

Seasonality and Histopathology of *Trichodina mola* Mitra and Haldar 2005 a Parasite of Mola Carplet *Amblypharyngodon mola* (Hamilton-Buchanon) from West Bengal, India

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Abstract During an Ichthyoparasitological survey in West Bengal, 134 mola carplet *Amblypharyngodon mola* (Hamilton-Buchanon) were investigated for protozoan ectoparasites. *Trichodina mola* Mitra and Haldar 2005 infecting the gills of the examined fish were isolated. The overall prevalence rate was 65.67%. The highest prevalence was observed in winter. The histopathological study revealed that *Amblypharyngodon mola* heavily infested by *T. mola* exhibited serious lesions such as hyperplasia of the epithelial cells, fusion and necrosis of secondary lamellae.

Keywords *Trichodina mola*, *Amblypharyngodon mola*, Prevalence, Histopathology, India.

Introduction

Trichodinid Ciliophorans are one of the most common and widely dispersed groups of symbionts as parasites

of aquatic invertebrate and vertebrate hosts (Van As and Basson 1989). The taxonomy of Trichodinids is based on the structure and the appearance of the adhesive disc and number and size of its constituents. All of these features can be revealed only by the silver impregnation technique of Klein (Klein 1958). Trichodinids are not well studied in India. Most of the records of trichodinids in India are from West Bengal only. Several new as well as erstwhile described species belonging to the genera *Trichodina* Ehrenberg, 1838, *Paratrichodina* Lom, 1963, *Trichodinella* (Raabe 1950) Šramek-Hušek, 1953, *Dipartiella* (Raabe 1959) Stein, 1961 have so far been reported (Mitra and Bandyopadhyay 2005, 2006a, b; 2009, Mitra et al. 2012a, b; 2013).

Trichodina mola was originally described from gills of mola carplet *Amblypharyngodon mola* (Hamilton-Buchanon) from west Bengal by Mitra and Haldar (2005). However, the pathogenicity of this trichodinid ciliophoran was not described earlier.

The present study reports the presence of *Trichodina mola* on the gills of *Amblypharyngodon mola* (Hamilton-Buchanon) in some ponds of Ranaghat, West Bengal. The objectives of the present paper are to provide morphological description of *T. mola*; evaluation of the seasonal prevalence rate in fish; evaluation of histopathological changes caused by the ciliate.

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Materials and Methods

Specimens were collected from the local fishermen collected from various ponds where other carps are cultured commercially in Ranaghat of West Bengal. Gill and skin smears were made on grease free slides at the river side. Slides containing trichodinid ciliophorans were impregnated using Klein's dry silver impregnation technique (Klein 1958). Examinations of prepared slides were made under an Olympus research microscope (Model CH 20i) at 1000X magnification with an oil immersion lens and photographs were taken with an Olympus digital camera. All measurements are in micrometers and follow the uniform specific characteristics as proposed by Lom (1958), Wellborn (1967) and Arthur and Lom (1984). In each case minimum and maximum values are given, followed in parentheses by arithmetic mean and standard deviation. In the case of denticles and radial pins, the mode is given instead of the arithmetic mean. The span of the denticle is measured from the tip of the blade to the tip of the ray. Body diameter is measured as the adhesive disc plus border membrane. The description of denticle elements follows the guidelines of Van As and Basson (1989). Sequence and method of the description of denticle elements follows the recommendations of Van As and Basson (1992).

Results and Discussion

Morphology

Trichodina molae Mitra and Haldar 2005 (Figs. 1. A-F, Table 1)

Medium-sized trichodinid. Concave adhesive disc bears dark central area. The denticulate ring consists of uniquely shaped denticles. Blade broad, almost semilunar, occupies most area between y-axes. Distal margin of blade flat; slightly rounded and remains in close proximity to border membrane. Tangent point rounded, situated lower than distal point of distal surface. Anterior margin slopes down gradually to form inconspicuous apex that almost touches and rarely extends beyond y + 1 axis. Blade apophysis not visible. Posterior margin of blade forms shallow curve, deepest point of which remains at same level

Table 1. Morphometric measurements of *Trichodina molae* Mitra and Haldar 2005 obtained from *Amblypharyngodon mola* (Hamilton-Buchanan).

Species	<i>T. molae</i> Mitra and Haldar 2005
Host	<i>Amblypharyngodon mola</i>
Locality	Ranaghat, India
Location	Gills
References	Mitra and Haldar (2005)
Diameter of body	32.3-40.7 (36.2 ± 2.7, 20)
Adhesive disc	27.6-32.9 (30.1 ± 2.0, 20)
Dimension of body	
Denticulate ring	12.9-23.8 (18.7 ± 1.6, 20)
Central area	2.6-4.4 (3.1 ± 0.7, 20)
Clear area	—
Width of the border membrane	2.8-3.9 (3.4 ± 0.6, 20)
Number of denticles	18-20 (20, 20)
Number of radial pins/denticle	6-7 (6.3 ± 0.5, 20)
Dimension of denticle	
Span	7.7-9.9 (8.9 ± 0.7, 20)
Length	3.4-5.2 (4.3 ± 0.6, 20)
Dimension of denticle components	
Length of the ray	4.2-5.3 (4.7 ± 0.3, 20)
Length of the blade	3.4-5.9 (3.7 ± 0.5, 20)
Width of the central part	1.1-3.6 (1.7 ± 0.7, 20)
Adoral ciliary spiral	400-410°

or slightly lower than apex. Blade connection thick. Posterior blade projection not observed. Central part slender, conical, extends halfway past y-1 axis in most cases, and fits tightly into preceding denticle. Sections above and below x-axis similar in shape. Ray apophysis absent. Ray connection narrow. After origin, ray gradually flattens laterally and then terminates with bluntly rounded end to take a spatula shape. Rays directed slightly anteriorly towards y + 1 direction. Macronucleus horseshoe shaped. micronucleus could not be detected.

