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Thelohanellus imphalensis sp. nov. (Myxozoa) infecting gills of a major carp *Labeo rohita* Hamilton 1822 from Thoubal, Manipur, India

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Summary

A new myxozoan parasite of the genus *Thelohanellus* Kudo, 1933 is described from gills of the cyprinid fish *Labeo rohita* Hamilton,1822 collected from Ikop Lake, Thoubal, Manipur, India. The species is characterised by the presence of a bifurcated tip of polar capsule and an oval sporoplasm, whose upper portion reaches one third of the polar capsule from the basal side.

Key words: Myxozoan, *Thelohanellus imphalensis* sp. nov., *Labeo rohita*, Ikop lake, Manipur

Introduction

Thélohan (1892) included the myxozoans with tailless spores containing one iodinophilous vacuole and one or two polar capsules into the genus *Myxobolus* Bütschli, 1882. Later, Kudo in 1933, separated the unicapsulated species from bicapsulated forms and established a new genus *Thelohanellus* to which unicapsulated *Myxobolus* species were transferred. The genus is characterized by a flattened or pyriform spore with gradually pointed posterior end, single polar capsule located at the anterior end, crescentic sporoplasm with or without an iodinophilous vacuole and a polar capsule sometimes bigger than two third of the size of the spore. Many species of this genus have been recorded from various fishes in diverse geographical localities of the world. In their monograph Lom and Dyková (1992) enlisted as many as 39 species of *Thelohanellus*, but descriptions of most of the Indian species have not been recorded there. In a paper by Basu and Haldar (1999), they listed 28 species of this genus from Indian fishes. But the species from North East India, particularly from Manipur, have not been included. Here we describe a new species from gills of major carp *Labeo rohita* Hamilton 1822 (Cypridae) affected with ulcerative disease syndrome, collected from Ikop Lake, Manipur, India. The species description follows the guideline of Lom and Arthur (1989).

Material and methods

Host fishes of about 10–12 cm in length were bought from local fisherman around Ikop Lake,

brought to the laboratory, and immediately examined for myxozoan parasites. Since no plasmodia were observed, gills were carefully removed with the help of a sterile forceps, smeared on clean grease-free slides and air dried. The air dried smears were stained with Giemsa after fixation with acetone-free absolute methanol. Measurements (based on twenty fresh/stained) were taken with the aid of a calibrated ocular micrometer. All measurements are presented in micrometers. Drawings were made with the help of a Camera lucida. Photomicrograph were taken with CCD camera attached to the computer.

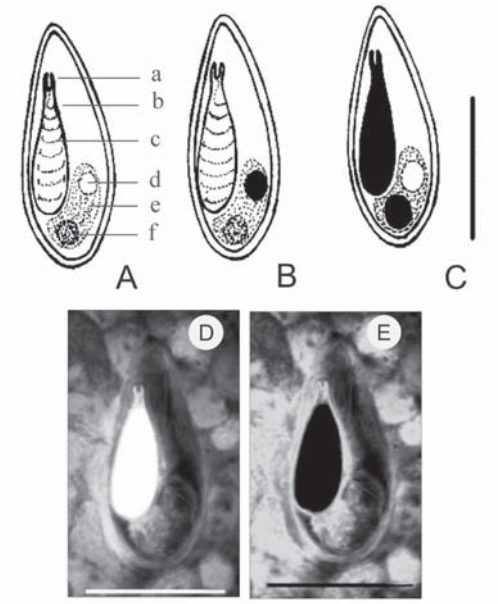
Results

Cyst: Not found. Vegetative stages are not observed.

Spore: Mature spores (Figs A-E) are histozoic and pyriform in shape. The anterior end is tapering while the posterior end is broadly rounded. Spores measure 20.4 – 22.1 μm (21.33 ± 0.755) in length and 8.5 – 10.2 μm (9.43 ± 0.595) in width. The spore valves are moderately thick, smooth and the sutural line is indistinct. No mucus envelope is observed around the spore body. A single pyriform-polar capsule is present inside the spore body which is always located closer to one side of the wall at the central region of the spore (i.e., at the equal distance from anterior and posterior ends). The capsule measures 10.2 – 11.5 μm (10.79 ± 0.389) in length and 3.4 – 4.25 μm (3.78 ± 0.422) in width. At its anterior end the polar capsule is clearly bifurcated (a unique character among *Thelohanellus* spp.); the fork length is about 0.85 – 1.7 μm . Inside the polar capsule the polar filament makes 7 – 8 loose coils.

The posterior part of the spore (extra capsular space) is filled with granular homogenous sporoplasm. Inside the sporoplasm a single iodinophilous vacuole and single nucleus are present. The iodinophilous vacuole is round, measures 0.85 – 1.7 μm in diameter, and located above the nucleus. The nucleus of the sporoplasm is bigger than the iodinophilous vacuole, measuring 1.7 – 2.55 μm in diameter. The sporoplasm is oval in shape, situated towards the basal periphery of the polar capsule and upper portion reaches one third of the polar capsule (Table 1).

Intraspecific variation: The novel species from *Labeo rohita* gills show no distinct variation among the spores. However in some spore populations iodinophilous vacuoles and nuclei inside sporoplasms were not observed. In some cases the polar capsules were located more posteriorly.



