

Tissue Level Reactions in the Indian Major Carp, *Catla catla* (Ham.), Due to *Myxobolus* sp. Infections

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Abstract

Pathoanatomical and histopathological observations of some vital organs of the catla, *Catla catla* (Ham.), affected by *Myxobolus* sp. infection resulting in mass mortality (100%) are reported. *Myxobolus* sp. cysts of varying sizes were found on the gills and in the kidneys of infected fish. Larger cysts were located at the distal end of the gill filaments while smaller developing ones were found at the proximal end, where they were surrounded by flattened epithelial cells. Although restricted, infection damaged the respiratory surface of the gills and the excretory tubules of the kidneys. Highly infected gill filaments appeared to consist of closely packed cysts surrounded by hyperplastic host epithelium. Presence of cysts in the kidney resulted in degeneration and necrosis of the renal tubuli and glomeruli. Mortality occurred between midnight and early morning and within five days of initial mortality all catla died.

Introduction

In recent years, frequent mass mortalities of fishes due to infections by pathogenic organisms in culture fishery operations have caused much concern to fish culturists throughout the world. The extent of damage caused by Myxosporidia, the pathogenic protozoans and the concomitant changes effected in carp were highlighted by Lom and Dykova (1981).

Several workers have studied the pathology of gill infections in recent years (Shulmann 1957; Minchew 1972; McCraren et al. 1975;

Lom et al. 1976). *Myxobolus* cysts from the gills of mullets in Israel and cyprinids in Ghana have been reported by Sarig (1971). Sanaullah and Ahmed (1980) from Bangladesh have reported a number of cases of mass mortalities of the fingerlings of Indian major carp, *Catla catla* (Ham.) due to *Myxobolus* spp. infection. Yunchis (1981) has indicated various factors promoting myxosporidian infection in fish.

Although adequate literature is available on the systematics and taxonomy of the Myxosporidia in India (Tripathi 1957; Kalavati et al. 1981), very little information is available on the biology of these parasites in Indian cultivable carps and their effects on the hosts. Mishra et al. (unpublished data) observed the presence of myxosporidian parasites in the kidneys of major carps. However, the present observations on the mass mortality of *Catla catla* due to *Myxobolus* sp. infection furnish for the first time the tissue level reactions caused by the parasite to cultivable carps in India.

Materials and Methods

Diseased specimens of *Catla catla* were collected during mid-January 1984 from the pond of a private fish culturist under the Institute's 'Lab-to-Land' program in Pubashasan village (Puri district). A thorough pathoanatomical examination of the infected carps was made and fresh tissues of kidney, liver, heart, brain and gill were fixed in Bouin's fluid and processed for histopathological studies. Paraffin-embedded sections (5-7 μ m thick) of the tissues were cut by a rotary microtome, stained with hematoxylin and eosin (H & E), and photomicrographs of the stained preparations taken.

Observations

The infected specimens brought to the laboratory were highly emaciated, weak and stunted. Their gills, having a thick coat of slime, were very pale in color with a number of white and opaque cysts mostly spherical but sometimes elongated. The cysts were 2-5 mm in diameter and their squash preparations showed numerous characteristic spores of *Myxobolus* sp. *Myxobolus* cysts were also found in squash preparations of kidney but not of liver, heart or brain of the infected carps. *Myxobolus* sp. infection was noticed only in *Catla catla* fingerlings (15-20 cm) although fingerlings of comparable

sizes of *Labeo rohita*, *Cirrhinus mrigala*, *Hypophthalmichthys molitrix* and *Cyprinus carpio* were also present in the pond. The fact that other species in the pond were healthy and that zooplankters, the preferred food item of catla, were available in the pond precludes emaciation due to malnutrition. Mortality of *Catla catla* fingerlings was observed to occur between midnight and early morning and within five days of the initial mortality all the catla stocked in the pond died.

A section through the anterior part of two heavily infected gill lamellae revealed the presence of larger cysts of the parasite in the distal and smaller ones in the proximal parts of the filaments (Fig. 1). The smaller developing cysts were found at the tips of the secondary lamellae being surrounded by flattened epithelial cells. In heavy infestation, microscopic cysts were found to occupy almost the whole length of the secondary gill lamellae and as such the highly infected gill filaments appeared to consist of closely packed cysts surrounded by hyperplastic host epithelium (Fig. 2). Intralamellar cysts were also found occasionally within the cartilage of gill filaments (Fig. 3). Kidney histopathology due to *Myxobolus* sp. infection revealed the presence of a large number of cysts of the parasite in various stages of development resulting in varying degrees of degeneration and necrosis of the renal tubuli and glomeruli (Fig. 4).



