Henneguya sp. (MYXOZOA: MYXOBOLIDAE) IN *Pimelodus maculatus* (OSTEICHTHYES: SILURIDAE) FROM VOLTA GRANDE RESERVOIR, MINAS GERAIS, BRAZIL

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ABSTRACT

A myxozoan parasite found in the gills of a siluroid fish, *Pimelodus maculatus* from Volta Grande Reservoir, State of Minas Gerais, Brazil is described. From a total of 67 fish captured bimonthly with a net, between April 2000 and April 2001, 9 (13.4%) were infected by *Henneguya* sp. (Myxozoa: Myxobolidae). From eleven fish collected in August 2000, two out of three female specimens were parasitized. However, from the fish collected in December 2000, three out of five males were parasitized. The highest incidence of the parasite occurred in fish collected from August 2000 to April 2001. This myxozoan differs in a great number of parameters from *H. travassosi*, *H. leporinicola* and *H. hoimba*. The present description also showed different measurements in spore width, polar capsule length and coils of polar filament when compared to *H. adherens,* and in spore length, distance from the anterior extremity to the polar capsule, length of caudal appendage and cyst appearance compared to *H. pisciforme*. It also differs in total length, spore length and polar capsule length from *Henneguya* sp. 2 Adriano and Cordeiro, 2004. This study provides comparative measurements of myxozoan in Brazilian fish.

Key words: Myxozoa, *Henneguya*, *Pimelodus maculates,* description, prevalence, seasonality, Brazil

Henneguya sp. (MYXOZOA: MYXOBOLIDAE) EM *Pimelodus maculatus* (OSTEICHTHYES: SILURIDAE) DO RESERVATÓRIO DE VOLTA GRANDE, MINAS GERAIS, BRASIL

RESUMO

Este trabalho descreve um parasito mixosporídeo em brânquias de *Pimelodus maculatus* do Reservatório de Volta Grande, Estado de Minas Gerais, Brasil. De um total de 67 peixes capturados com rede bimestralmente entre abril de 2000 e abril de 2001, 9 (13,4%) estavam parasitados por *Henneguya* sp. (Myxozoa: Myxobolidae) nas brânquias. De 11 peixes coletados em agosto de 2000, duas de três fêmeas estavam parasitadas, sendo que de 11 coletados em dezembro de 2000, três de cinco machos estavam parasitados. A maior incidência do parasito ocorreu em peixes coletados entre agosto de 2000 e abril de 2001. Este mixosporídeo apresentou medidas diferentes quando comparado a *H. travassosi*, *H. leporinicola* e *H. hoimba*. A presente descrição também mostrou diferença nas medidas de largura do esporo, comprimento da cápsula polar e número de voltas do filamento polar quando comparada a *H. adherens* e no comprimento do esporo, distância da extremidade anterior até a cápsula polar e comprimento do apêndice caudal de *H. pisciforme*. De *Henneguya* sp. 2 Adriano e Cordeiro, 2004 difere no comprimento total, comprimento do esporo e comprimento da cápsula polar. Este trabalho fornece as medidas comparativas de mixosporídeos de peixes brasileiros.

Palavras-chave: Myxozoa, *Henneguya*, *Pimelodus maculatus,* descrição, prevalência, sazonalidade, Brasil

