NORTH-WESTERN JOURNAL OF ZOOLOGY 7 (1): pp.1-4
Article No.: 101101

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Myxobolus lalbaghensis sp. n. from a freshwater fish of West Bengal, India

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Received: 24. March 2010 / Accepted: 11. November 2010 / Available online: 16. December 2010

Abstract. *Myxobolus* Bütschli 1882 (Myxozoa, Myxosporea, Bivalvulida, Myxobolidae) is an important parasitic protozoan of freshwater fishes reported from almost all over the world. The severity of infection may lead to mortality of fish host. The present paper deals with the description of a new species of *Myxobolus* Bütschli 1882, *Myxobolus lalbaghensis* sp. n. from a freshwater food fish *Labeo bata* (Hamilton, 1822) from the state of West Bengal, India.

Key words : Myxozoa, *Myxobolus lalbaghensis* sp.n., parasite, fish, India.

Introduction

Numerous descriptions of myxosporeans have been reported in fishes from different geographic areas (Landsberg & Lom 1991, Lom & Dyková 1992). Myxozoa Bütschli 1882 comprises more than 1200 available species commonly found in fishes (Lom & Dyková 1992). Among them, the genus *Myxobolus* Bütschli, 1882, with 744 species described, is the largest group of the Myxobolidae family (Eiras et al. 2005) and has been reported as an important pathogen in fresh water fishes. The genus *Myxobolus* was first established by O. Bütschli and then it included myxozoans having spores with or without an iodinophilous vacuole and with one or two polar capsules (Bütschlii 1882). Presently, the myxozoan spores having two polar capsules, with or without iodinophilus vacuoles and generally two sporogenic nuclei are placed under the Genus *Myxobolus* Bütschli, 1882 (Kudo 1933).

During a survey on the protozoan parasites of fishes, a new species of the Genus *Myxobolus* Bütschli, 1882 has been encountered. The description of the species is given in this paper in accordance with the guidelines of Lom & Arthur (1989) and Lom & Dyková (1992).

Material and Methods

Host fishes were collected from the fish market of Lalbagh in Murshidabad district, West Bengal, India and brought alive to the laboratory where they were kept in the close by vats. Host fishes were examined from time to time. When sporogonic plasmodia were found they were carefully removed with sterile needles, smeared on clean grease free slides with drops of distilled water, covered with cover slips and sealed with DPX for examination of fresh spores under the oil immersion lens of Olympus KH phase contrast microscope. Some of the fresh smears were treated with various concentrations of KOH (2- 10%) for the extrusion of polar filament. The Indian ink method (Lom & Vavrá 1963) was employed for observing the mucous membrane around the spores. Some fresh smears containing the spore were treated with Lugol's Iodine solution for the detection of iodinophilus vacuoles. For permanent preparations, air dried smears were stained with Giemsa stain after fixation in acetone free absolute methanol. Measurements based on 20 fresh spores (stained with both Lugol's Iodine and Giemsa) were made with a calibrated ocular micrometer. All measurements are presented in micrometer (µm) as mean ± SD followed by range in parentheses. Drawings were made on fresh / stained materials with the aid of mirror type camera lucida, and photomicrographs of the stained spores were also taken with the help of an Olympus phase contrast microscope fitted with an Olympus camera.

Results

Spore Description:
***Myxobolus lalbaghensis* sp. n.** (Figs 1-9)

Plasmodia- These were isolated from the gills of the infected fishes. Plasmodia were creamy white in colour and rounded in shape (2-3 mm in diameter). They contain both late developmental stages and mature spores.

