Myxobolus leafa sp. nov. (Myxozoa: Bivalbulida) from the gill filament of Labeo bata (Hamilton) from Manipur, India

Hindistan (Manipur’ı daki Labeo bata Balığının Solungaç Filamentinden Yeni Bir Tür Myxobolus leafa sp. nov. (Myxozoa: Bivalbulida)

ABSTRACT
Objective: The aim of this study was to investigate the gill filaments of Labeo bata in India parasitologically and to describe the new Myxozoa parasite species, Myxobolus leafa sp. nov., which was determined.

Methods: Fish were collected alive from fish farms from Manipur (India). Sporogonic plasmodia were removed with sterile forceps and observed under phase contrast microscope. For permanent preparations, air dried smears were stained with Giemsa after fixation in acetone free absolute methanol.

Results: Mature spores of the new species appear as leaf-like structures in valvular or frontal view, tapering at both ends. The anterior end of the spore is broader than the posterior end. Spores measure 15.3-11.8 µm (16.91±1.16) in length and 13.6-15.3 µm (14.15±0.67) in breadth.

Conclusion: The new gill parasite species, Myxobolus leafa sp. nov., was described from fish in India. The prevalence of the parasite was 3.3% and two stages (cyst and spore) of the parasite existed in its life cycle. (Turkiye Parazitol Derg 2013; 37: 40-3)

Key Words: Myxozoa, parasite, fish, Myxobolus leafa sp. nov., India

ÖZET
Amaç: Bu çalışmanın amacı Hindistan’ı daki Labeo bata balığı gill filamentinin parazitolojik açıdan araştırılarak ve tespit edilen yeni Myxozoa parazit türü olan Myxobolus leafa sp. nov. tanımlamaktır.


Bulgular: Tespit edilen yeni parazit türünün olgun sporları ön Ventralda yaprak benzeridir ve her iki ucunda doğru daralır. Sporların ön ucunda arka ucunda daha genişdir. Sporların uzunluğunda 15.3-11.8 µm (16.91±1.16), genişliği 13.6-15.3 µm (14.15±0.96)’dır.

Sonuç: Hindistan’ı daki balıklardan yeni bir solungaç paraziti Myxobolus leafa sp. nov. tanımlanmıştır. Parazitin yaygınlığı %3.3’tür ve yaşam döngüsünde 2 safha (cist ve spore) mevcuttur. (Turkiye Parazitol Derg 2013; 37: 40-3)

Anahtar Sözcükler: Myxozoa, parazit, balık, Myxobolus leafa sp. nov., Hindistan


Address for Correspondence / Yazıışma Adres: Dr. Gözde Gürelli, Department of Biology, Faculty of Science and Art, Kastamonu University, Kastamonu, Turkey Phone: +90 366 280 19 06 E-mail: ggurelli@yahoo.com
doi:10.5152/tpd.2013.10
INTRODUCTION

Numerous descriptions of myxosporean species of fish have been made from different geographic areas (1, 2). Myxozoa Bütschli, 1882 include more than 1200 valid species commonly found in fish (2, 3). Among them, Myxobolus Bütschli, 1882, with 744 species described, is the largest genus of the family Myxobolidae and has been reported as an important pathogen in freshwater fish (3).

Manipur, located in the Himalayan range, has a rich fish faunal diversity. However, the survival of many indigenous fish species has been hampered with the introduction of many new exotic fish species. This has also given rise to an increase in parasites including myxozoans. Many of these myxosporidians have pathogenic effects on the fish, causing serious damage to various body parts and resulting in heavy economic loss to the fish farmers and also threatening the biodiversity of indigenous fish species.

During a parasitological survey, examinations were conducted on various host fish species, which revealed the presence of a new myxozoan species of the genus Myxobolus from the gill filaments of Labeo bata (Hamilton) collected from a fish farm of Langmeidong, Manipur, India.

METHODS

Host fish of the genus Labeo bata (Hamilton) were collected alive from fish farms of Langmeidong, brought to the laboratory and examined immediately. Sporogonic plasmodia, when found, were carefully removed with sterile forceps, smeared on clean grease free slides with drops of 0.5% NaCl solution, covered with cover slips and sealed with bee wax for examination under the oil immersion lens of the Olympus CH2 phase contrast microscope. Some of the fresh smears were treated with various concentrations (2-10%) of KOH solution for the extrusion of polar filaments. The Indian ink method of was employed for observing the mucous envelope of spores (4). For permanent preparations, air dried smears were stained with Giemsa after fixation in acetone free absolute methanol (5). Measurements (based on twenty fresh spores treated with Lugol’s iodine) were done with the aid of a calibrated ocular micrometer. All measurements are presented in µm as mean±SD followed in parentheses by the range.

Drawings were made on fresh or stained material with the aid of a mirror type camera lucida and the Corel Draw 10.0 computer programme.

To describe the morphology of the parasite, several abbreviations have been used, as follows.

RESULTS

Myxobolus leafa sp. nov. (Figures 1a-j, Tables 1, 2)

Phylum: Myxozoa
Class: Myxosporea
Order: Bivalvulida
Family: Myxobolidae
Genus: Myxobolus
Species: leafa

Diagnosis

Cyst: Numerous yellowish white, spherical cysts or plasmodia are found attached to the gill filaments of the host, measuring 1.4-1.6 mm in diameter. Cysts contain mostly mature spores. A few developmental stages are also observed.

