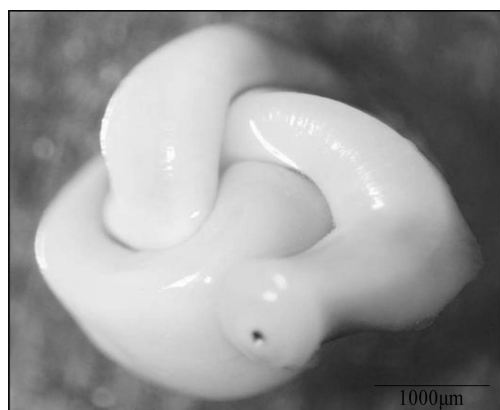


Fig. 2 - (Viewing in magnifying glass): *Ithyoclinostomum dimorphum* metacercariae collected in peritoneal cavity of *Hoplias malabaricus* from Rio Doce, MG.



Fig. 3 - (40x Objective lenses): Egg obtained by the maceration of the *Ithyoclinostomum dimorphum* metacercariae from peritoneal cavity of *Hoplias malabaricus* from Rio Doce, MG.

REFERENCES

BARROS, L.A.; MORAES FILHO, J.; OLIVEIRA, R.L. Larvas de nematóides de importância zoonótica encontradas em traíras (*Hoplias malabaricus* Bloch, 1794) no município de Santo Antonio do Leverger, MT. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, v.59, p.533-535, 2007.

BRASIL-SATO, M.C. Digenea of *Salminus brasiliensis* (Cuvier, 1817) (Osteichthyes, haracidae) of the São Francisco river basin, Brazil. *Revista Brasileira de Parasitologia Veterinária*, v.11, p. 95-98, 2002.

DIAS, M.L.G.G.; SANTOS, M.J.; SOUZA, G.T.R.; MACHADO, M.H.; PAVANELLI, G.C. Scanning electron microscopy of *Ithyoclinostomum dimorphum* (Trematoda: Clinostomidae), a parasite of *Ardea cocoi* (Aves: Ardeidae). *Parasitology Research*, v.90, p.355-358, 2003.

EIRAS, J.C.; TAKEMOTO, R.M.; PAVANELLI, G.C. *Diversidade dos parasitas de peixes de água doce do Brasil*. Maringá: Clichetec, 2010. 333p.

FARIA, C.M.A.; RODRIGUES, M.; AMARAL, F.Q., MÓDENA, E.; FERNANDES, A.M. Aves em fragmento de Mata Atlântica no alto Rio Doce, Minas Gerais: colonização e extinção. *Revista Brasileira de Zoologia*, v.23, p.1217-1230, 2006.

GALLIO, M.; SILVA, A.S.; SOARES, J.F.; SILVA, M.K.; SALOMÃO, E.L.; MONTEIRO, S.G. Ocorrência de metacercárias de *ithyoclinostomum dimorphum* em traíras no Rio Grande do Sul, Brasil: relato de caso. *Estudos de Biologia*, v.29, p.337-339, 2007.

KOHN, A.; FERNANDES, B.M.M.; BAPTISTA-FARIAS, M.F.D. Metacercariae of *Diplostomum (Austrodiplostomum) compactum* (Trematoda, Diplostomatidae) in the eyes of *Plagioscion squamosissimus* (Teleostei, Sciaenidae) from the Reservoir of the Hydroelectric Power Station of Itaipu, Brazil. *Memórias do Instituto Oswaldo Cruz*, v.90, p.341-344, 1995.

LINS, L.V. *Diagnóstico ornitológico do Parque Estadual do Rio Doce*: Relatório técnico. Belo Horizonte, 2001. Disponível em: <<http://www.ief.mg.gov.br>>. Acesso em: 1 dez. 2011.

LUQUE, J.L.; POULIN, R. Metazoan parasite species richness in Neotropical fishes: Hotspots and the geography of biodiversity. *Parasitology*, v.134, p.865-878, 2007.

MACHADO, R.B.; FONSECA, G.A.B.F. The avifauna of rio Doce valley, southeastern Brazil, a highly fragmented area. *Biotropica*, v.32, p.914-924. 2000.

MACHADO, M.H.; PAVANELLI, G.C.; TAKEMOTO, R.M. Structure and diversity of endoparasitic infracommunities and the trophic level of *Pseudoplatystoma corruscans* and *Schizodon Borelli* (Osteichthyes) of the high Paraná river. *Memórias do Instituto Oswaldo Cruz*, v.91, p.441-448, 1996.