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INTRODUCTION

Myxozoan parasites are normally present in wild and captive fish. They do not cause any problem to their hosts when there is equilibrium between fish and environment. When any kind of stress to the host occurs - such as handling, poor water quality or over-population - the parasites appear and several kinds of diseases arise (LOM and NOBLE, 1984). In Brazil, PINTO (1928a, b) described *H. linearis* in the gills of *Rhamdia sebae* and *Pseudoplatystoma fasciatum*, *H. occulta* in Callichthyidae fish, *H. wenyoni* in *Astyanax fasciatus* and *H. iheringi* in *Serrasalmus spilopleura*. GUIMARÃES and BERGAMIM (1934) observed *H. santae* in *Tetragonopterus santae*. AZEVEDO and MATOS (1989) studied *Henneguya* infection in the gills of *Hoplosternum litorale* while ROCHA *et al.* (1992) observed *H. amazonica* in *Crenicichla lepidota*. *H. adherens* was present in *Acestrorhynchus falcatus* (AZEVEDO and MATOS, 1995) and *H. malabarica* in *Hoplias malabaricus* (AZEVEDO and MATOS, 1996). GIOIA and CORDEIRO (1996) arranged Brazilian myxosporidian parasites in a checklist. Moreover, MARTINS and SOUZA (1997) described *H. piractus* in the gills of *Piaractus mesopotamicus* and recently ADRIANO (2004) reported the presence of myxozoan in the gills of cultivated fish.

The present study relates the presence of *Henneguya* Thélohan, 1892 in the gills of a native freshwater fish *Pimelodus maculatus* Lacépède, 1803 from Volta Grande Reservoir, Minas Gerais, Brazil. This kind of siluroid fish has great economic importance as a comestible in this region. The prevalence of parasites was also analyzed.

MATERIAL AND METHODS

This study was conducted at the Hydroelectric Power Station of Minas Gerais (CEMIG) situated on the Volta Grande Reservoir, State of Minas Gerais, Brazil, which has a 195 km^2 area. During the period of April 2000 to April 2001, sixty seven *Pimelodus maculatus* were captured by net, every two months.

Fragments of organs were compressed between a glass slide and a microslide for smear preparation. The smear was air-dried at room temperature, fixed by immersion in undiluted methylic alcohol and stained by a 1:9 Giemsa solution for 10 min (MARTINS *et al.,* 1999a). Parasite identification was performed according to LOM and ARTHUR (1989) and MARTINS *et al*. (1999a). For visualization of the iodophilic vacuole, spores were fixed in a 10% buffered formalin solution and stained by Lugol's solution. Sixty-two myxozoan spores were measured (µm) and drawn in a camera lucida and a light microscope. For measurement and description, fresh spores were also mounted in glycerine gelatine for observation by differential interference contrast optics in an Olympus BX 60 microscope. Parasite prevalence was calculated according to BUSH *et al*. (1997).

RESULTS

In this study, a low prevalence of myxozoan parasites in the gills of *P. maculatus* from the region of Minas Gerais State was observed throughout the studied period (13.4%) and detailed in table 1. A total of eleven fish were collected in August 2000, of which two out of three female specimens were found to be parasitized with myxozoans in their gills. From the

Table 1. Means values standard deviation of total length and weight of *Pimelodus maculatus*; relation between infected males and females; and prevalence of *Henneguya* sp. from April 2000 to April 2001

Month	W (g)	L (cm)	IF/CF	TP (%)	MI/MC	P (%)	FI/FC	P (%)
Apr 2000	448.5 ± 205.5	33.7 ± 5.0	0/10	0	0/6	0	0/4	0
Jun 2000	260.6 ± 167.0	31.3 ± 5.1	0/6	0	0/3	0	0/3	0
Aug 2000	327.7 ± 135.0	32.2 ± 3.9	2/11	18	0/8	0	2/3	66
Oct 2000	443.1 ± 240.0	34.1 ± 4.9	2/10	20	1/6	16	1/4	25
Dec 2000	378.8 ± 121.8	33.2 ± 3.3	3/10	30	3/5	60	0/5	0
Feb 2001	314.9 ± 147.0	30.6 ± 4.0	1/10	10	1/7	14	0/3	0
Apr 2001	300.4 ± 107.5	31.3 ± 3.6	1/10	10	1/6	17	0/4	0

W: fish weight; L: fish length; IF/CF: total number of infected fish/collected fish in month; TP: total prevalence in a month; MI/MC: male infected/male collected; FI/FC: female infected/female collected; P: prevalence by sex of collected fish

fish caught in December 2000, three out of five males were parasitized. Despite the low number of collected males, an increase in prevalence of myxozoan parasites in gills of male *P. maculatus* can be inferred.

