

PREVALENCE AND HISTOPATHOLOGY OF
Neoechinorhynchus curemai NORONHA, 1973
(ACANTHOCEPHALA: NEOECHINORHYNCHIDAE) IN
Prochilodus lineatus VALENCIENNES, 1836 FROM
VOLTA GRANDE RESERVOIR, MG, BRAZIL

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ABSTRACT

The present work studied the prevalence and histopathology of *Neoechinorhynchus curemai* Noronha, 1973 (Acanthocephala: Neoechinorhynchidae) from curimatá, *Prochilodus lineatus* Valenciennes, 1836. Eighteen fishes with averages of 46.7 ± 1.1 cm length and $1,674.8 \pm 75.6$ g weight were collected with net, bimonthly from December 1995 thru December 1996 in the hydroelectric power station of Volta Grande Reservoir (Cemig), Minas Gerais, Brazil. From analysed fishes, 15 were infected with acanthocephalans in the intestine (prevalence 83.3%). The greatest mean intensity occurred in August 1996 with 66.5 (16 to 208) parasites. Histopathological analysis showed complete desquamation of the intestinal epithelium with severe hyperplasia and hypertrofia of the goblet cells. Severe inflammatory reaction at the submucosa, displacement of their sheaf, associated with oedema and mononuclear and eosinophilic infiltration were observed.

Key words: Acanthocephala, *Neoechinorhynchus curemai*, histopathology, *Prochilodus lineatus*, Minas Gerais, Brazil.

RESUMO

**Prevalência e histopatologia de *Neoechinorhynchus curemai* Noronha, 1973
(Acanthocephala: Neoechinorhynchidae) em *Prochilodus lineatus* Valenciennes, 1836 do
Reservatório de Volta Grande, MG, Brasil**

O presente trabalho estudou a prevalência e a histopatologia de *Neoechinorhynchus curemai* Noronha, 1973 (Acanthocephala: Neoechinorhynchidae) em curimatá, *Prochilodus lineatus* Valenciennes, 1836. Dezoito peixes com comprimento total médio de $46,7 \pm 1,1$ cm e peso médio de $1.674,8 \pm 75,6$ g foram coletados com rede, bimestralmente, de dezembro de 1995 a dezembro de 1996 na usina hidrelétrica do Reservatório de Volta Grande (Cemig), Minas Gerais, Brasil. Dos peixes analisados, 15 estavam infectados com acantocéfalos no intestino (prevalência de 83,3%). A maior intensidade média ocorreu em agosto de 1996, com 66,5 (16 a 208) parasitos. A análise histopatológica revelou completa descamação do epitélio intestinal com severa hiperplasia e hipertrofia das células caliciformes. Observou-se, ainda, forte reação inflamatória na submucosa, deslocamento de feixes, associado a edemas, bem como infiltração mononuclear e eosinofílica.

Palavras-chave: Acanthocephala, *Neoechinorhynchus curemai*, histopatologia, *Prochilodus lineatus*, Minas Gerais, Brasil.

INTRODUCTION

Observations about taxonomy on *Neoechinorhynchus curemai* Noronha, 1973 were carried out by Noronha (1973, 1984), Kohn *et al.* (1985) and Martins *et al.* (2000). Nothing is known related to seasonality, prevalence or histopathology of such species. Prevalence or seasonality studies in Brazilian freshwater fishes are scarce. Muzzal (1980), Lassiere & Crompton (1988), Amin & Vignieri (1986) and Amin (1986) related prevalence and seasonality of acanthocephalan. Recently, in Brazil, Brasil-Sato & Pavanelli (1999) studied an ecological and reproductive aspects of *N. pimelodi* from *Pimelodus maculatus* of the São Francisco River, Minas Gerais. From histopathology, Esch & Huffines (1973) related reduced villus size by mucosal erosion, fibrosis and eosinophilic infiltration in smallmouth bass, *Micropterus dolomieu* infected with the acanthocephalan *Leptorhynchoides thecatus*. Nevertheless, Amin & Heckmann (1992) observed obstruction, compression of villi, including some inflammatory response and haemorrhages in the intestinal epithelium of *Catostomus columbianus*. Necrosis, macrophages, collagenous fiber production were related by the authors at the point of proboscis attachment. The unique histopathological investigation performed in Brazil was from pacu, *Piaractus mesopotamicus* in Pirassununga, SP (Ferraz de Lima *et al.*, 1990), parasitized with *Metechinorhynchus jucundus* that included an inflammatory reaction with mononuclear cells and haemorrhages in the intestinal epithelium.

The present work describes for the first time prevalence and histopathology of *N. curemai* from curimatá, *Prochilodus lineatus* collected in the Volta Grande Reservoir, MG, Brazil.