- MARTINS, M.L.; FUJIMOTO, R.Y.; NASCIMENTO, A.A.; MORAES, F.R. Ocorrência de *Diplostomum* sp. Nordmann, 1832 (Digenea: Diplostomidae) em *Plagioscion squamosissimus* (Heckel, 1840) proveniente do reservatório de Volta Grande, MG, Brasil. *Acta Scientiarum*, v.21, p.263-266, 1999.
- OVERSTREET, R.M.; CURRAN, S.S. Defeating diplostomoid dangers in USA catfish aquaculture. *Folia Parasitologica*, v.51, p.153-165, 2004.
- PAES, J.V.K.; CARVALHO, E.D.; SILVA, R.J. Infection by *Austrodiplostomum compactum* metacercariae in fish from the Nova Avanhandava reservoir, Tietê river, São Paulo State, Brazil. *Acta Scientiarum. Biological Sciences*, v.32, p.273-278, 2010.
- PARAGUASSÚ, A.R.; LUQUE, J.L. Metazoários parasitos de seis espécies de peixes do reservatório de Lajes, estado do Rio de Janeiro, Brasil. *Revista Brasileira de Parasitologia Veterinária*, v.16, p.121-128, 2007.
- PAVANELLI, G.C.; SCHAEFFER, G.V.; SANTOS, M.S. Ocorrência e histopatologia de *Ithyoclinostomum dimorphum* (Diesing, 1850) (Trematoda: Clinostomatidae) em traíras coletadas no rio Paraná. *Revista Unimar*, v.12, p.69-75, 1990.
- PINTO, R.M.; BARROS, L.A.; TORTELLY, L.; TEIXEIRA, R.F.; GOMES, D.C. Prevalence and pathology of helminths of ciconiiform birds from the Brazilian swamplands. *Journal of Helminthology*, v.78, p.259-264, 2004.
- POULIN, R.; CRIBB, T.H. Trematode life cycles: short is sweet? *Trends in Parasitology*, v.18, p.176-183, 2002.
- REIS, R.E.; KULLANDER, S.O.; FERRARIS, J.C.J. Check list of the freshwater fishes of South and Central America. Porto Alegre: EDIPUCRS, 2003.729p.
- SHIBATTA, O.A.; ORSI, M.L.; BENNEMANN, S.T.; SILVA E SOUZA, A.T. Diversidade e distribuição de peixes na bacia do rio Tibagi. In: MEDRI, M.E.; BIAN-
- CHINI, E.; SHIBATTA, O.A.; PIMENTA, J.A. (Ed.). *A Bacia do Rio Tibagi*. Londrina: EDUEL, 2002. p.403-423.
- SICK, H. *Ornitologia brasileira*. Rio de Janeiro: Nova Fronteira, 1997. 912p.
- SILVA-SOUZA, A. T. *Estudo do parasitismo de Plagioscion squamosissimus* (Heckel, 1940) (Perciformes, Sciaenidae) por *Diplostomum* (*Austrodiplostomum*) *compactum* (Lutz, 1928) (Trematoda, Digenea) no Rio Tibagi, PR. 1998. 125f. Tese (Doutorado em Ciências) - Universidade Federal de São Carlos, São Carlos, SP, 1998.
- SZIDAT, L.; NANI, A. Diplostostomiasis cerebralis delpejerrey. Una grave epizootia que afecta la economía nacional producida por larvas de trematodes que destruyen el cerebro de los pejerreys. *Revista del Instituto Nacional de Investigacion de las Ciencias Naturales*, v.1, n.8, p.323-384; 1951.
- WANG, C.L.; THOMAS, F. Egg production by metacercariae of *Microphallus papillorobustus*: a reproductive insurance? *Journal of Helminthology*, v.76, p.279-28, 2002.
- YAMADA, F.H.; MOREIRA, L.H.A.; CESCHINI, T.L.; TAKEMOTO, R.M.; PAVANELLI, G.C. Novas ocorrências de metacercária de *Austrodiplostomum compactum* (Lutz, 1928) (Platyhelminthes: digenea) parasito de olhos de peixes da bacia do rio Paraná. *Revista Brasileira de Parasitologia Veterinária*, v.17, p.163-168, 2008.
- ZICA, E.O.P.; SANTOS, K.R.; RAMOS, I.P.; ZANATTA, A.S.; CARVALHO, E.D.; SILVA, R.J. First case of an infection of the metacercariae of *Austrodiplostomum compactum* (Lutz, 1928) (Digenea, Diplostomidae) in *Hypostomus regani* (Ihering, 1905) Siluriformes: Loricariidae). *Pan-American Journal of Aquatic Sciences*, v.4, p.35-38, 2009.

Received on 17/12/11

Accepted on 9/4/13