Spore characteristics - The gill slides revealed several elongated spindle-shape spores, with bifurcated caudal appendages (Figures 1-3). Two polar capsules were observed on the anterior extremity, each one with a polar filament. The sporoplasm and an iodophilic vacuole were found in the interior of the spore stained by Lugol. Spore characteristics shown were: total length with caudal appendages 33.4 + 3.1 µm (28.0 to 40.8); body spore length 13.3 + 1.1 µm (12.0 to 15.2); body spore width 6.8 + 0.7 µm (4.0 to 7.6); polar capsule length 5.8 + 0.3 µm (5.2 to 6.4); polar capsule width 1.5 + 0.2 µm (1.2 to 1.6); number of coils of polar filament 8 to 9; distance from the anterior extremity of the spore to the polar capsule 1.2 + 0.2 µm (0.8 to 1.4); caudal length 20.0 + 2.9 µm (16.0 to 28.8).

Fresh spore characteristics - Total length with caudal appendages 38.4 + 1.7 µm (33.6 to 39.6); body spore length 13.6 + 1.0 µm (12.0 to 14.4); body spore width 4.2 + 0.3 µm (4.0 to 4.8); caudal appendage length 25.6 + 1.2 µm (24.0 to 27.2).

Morphometric values and parasite morphology consistent with those of *Henneguya* (Myxozoa: Myxobolidae) confirmed the identification.

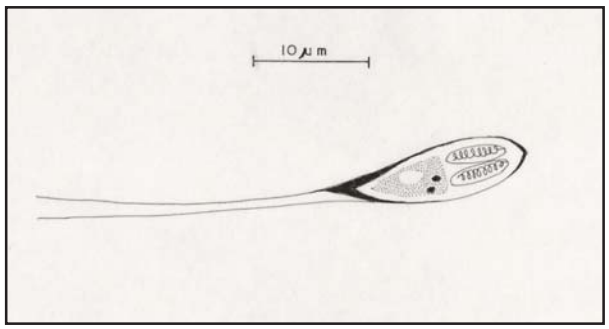

Figure 1. *Henneguya* sp. from the gills of *Pimelodus maculatus* collected in the Volta Grande Reservoir, Minas Gerais, Brazil

Figure 2. Fresh mount of a mature spore of *Henneguya* sp. mounted in glycerine gelatine observed by differential interference contrast optics. x 1,801

Figure 3. *Henneguya* sp. from the gills of *Pimelodus maculatus* collected in the Volta Grande Reservoir, Minas Gerais, Brazil, stained by Giemsa, x 3,003

Host type: *Pimelodus maculatus* Lacépède, 1803 (Siluridae)
Local name: "mandi amarelo"
Site of infection: gill filaments
Prevalence: 13.4%
Locality: Volta Grande Reservoir, Minas Gerais, Brazil