MATERIAL AND METHODS

The present work is part of an accord between Aquaculture Center of Unesp and hydroelectric power station of Volta Grande Reservoir (Cemig), MG, Brazil that relates parasites fauna of their fish. The reservoir has an inundated area of 195 km². Eighteen specimens of curimatá, *Prochilodus lineatus* Valenciennes, 1836 (Osteichthyes: Prochilodontidae) were collected bimonthly with the aid of a net from December/1995 through December/1996. Acanthocephalans were carefully collected on Petri dishes with distilled water, re-

frigerated and fixed in AFA for 24 hours to posterior storage in alcohol 70% for count. For histopathological analysis parasitized tissue were fixed in 10% buffered formalin and embedded in paraffin-block, sectioned (6 mm) and stained with haematoxylin-eosin. Prevalence (number of infected host/number of examined host) and mean intensity (total number of parasite/number of infected host) were calculated according to Bush *et al.* (1997).

RESULTS

From 18 collected specimens of *P. lineatus*, 15 presented acanthocephalans in the intestine showing a prevalence of 83.3%. Fishes were present only in August/96, October/96 and December/96 samples. Prevalence of acanthocephalans in those three months was 83.3% (Table 1). However, the higher mean intensity was observed in August (66.5) varying from 16 to 208 helminths. Relation between number of parasites and fish size was not related. Although the acanthocephalans were present in three collecting months the higher pluviosity was observed in December/96 (Fig. 1).

Histopathological analysis showed complete desquamation of the epithelium of intestinal mucosa. In the intestinal lumen it was present cell debris and parasite structures (Figs. 2 and 3). Severe hyperplasia and hypertrofia of the goblet cells were observed (Fig. 4). Nevertheless, a severe inflammatory reaction at the submucosa, displacement of their sheaf, associated with oedema and mononuclear and eosinophilic infiltration were the host responses (Fig. 5).

DISCUSSION

In Brazil, the endoparasitic infections of cultivated fish has a little importance while ectoparasites may cause significant mortality as related by Martins (1998) and Pavanelli *et al.* (1998). The present work, is one of a sequence of papers reporting parasites of fishes collected from Volta Grande Reservoir. In *Plagioscion squamosissimus* from this Reservoir, Martins *et al.* (1999) observed the highest prevalences of larvae of *Diplostomum* sp. (Diplostomatidae) from the eyes, in April, June and August/96. Nevertheless, Martins *et al.* (2000) related the highest prevalences of larvae of *Thynnascaris* sp. (Anisakidae) from the mesentery

of fish, in December/95, February, October and December/96.

During a period of 1 year, 15 out of 18 specimens of *P. lineatus* showed acanthocephalans in the intestine with a prevalence of 83.3%. Nevertheless, only in August, October and December fish were present in nets.

Similar prevalence of 75% was reported by Muzzal (1980) from *C. commersoni* infected with *N. cristatus*. By the other hand, an amplitude of variation about 1% to 100% prevalence of *N. cylindratus* in a several fish species in the Silver Lake and Tichigan Lake at South-eastern Wisconsin was observed (Amin, 1986).

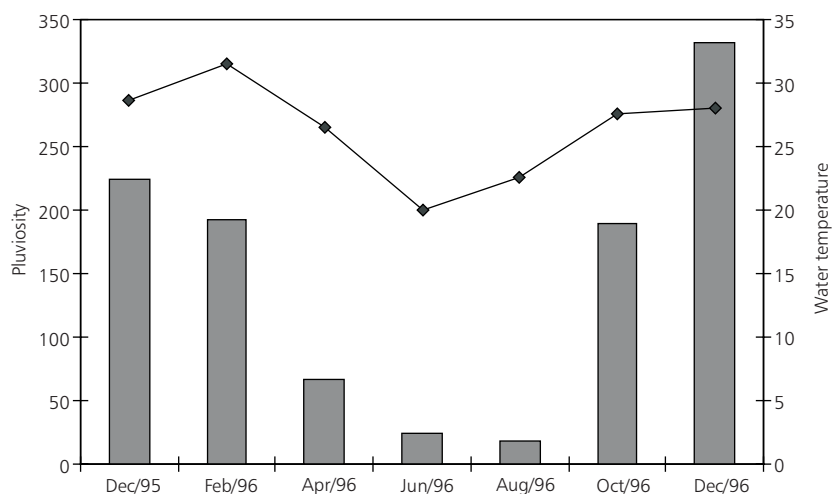


Fig. 1 — Pluviosity (mm) and water temperature (°C) in the Volta Grande Reservoir during the collecting period of December/1995 to December/1996. Bar: pluviosity; Line: water temperature.