Spore - Immature spores are round to ovoid in

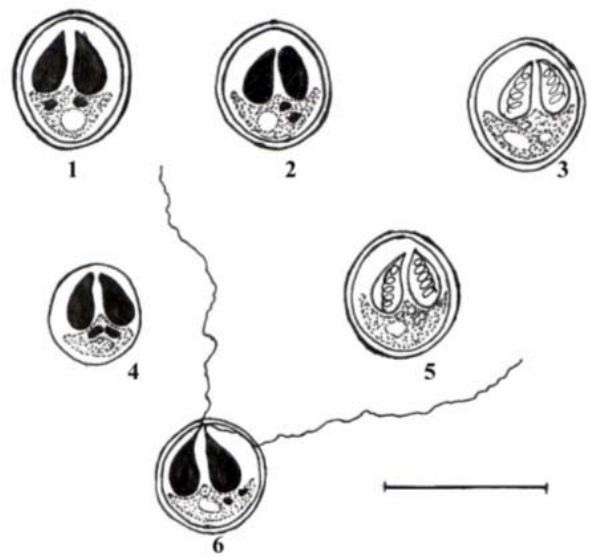

Figure 1-6. Camera lucida drawing of the spore of *Myxobolus lalbaghensis* sp.n. **1, 2**- Mature spore stained in Geimsa; **3, 5** - Mature spore stained with Lugol's Iodine; **4**- Immature spore stained with Geimsa; **6**- Mature spore with extruded polar filament stained with Geimsa; Scale bar: 17 µm.

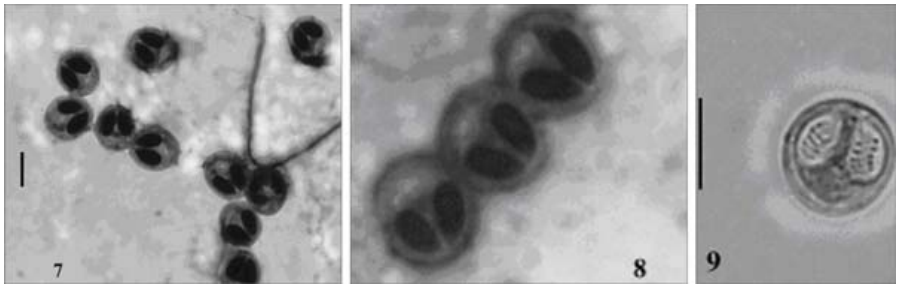

Figure 7-9. Photomicrographs of the stained spores of *Myxobolus lalbaghensis* sp.n. (Scale bar: 17 µm)

shape (Fig. 4). Two polar capsules are pear shaped. Sporoplasm has two nuclei.

Mature spores are ovoidal to rounded in shape in front view (Fig. 1, 2) and sizes of 9.22 ± 1.0 (7.65- 11.9) × 6.8 ± 1.17 (5.1-8.5). Both the anterior and posterior ends are blunt. The two polar capsules are equal in shape [5.185 ± 0.706 (4.25-6.8) × 2.337 ± 0.368 (1.7- 2.55)]. The capsules are pear shaped with anterior tip and blunt posterior end. The polar filament makes 4 – 5 coils which can be prominently observed by staining with Lugol's Iodine (Fig. 3, 5). The polar filaments are thin and extrude out through a single opening at the blunt anterior end of the spore. The length of the extruded polar filament varies from 20.4-22.1µm (Fig. 6). The granular sporoplasm fills the extracapsular region. It contains two sporoplasmic nuclei and one glycogen filled iodinophilus vacuole.

Spore index:

The Table 1 shows the statistical data of the spores. The spore index calculated is as follows:

- Length of the spore (LS): Breadth of the spore (BS) = 1: 0.737
- Length of the polar capsule (LPC): Breadth of the polar capsule (BPC) = 1: 0.45
- Length of the spore (LS): Length of the polar capsule (LPC) =1: 0.562
- Breadth of the spore (BS): Breadth of the polar capsule (BPC) =1: 0.343

Table 1. Statistical analysis of measurement of the spores of *Myxobolus lalbaghensis* sp.n.

Measurement	Range	Mean	SD	SE	CV%
Length of the spore (LS)	7.65 -11.9	9.22	1.08	0.242	11.713
Breadth of the spore (BS)	5.1 – 8.5	6.8	1.17	0.261	17.205
Length of the polar capsule (LPC)	4.25 – 6.8	5.185	0.706	0.157	13.616
Breadth of the polar capsule (BPC)	1.7-2.55	2.337	0.368	0.082	15.746
Diameter of the iodinophilus vacuole (DIV)	1.7 – 2.55	2.337	0.368	0.082	15.746
Diameter of nucleus (DN)	0.85- 1.7	1.204	0.419	0.093	34.8
Length of the polar filament (LPF)	20.4 – 22.1	-	-	-	-

Table 2. Comparison chart between the present species and closely related described species.