Fig. 1. Photomicrograph of a section through the anterior portion of two infected gills of *Catla catla* with cysts of *Myxobolus* sp. attached to the lamellae (H&E stain). (x 120)

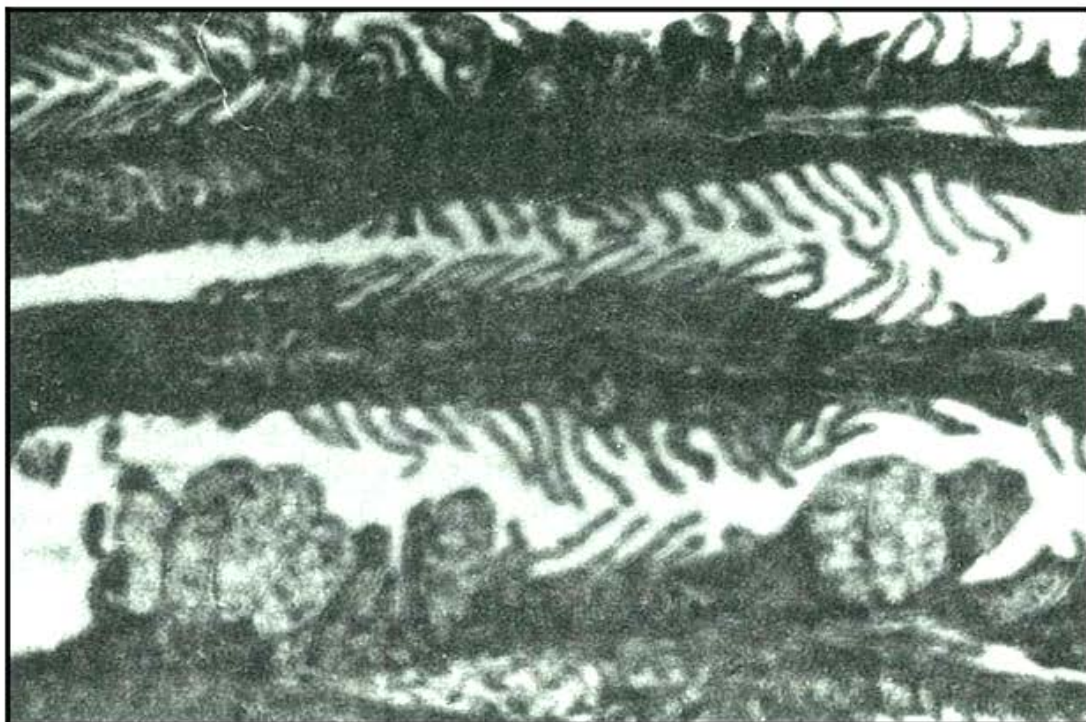


Fig. 2. Photomicrograph of a section through anterior portions of three gill filaments of *Catla catla* showing early stages of *Myxobolus* sp. infection in the uppermost, uninfected middle and advanced stages of infection in the lowermost gill filament (H&E stain). (x 120)