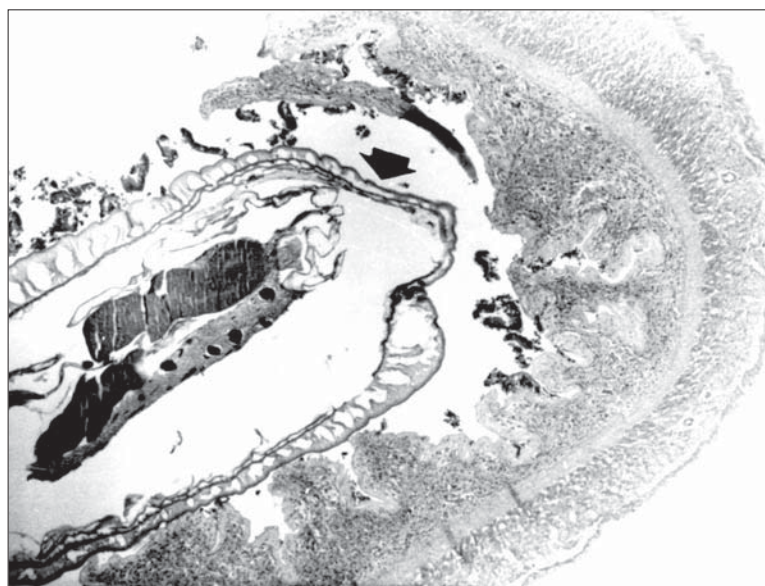


Fig. 2 — Histopathological analysis showing *Neoechinorhynchus curemai* in the intestinal lumen of *Prochilodus lineatus*. Haematoxylin-eosin, 60x.

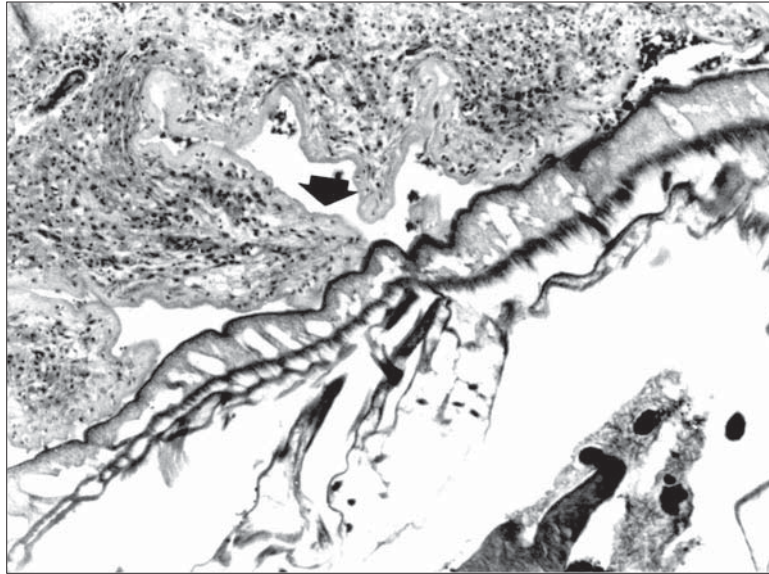


Fig. 3 — A complete desquamation of the intestinal epithelium of *Prochilodus lineatus* infected with *Neoechinorhynchus curemai*. Haematoxilin-eosin, 150x.

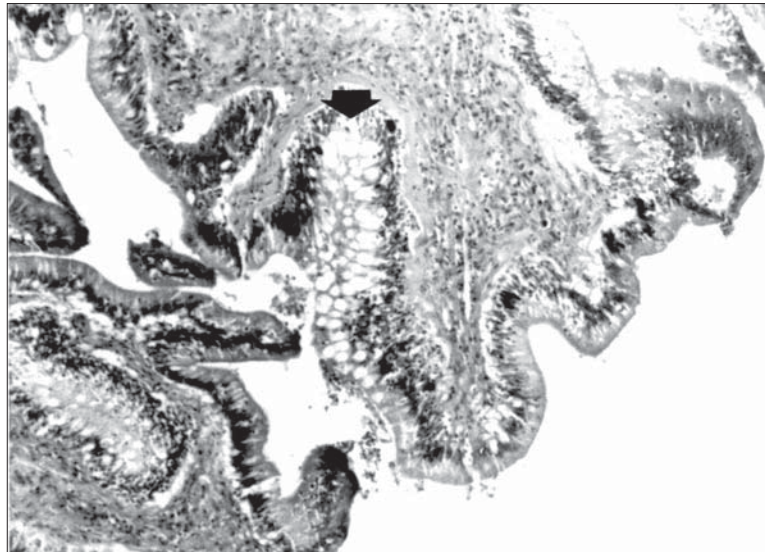


Fig. 4 — Hyperplasia and hypertrofia of the goblet cells of the intestinal epithelium of *Prochilodus lineatus* infected with *Neoechinorhynchus curemai*. Haematoxilin-eosin, 150x.

