NOTE

Effects of gryporhynchid metacestodes (Cestoda: Cyclophyllidea) in common carp (Cyprinus carpio) from Mozambique

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Abstract
Larvae of two species of gryporhynchid tapeworms were found in common carp (Cyprinus carpio) collected in Mozambique, Africa. Metacestodes of Parvitaenia samfya were recovered encysted in a fibrous coat rich on collagen fibres in the mucosa of the intestinal wall. Larvae of unidentified species of Cyclustera, closely resembling C. magna, were encysted by a thin fibrous coat in the liver causing necrosis and hyperaemia in the adjacent tissue. The levels of infection by P. samfya were high attaining a maximum of 600 metacestodes. Higher infection levels were observed in smaller fish.

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Larval stages (metacestodes) of Gryporhynchidae Spassky, 1995 (Cestoda: Cyclophyllidea), previously included in the family Dilepididae Railliet & Henry, 1909, are parasites of fresh and brackish water fish and the adults of fish-eating birds (Bona, 1994; Scholz et al. 2004). Most data of known gryporhynchid metacestodes comes from Europe, countries of the former USSR and from Mexico (Scholz and Salgado-Maldonado, 2001; Scholz et al. 2004). Until the study conducted in Mozambique only two gryporhynchids species have been so far reported from Africa.

During a two years study on parasites of Cyprinus carpio L. conducted in Mozambique metacestodes of two gryporhynchid tapeworms, never reported in fish before, were found. These species were identified by Scholz et al. (2008) as Parvitaenia samfya Mettrick, 1967 and a species of the genus Cyclustera Fuhrmann 1901, closely resembling Cyclustera magna (Baer, 1959). The levels of infection, the relationship between infection and host length and condition factor and the histopathological effects caused by these metacestodes in fish host are reported in this paper.

Specimens of the common carp were collected by fishermen in the River Limpopo (24º23’ S; 32º50’E) and in the Lagoon Chuáli (25º03’ S;
32°54′E) located in Mozambique, Africa. All fish were measured in cm (fork length, \( L_f \)), weighed in g (W), and Fulton’s condition factor (K) calculated from 100 \( W / L_f^3 \). Metacestodes were removed and counted. Prevalence, intensity and abundance of infection were determined according to Bush et al. (1997). Differences in length (\( L_f \)), weigh (W) and condition factor (K) between fish from River Limpopo and Lagoon Chuáli were analysed by Mann-Whitney test. Differences in occurrence, intensity and abundance among the two localities were performed by \( \chi^2 \), Mann-Whitney and Median tests respectively. The correlation between occurrence and intensity of infection, and length (\( L_f \)) and condition factor (K) were performed by Spearman’s test (Siegel and Castellan, 1989). For histological studies, samples of infected intestine and liver were fixed in 10% phosphate-buffered formalin, routinely processed, sectioned at 5 μm thick, stained with Mallory and examined by light microscope.

Data on length (\( L_f \)), weight (W) and condition factor (K) are presented in Table 1. Common carp from River Limpopo and Lagoon Chuáli are not significantly different in length (Mann-Whitney, P >0.05) and weight (Mann-Whitney, P >0.05) but condition factor was significantly different (Mann-Whitney, P <0.05) showing higher values in carps from River Limpopo.

Data on the prevalence, intensity and abundance of *P. samfya* are presented in Table 2. Significant differences were not detected in the occurrence (\( \chi^2 \), P > 0.05), intensity (Mann-Whitney, p > 0.05) and abundance (\( \chi^2 \), P > 0.05) of infection in the two localities. From all studied relationships only a significant negative correlation was found between the intensity of infection and length (n = 40, p <0.05).

Encysted *P. samfya* metacestodes were observed in the lamina propria of the intestine mucosa causing a chronic inflammatory reaction that consists of a fibrous coat rich on collagen fibres (Figure 1). Sometimes more than one metacestode was observed in each cyst.

<table>
<thead>
<tr>
<th>Table 1. Fork length (( L_f )), weight (W) and Fulton’s condition factor (K) (mean ± S.D. and range) of all examined fish, fish from River Limpopo (RL) and Lagoon Chuáli (LC).</th>
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<tr>
<td>Fish examined (n)</td>
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<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>( L_f ) (cm)</td>
</tr>
<tr>
<td>W (g)</td>
</tr>
<tr>
<td>K</td>
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Five *Cyclustria* sp. metacestodes were detected in 2 fish from the River Limpopo. *Cyclustria* sp. metacestodes were encysted in the connective...
tissue of liver capsule. A thin fibrous coat surrounds the parasite and necrosis and hyperaemia were observed in the adjacent tissue. Inside the cyst the metacestode were surrounded by necrotic tissue (Figure 2).

Larval parasites are common on fish viscera and musculature causing in general more deleterious effects in host tissues than adults (Roberts, 2001; Woo, 2002). Developmental stages of cestodes have been associated with mortalities on wild and farmed fish (Bruno and Poppe, 1996) but there are very few reports about the effects of gryphorynchid metacestodes on their hosts. Körting (1984) reports haemorrhage, necrosis and cellular host reaction in the intestine of carp and tench infected with unidentified gryporhynchid metacestodes. Molnár (2005) detected metacestodes of Neogryporhynchus cheilancristrotus (Wedl, 1855) in direct contact with the lamina propria of the intestine of the fish examined (n)

<table>
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<tr>
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<th>Total (401)</th>
<th>RL (201)</th>
<th>LC (200)</th>
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<tbody>
<tr>
<td>Prevalence (%)</td>
<td>10.0</td>
<td>10.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Intensity</td>
<td>70.3±139.4</td>
<td>103.4±181.0</td>
<td>31.4±30.5</td>
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<td></td>
<td>(1-600)</td>
<td>(1-600)</td>
<td>(3-102)</td>
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<tr>
<td>Abundance</td>
<td>7.0±48.4</td>
<td>11.3±67.0</td>
<td>2.7±12.3</td>
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Figure 1. Section of intestine of common carp with metacestode of Parvitaenia samfya encysted by a fibrous coat of collagen fibers in the lamina propria of the mucosa.

Table 2. Prevalence, intensity and abundance (mean ± S.D. and range) of Parvitaenia samfya detected in all examined fish and fish from River Limpopo and Lagoon Chuáli.
gibel carp, *Carassius gibelio* (Bloch) causing degeneration and inflammation of the surrounding tissues. In Africa there are several reports of gryporhynchid metacestodes in freshwater fish, especially tilapias (Bray, 1974; Aloo, 2002; Scholz et al., 2004) but the effects of these parasites in the host are not referred. In the present study it was observed that both species of parasites cause a chronic inflammatory reaction in host tissues and *P. samfya* metacestodes do not cause detrimental effects even in the smaller most intensively infected fish. According to the levels of infection observed it seems that *P. samfya*, a species that was detected only once in two species of herons in Zambia, Central Africa (Bona, 1975) and never detected in fishes before may be more largely distributed in African continent than previously thought.

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**References**