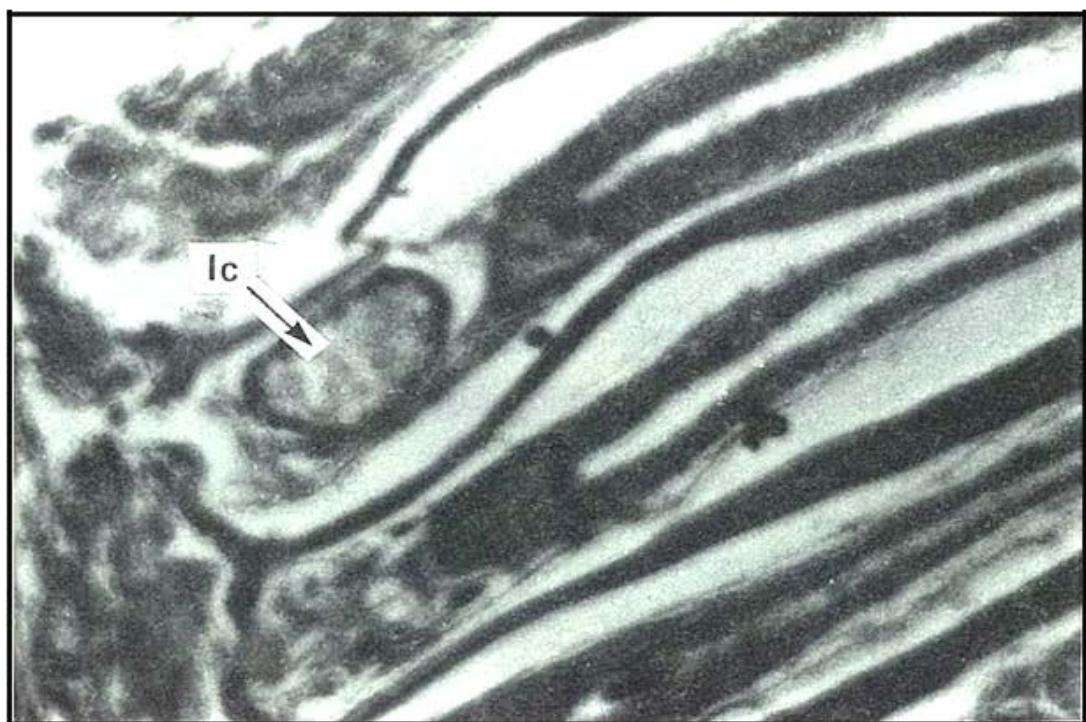


Fig. 3. Photomicrograph of a section of gill filaments of *Catla catla* showing an intrafilament cyst (Ic) of *Myxobolus* sp. in one (H&E stain). (x 120)

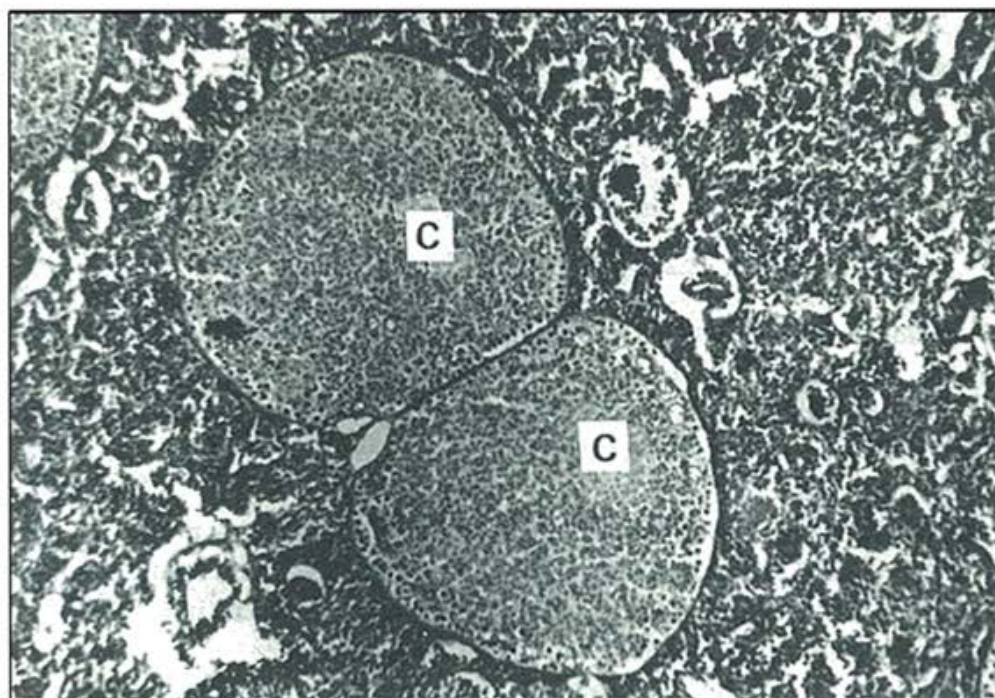


Fig. 4. Photomicrograph of a section of kidney of *Catla catla* showing two large cysts (C) of *Myxobolus* sp. and degenerated renal tubuli and glomeruli (H&E stain). (x 120)

Conclusions

The present histopathological observations on the effects of *Myxobolus* sp. infection in the gills of *Catla catla* are similar to those described by Dykova and Lom (1978) and McCraren et al. (1975). Total mortality of *Catla catla* fingerlings alone in the pond suggests that the parasite involved might be specific to *Catla catla* only.

That fish mortality occurred from midnight to early morning suggests that depletion of oxygen in the pond water during early hours coupled with reduction of respiratory surface area of the secondary gill lamellae due to parasitic infection resulted in greater respiratory stress on the fishes which could not be withstood because of their poor health. Sanaullah and Ahmed (1980) reported similar observations in Bangladesh.

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