Nevertheless, Lasee (1989) related 47% prevalence of *N. pungitius* from brook stickleback collected in the Sioux Creek, Wisconsin. In Brazil, Brasil-Sato & Pavanelli (1999) observed 39.3% prevalence of *N. pimelodi* from *P. maculatus* during the studied period in the São Francisco River, Mi-

nas Gerais State. In the present work, it was difficult to verify seasonality of *N. curemai* due to the presence of fish in only three months (August, October and December).

This is the first record about histopathology of the *P. lineatus* infected with *N. curemai*.

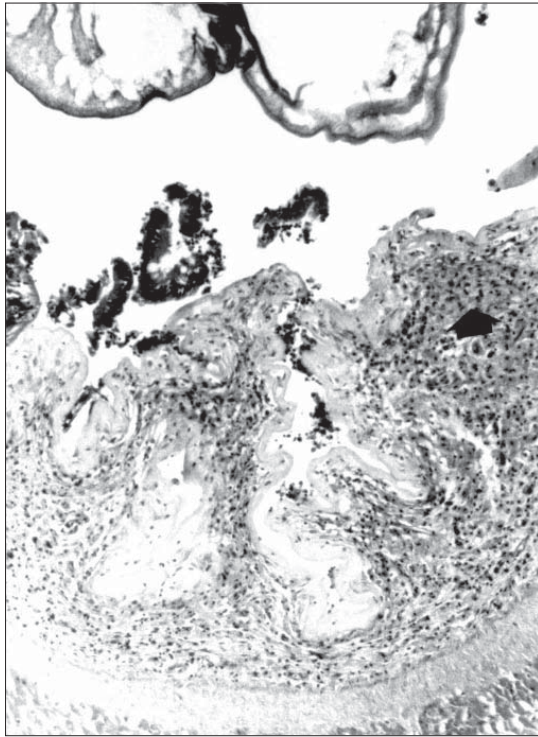


Fig. 5 — Inflammatory reaction at the submucosa associated with oedema and mononuclear and eosinophilic infiltration of the intestinal epithelium of *Prochilodus lineatus* infected with *Neoechinorhynchus curemai*. Haematoxylin-eosin, 150 x.

In Brazil, a brief description of the histopathological aspects caused by *M. jucundus* in pacu (*P. mesopotamicus*) was performed by Ferraz de Lima *et al.* (1990). Those authors observed an

inflammatory foci of mononuclear cells and haemorrhages in the intestine. In addition, the present study showed complete desquamation of the epithelium of the intestinal mucosa. Severe hyperplasia and hypertrofia of the goblet cells were also observed. Moreover, a severe inflammatory reaction at the submucosa, displacement of their sheaf, associated with oedema and mononuclear and eosinophilic infiltration were the host responses.

When Esch & Huffines (1973) studied the tissue reaction of *M. dolomieu* infected with *L. thecatus* the deep penetration of the acanthocephalan proboscis showed fibrosis and eosinophilic granulocytosis as observed in the present work. Moreover, the authors commented that heavy parasitism with other parasites larvae (plerocercoids of *Proteocephalus ambloplitis*) may contribute to the reduction in reproductive potential. The presence of a great number of helminths may cause inapetence and susceptibility to secondary infection by fungus and bacteria. This is specially true when the analysis of cultured fish is performed (Hedrick, 1998; Martins, 1998).

Intestinal obstruction, compression of villi, haemorrhages, presence of macrophages and fibroblasts were tissue changes related by Amin & Heckmann (1992) from *C. columbianus* infected with *N. idahoensis*. This confirmed the present data in which the proboscis attachment provoked the host tissue response. In spite of the presence of a great number (208) of *N. curemai* in the intestine of *P. lineatus* it was not observed cell necrosis as caused by *N. idahoensis* infection.

TABLE 1
Mean values of total length and weight of fishes, number of *Neoechinorhynchus curemai* and prevalence in *Prochilodus lineatus*, from December 1995 to December 1996.

Month	CF/IF	FL (cm)	W (g)	TNP	MI (R)	P (%)
Dec/95	0/0	0	0	0	0	0
Feb/96	0/0	0	0	0	0	0
Apr/96	0/0	0	0	0	0	0
Jun/96	0/0	0	0	0	0	0
Aug/96	6/5	45.3	1,592.6	334	66.5 (16-208)	83.3
Oct/96	6/5	48.1	1,775.1	119	23.8 (1-77)	83.3
Dec/96	6/5	46.7	1,656.8	149	29.8 (3-83)	83.3

(CF/IF) collected fish/infected fish; (FL) fish length; (W) fish weight; (TNP) total number of collected parasite; (MI) mean intensity and range (R); (P) prevalence.

However, future studies must be done with acanthocephalan infection in the native and cultured Brazilian fish to evaluate other possible tissue changes, population dynamics and the consequences of the parasite to the host reproduction.

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