Name of species	*M. calcariferum*	*M. carnaticus*		*M. indicum*		*M.anili*	*M. rohitae*	Present study
Length of spore	6.1- 7.1(6.6)	8-9 (8.6)		9.5 -10.8		9.4-11.0 (10.7)	10.4-13.3 (11.2)	7.65-11.9 (9.22)
Breadth of spore	5.7- 6.5(6.2)	6-7 (6.8)		7.5 -8.2		7.9-9.8 (8.6)	8.6-10.7 (9.8)	5.1- 8.5 (6.8)
Length of Polar capsule	3.8-4.5(4.2)	Large 3.5-4 (3.8)	Small 2-3 (2.1)	Large 2.7-3.6	Small 1.8	4.25-6.8 (5.185)	4.7-5.0 (4.8)	6.5-7.8 (7.2)
Breadth of Polar capsule	2.0-2.7(2.3)	2	1-2 (1.5)	Large 1.8	Small 1	1.7-2.55 (2.337)	2.4-3.1 (3.0)	3.5-5 (4.2)
No. of coil	4 -5	-	-	-		4 -5	4 -5	6-9
Host	*Lates calcarifer* (Bloch)	*C. mrigala*		*C. mrigala*		*Rhinomugil corsula*	*L. rohita*	*L.bata*
Site of infection	Gill lamellae	Inner base of the hemibranchs		Scales, liver, intestinal wall		Mesentary	Gill filament	Gill
Reference	Basu and Haldar (2003)	Senappa and Manohar (1980)		Tripathi (1952)		Sarkar (1989)	Haldar,Das, Sharma (1983)	Present study

Taxonomic Summary

Type Material: ***Myxobolus lalbaghensis* sp.n.**

Type Host **-** *Labeo bata* (Hamilton, 1822)

Site of Infection: Gills

Type Locality – Lalbagh, Murshidabad West Bengal, India.

Prevalence: 2/10 (20%)

Type Material

Holotype: Slide LB/2/2009 is deposited in the Parasitology Laboratory of the Department of Zoology, University of Kalyani , Kalyani 741235, West Bengal, India.

Paratype: Slide LB/3/2009, LB/6/2009 are deposited in the Parasitology Laboratory of the Department of Zoology, University of Kalyani , Kalyani 741235, West Bengal, India.

Etymology: The species is named after the type locality, Lalbagh, a historical place of Murshidabad district of West Bengal.

Discussion

Taxonomic affinities

The *Myxobolus* sp. under discussion shows similarities with *M. calcariferum* Basu & Halder, 2003; *M. indicum* Tripathi, 1952; *M. rohitae* Haldar, Das & Sharma, 1983; *M. carnaticus* Seenappa and Manohar, 1980 in having close morphometric data but still there are some differences (Tripathi 1952, Seenapa and Manohar 1981, Haldar et al.1983, Basu & Haldar 2003). The spores of the present form are different from *M. calcariferum* in having iodinophilus vacuole which is absent in *M. calcariferum*. The spores of *M. indicum* have two unequal polar capsules whereas the species under consideration has two equal polar capsules. The species under study has similarities with *M. anili* Sarkar, 1989 in having equal polar capsules, but the major difference is that the iodinophilus vacuole is absent in *M. anili*. It resembles *M. rohitae* Haldar, Das & Sharma, 1983, in shape but the latter one is bigger than the present form. The structure of the polar capsule is also different. It is pear shaped with an anterior neck like structure in

M. rohitae, and pear shaped with pointed anterior tip and blunt posterior end in the present form. Furthermore, the myxozoan species under study closely resembles *M. carnaticus* Seenappa and Manohar, 1980 in both shape and size but presence of an intercapsular ridge and unequal polar capsules distinctly shows their dissimilarity. The detailed comparisons between the present species and closely related described species have been incorporated in Table 2.

Considering all the differences, the *Myxobolus* species obtained from the gills of the freshwater minor carp fish *Labeo bata* (Hamilton, 1822) is new to science and designated as *Myxobolus lalbaghensis* sp.n. in the paper.

Acknowledgements. One of the authors (SB) is thankful to the Department of Science and Technology, Govt. of India, New Delhi, India for financial support to run the project (Project No.ST (WB)/ST/LSR/461)

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