REMARKS

In Brazil, endoparasitic infections in cultivated fish have little importance while ectoparasites may cause significant mortality. The construction of a reservoir can provoke significant change in fish or parasite population. The studied fish species has great importance as nutrition for the neighboring population at Volta Grande Reservoir. The capture of *Plagioscion squamosissimus* and *Pimelodus maculatus* contributed with 88.7% of the total catch during the year of 1995. Native and captive fish are continually exposed to parasites, as well as to intermediate hosts. Data regarding seasonality of *H.* genus in Brazilian freshwater fish was not obtained. Some information can be found about prevalence: *Hyphessobrycon anisitsi* showed 20% of *H. pisciforme* infection (CORDEIRO *et al*., 1983/84); *Astyanax scabripinis* showed 11.5% of *H. intracornea* infection (GIOIA *et al*., 1986); *Acestrorhynchus falcatus* showed 55.5% of *H. adherens* (AZEVEDO and MATOS, 1995); *Hoplias malabaricus* showed 6.7% of *H. malabarica* (AZEVEDO and MATOS, 1996); farmed *Piaractus mesopotamicus*, *Colossoma macropomum* and hybrid tambacu (*P. mesopotamicus* male x *C. macropomum* female), showed respectively 97.3%, 33.3% and 5.6% *H. piaractus* infection (MARTINS *et al*., 1999b); *Moenkhausia oligolepis* showed 28% *H. testicularis* infection (AZEVEDO *et al*., 1997). More recently, ADRIANO (2004) reported 48.3% prevalence of *Henneguya* sp. 1 in *Prochilodus lineatus*, 8.3% of *Henneguya* sp. 2 in *P. mesopotamicus* and 45% of *H. piaractus* in *P. mesopotamicus*. It can be observed that the highest prevalence occurred in farmed fish. Thirty percent of all infected fish in December 2000 exhibited intermediate value regarding parasite prevalence (Table 1) when compared to those observed by the authors above. Further studies must be carried out to evaluate the seasonality of *Henneguya* sp. in *P. maculatus* from other localities. Moreover, we also suggest future studies in the same locality with more sampled fish to improve the significance in analyzing the data and to identify the species of parasite. ADRIANO *et al*. (2002) found higher prevalence of *H. piaractus* and *Henneguya* sp. in *P. mesopotamicus* captured in Rivers Miranda, Aquidauana and Paraguay than the one observed in the Volta Grande Reservoir. Different results must be commented when BARASSA *et al*. (2003) studied *Astyanax altiparanae* from a lake near Campinas, São Paulo State. In this case the authors verified prevalence of *H. chydadea* varying between 80 and 100%.

Based on the morphology of the spores observed in light microscope and interference contrast optics, it is evident that this material belongs to *Henneguya* genus (LOM and ARTHUR, 1989). In this study, cysts in the gills were not observed, differently from *H. pisciforme* (CORDEIRO *et al*., 1983/84), *H. travassosi* (GUIMARÃES and BERGAMIN, 1933) and *H. leporinicola* (MARTINS *et al*., 1999a) infection, where the presence of cysts was detected. Despite the similarity of polar capsule width and length of caudal appendages of *H. adherens* (AZEVEDO and MATOS, 1995), the present description showed different spore width, polar capsule length and coils of polar filament. Moreover, spore length, distance from anterior extremity, length of caudal appendages and the presence of cyst in *H. pisciforme* (CORDEIRO *et al*., 1983/84) were also different in the present report. Once more, despite the similarity in total length and tail length of *H. hoimba* (CORDEIRO and GIOIA, 1987), this paper showed the lowest measures of spore length and spore width, as well as yet lower spore length and total length when compared to *H. piaractus* (MARTINS and SOUZA, 1997) and *H. striolata* (CASAL *et al*., 1997). Our specimens displayed lower measurements of total length, spore width and tail length than those found in *Henneguya* sp. From *Pimelodus maculatus* by CORDEIRO *et al*. (1989). The biggest polar capsule and spore length were noted when compared to *H. leporinicola* (MARTINS *et al*., 1999a). When analyzing our parasite against *Henneguya* sp 2 (ADRIANO, 2004), there was only similarity in tail length.

Finally, the present description differs from *H. postexilis*, *H. exilis* (MINCHEW, 1977), *H. bopeleti* (FOMENA and BOUIX, 1987) and *H. ghaffari* (ALI, 1999) in all measurements; from *H. waltairensis* (NARASIMHAMURTI and KALAVATI, 1975), *H. sebasta* (MOSER and LOVE, 1975), *H. doori* (CONE, 1979) and *H. theca* (KENT and HOFFMAN, 1984) in spore morphology. On the other hand, *H. shaharini* (SHARIFF, 1982) and *H. mystusia* (SARKAR, 1985) collected respectively from *Oxyeleotris marmoratus* in

Malaysia and *Mystus* sp. in India presented similar shape but differed in spore width, polar capsule length and caudal appendage length.

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