Figs A-E. Camera lucida drawings and photomicrographs of mature spores of *Thelohanellus imphalensis* sp. nov. A - Fresh spores in valvular view; B - fresh spore in valvular view (Lugol's Iodine); C - fixed spore in valvular view (Giemsa stained); D-E - photomicrographs of fixed spore in valvular view. *Abbreviations*: a-bifurcated tip of polar capsule; b-polar capsule; c-polar filament; d-iodinophilous vacuole; e-sporoplasm; f-sporoplasmic nucleus. Scale bars = 5μm.

Seasonal variation: The novel species was first collected in September, 2008. It was observed upto the month of November, while in other months it was not observed.

Taxonomic affinities and differential diagnosis: The described species possesses pyriform spores and single polar capsule and thus fits well with diagnostic characters of the genus *Thelohanellus* Kudo, 1933. The species is similar in morphology and/

Table 1. Morphometry of 20 fresh/stained spores of *Thelohanellus imphalensis* sp. nov.

Characters	Range	Mean	SD	SE	CV%
LS	20.4 – 22.1	21.33	0.755	0.168	3.539
BS	8.5 – 10.2	9.43	0.595	0.133	6.309
LPC	10.2 – 11.5	10.79	0.389	0.087	3.605
BPC	3.4 – 4.25	3.78	0.422	0.094	11.164
DIV	0.8 – 1.7	1.19	0.416	0.931	34.95
DN	1.7 – 2.55	1.99	0.405	0.090	11.24

Spore Index:
LS : BS = 1 : 0.442
LPC : BPC = 1 : 0.350
LS : LPC = 1 : 0.505
BS : BPC = 1 : 0.400

Table 2. Comparison of the *Thelohanellus imphalensis* sp. nov. with closely related species of same genus.

Characters	*T. bifurcata*	*T. disporomorphus*	*T. rodgii*	*T. jiroveci*	*T. qadrii*	*T. imphalensis* sp. nov.
LP	30.6 – 39.9 (34.8 ± 2.63)	31.4 – 32.6 (32.6 – 0.43)	*31.0 – 41.0 (34.3)*	*31.0 – 36.1 (35.0)*	*14.3 – 17.1 (14.7)*	*20.4 – 22.1 (21.33 ± 0.755)*
BS	*7.5 – 9.9 (9.2 ± 9.3)*	*8.0 – 9.3 (8.9 ± 0.30)*	*10.0 – 15.0 (11.7)*	*11.1 – 13.0 (13.0)*	*5.0 – 6.0 (5.4)*	*8.5 – 10.2 (9.43 ± 0.595)*
LPC	20.4 – 26.7 (23.3 ± 2.28)	19.8 – 22.4 (21.1 ± 0.87)	15.0 – 20 (16.9)	15.5 – 19.9 (18.4)	7.5 – 8.6 (8.2)	10.2 – 11.05 (10.79 ± 0.389)
BPC	6.1 – 7.5 (6.6 ± 0.41)	7.5 – 8.3 (7.9 ± 0.29)	7.0 – 8.0 (7.6)	5.5 – 7.7 (7.0)	2.9 – 3.9 (3.9)	3.4 – 4.25 (3.78 ± 0.422)
Host	Hybrid *Labeo rohita* x *Catla catla*	*Cirrhinus mrigala*	*Labeo calbasu*	*Labeo bata*	*Labeo potial*	Labeo rohita
Site of infection	Gill	Tail fin	Gill	Branchiae	Gill content	Gill
Reference	Basu and Haldar, 1999	Basu et al., 2006	Hargarfi et al., 1979	Kundu and Haldar, 1981	Lalitha Kumari, 1969	Present paper

or morphometry to *T. bifurcate* Basu and Haldar, 1999 from gills of hybrid carp *Labeo rohita, Catla catla; T. disporomorphus* Basu et al., 2006 from a tail fin of *Cirrhinus mrigala; T. rodgii* Hargargi et al., 1979 from gills of *L. calbasu; T. jiroveci* Kundu and Haldar, 1981 from branchiae of *L. bata*, and to *T. qadrii* Lalitha Kumari, 1969 from gills of *L. rohita*. However the present species differs from *T. qadrii* by larger spore size and bifurcated tip of the polar capsule. It can be differenciated from *T. rodgii* and *T. jiroveci* by smaller spores and polar capsules, as well as by bifurcated tip of the polar capsule, and from *T. bifurcate* and *T. disporomorphus* by the absence of bulbular structure at the posterior end of the spore separated by a notch like structure, characteristic for both latter species. Moreover, these species have much larger spores and polar capsules than the novel species. (Table 2).

By considering the above differences from closely related species of the genus we designate the newly discovered myxozoan parasite as a new speciess *Thelohanellus imphalensis* sp. nov.

Taxonomic Summary

Type material: *Thelohanellus imphalensis* sp. nov.
Type host: *Labeo rohita* (Hamilton).
Type of locality: Ikop pat, Mayang Imphal side (24.675^{0}N, 93.9037^{0}E).
Site of infection: Gills.
Prevalence: 4/220 (1.88%).
Intensity: Not apparent.
Type material: Slides containing holotype (MU/P/Thelo3$_{a-d}$) and paratype (MU/P/Thelo3a-d) were deposited in the collection of Parasitology Section. Life Sciences Department, Manipur University.

Etymology: Species name derived from Imphal, the capital of Manipur.

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