The denticle morphology and dimensions of *T. molae* recorded in this study are similar to those reported by Mitra and Haldar (2005).

Taxonomic summary

Type host : *Amblypharyngodon mola* (Hamilton-Buchanan)

Type locality : Ranaghat (Latitude : 23.17°, Longit-

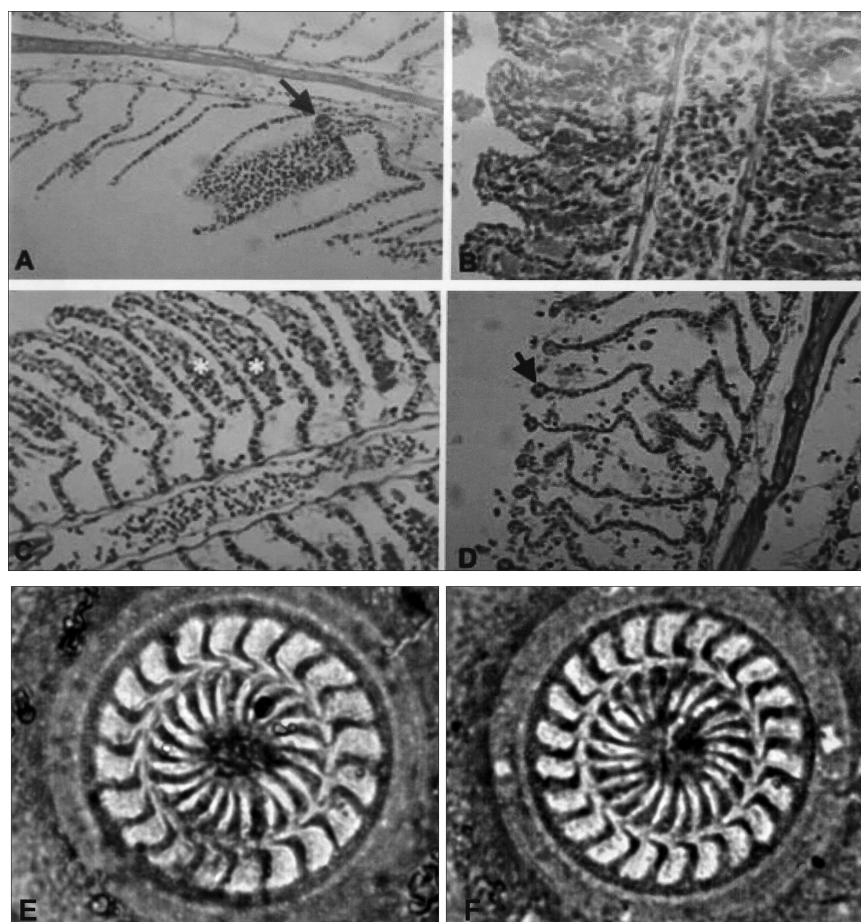


Fig. 1. A-D : Histological sections of infested gills showing the pathological lesions of *Trichodina molae* Mitra and Haldar 2005. A : Fusion of 2 secondary lamellae (*T. molae* indicated by arrow); B : Pronounced hyperplasia in secondary lamellae; C : Degenerative and necrotic changes (*) in the epithelium ; D : Aneurism (arrow) in the apical region of secondary lamellae (x 400 magnification). **Fig. 1. E-F :** Silver impregnate adhesive discs of *Trichodina molae* Mitra and Haldar 2005.

tude : 88.57°), West Bengal, India

Location : Gill filaments

Prevalence : 88/134 (65.67 %)

Parasite seasonal dynamics

The prevalence of *T. molae* are variable with respect to the season. The prevalence increases from 8% in autumn, reaches a peak value of 65.67% in winter and then decreases to 16.7% in summer. It seems that the presence of Trichodinids is closely linked to environmental conditions, particularly to temperature. In this study we noted that the highest prevalence level of *T.*

molae are recorded during winter which correspond to the multiplication season for Trichodinids, while the lowest infestation rate occurred in summer. This is due to the fact that the high temperature of water in summer prevents the proliferation of Trichodinids. It seems that the average temperature of water during winter favors the multiplication of *T. molae*.

Trichodinid histopathology

In the present study, the infestation with *T. molae* caused serious pathological lesions in gills such as proliferation of the epithelium and fusion of second-

ary lamellae, hypertrophy and hyperplasia, degenerative and necrotic changes in the epithelium of secondary lamellae and aneurysm in the apical region of the secondary lamellae. These pathogenic effects caused by *T. molae* on *Amblypharyngodon mola* are reported for the first time in this study. However, previous researchers have reported similar clinical symptoms (hypertrophy, hyperplasia and fusion of secondary lamellae) in other fish caused by Trichodinids in cases of sever infestation (Pandos & Nigrelli 1942, Davis 1947, Sarig 1971, Hassan 1999).

In conclusion, the *T. molae* parasite of *Amblypharyngodon mola* from cultured ponds of West Bengal, India can become very pathogenic in particular environmental conditions, especially in winter when the temperature was favorable for Trichodinid proliferation. Young fish are affected to a greater degree by this species and are more susceptible than adults.

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