Spore: Mature spores appear as leaf-like structures in the valvular or frontal view, tapering at both ends. The anterior end of the spore is broader than the posterior end. The spore measures 15.3-11.8 µm (16.91±1.168) in length and 13.6-15.3 µm in breadth.

Table 1. Measurements of 20 fresh/stained spores of Myxobolus leafa sp. nov.

<table>
<thead>
<tr>
<th>Characters</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS</td>
<td>15.3-18.7</td>
<td>16.91</td>
<td>1.168</td>
<td>0.261</td>
<td>6.907</td>
</tr>
<tr>
<td>BS</td>
<td>13.6-15.3</td>
<td>14.152</td>
<td>0.673</td>
<td>0.150</td>
<td>4.755</td>
</tr>
<tr>
<td>LPC</td>
<td>5.95-8.5</td>
<td>6.67</td>
<td>0.724</td>
<td>0.162</td>
<td>10.854</td>
</tr>
<tr>
<td>BPC</td>
<td>5.1-5.95</td>
<td>5.31</td>
<td>0.368</td>
<td>0.082</td>
<td>6.23</td>
</tr>
</tbody>
</table>

Spore Index

| LS: BS 1: | 0.836  |
| LPC: BPC 1: | 0.796 |
| LS: LPC 1: | 0.394 |
| BS: BPC 1: | 0.375 |

LS: length of the spore, BS: breadth of the spore, LPC: length of the polar capsule, BPC: breadth of the polar capsule, LPF: length of the polar filament, DIV: diameter of iodinophilous vacuole

Figure 1. (a-g) Camera lucida drawings of different stages of matured spores of Myxobolus leafa sp. nov. (h-j) Photomicrographs of matured fixed spores in valvular view (Giemsa stained) of Myxobolus leafa sp. nov. scale bar ~ 6.67 µm. (a, b) Fresh spore developmental stages. (c) Fresh spore in valvular view. (d) Fresh spore in sutural view. (e) Fresh spore in valvular view-Lugol’s Iodine. (f, g) Fixed spores in valvular view-Giemsa stained
(14.15±0.67) in breadth. On sutural view the spore is pyriform in shape with a distinct, slightly curved sutural line without a ridge or fold. Two shell valves are symmetrical, smooth, thin and uniform with no parietal fold. The posterior part of the spore is surrounded by a mucus envelope.

Two equal polar capsules are oval to pyriform in shape with a broadly pointed anterior end and rounded posterior end. Each polar capsule measures 5.95-8.5 µm (6.67±0.72) in length and 5.1-5.95 µm (5.31±0.36) in breadth. Inside the polar capsule, polar filaments coil obliquely forming 4-5 turns. Polar capsules converge slightly at the anterior part. An intercapsular ridge is present as an outgrowth of the inner wall of the spore at the anterior half of the spore cavity. The extracapsular region is occupied by a double crescent shaped sporoplasm. An odinophilous vacuole is absent but a tiny sporoplasmic nucleus is present at the upper part of the sporoplasm.

In many cases, the mucus envelope is very prominent while in some spores, the mucus envelope remains in restricted areas at the posterior most part of the spore. In some other cases, the posterior end is prominently pointed-like the tip of a leaf, while in some spores it is bluntly pointed. In most cases the anterior portion is wider than the posterior portion.

**Taxonomic Summary:**
Type Host: _Labeo bata_ (Hamilton)

Type Locality: Langmeidong, Thoubal Dist.[24° 27′ 30.47″ N; 93° 55′ 15″ E]

Site of Infection: Gill

Prevalence: 7/210 (3.3%)

Type material: Slides containing holotype (MU/P/My) and paratype (MU/P/My_c-d has been deposited in the collection of Parasitology Section. Life Sciences Department, Manipur University, Canchipur, Imphal, India.)

Number of specimen measured: 30

Etyymology: This species was named as per structural resemblance of the parasite to a leaf.

**DISCUSSION**

Due to the presence of two equal pyriform to oval polar capsules with intercapsular appendage, the present myxozoan species is placed under the genus _Myxobolus_ Bütschli, 1882 and group I of Tripathi’s grouping of the genus _Myxobolus_. When the present species is compared with other closely related species of the genus _Myxobolus_, it resembles _M. drijagini_ Akmerov, 1954 (6) reported from the subcutaneous tissue of _Hypopthalmichthys molitrix_ from Amur River, Russia [LP-12.5, BS-9.5, LLPC-3.35, BLPC-3.8, BSPC-2.35]; _M. iucundus_ Hine, 1977 (7) reported from the skin of _Galaxias maculates_ from New Zealand [LP-13, BS-10.7, LPC-3.6]; _M. hendricksoni_ Mitchell et al. (8), reported from the brain of _Pimephales promelas_ from USA [LP-13.1, BS-12.3]; _M. magnaspherus_ Cone et al. (9), reported from the kidney of _Lepomis gibbosus_ [LP-18, BS-20, LPC-10, BPC-6] and _M. mokhayeri_ Baska et al. (10), reported from the fin of _Capoeta trutta_ [LS-15.8, BS-12.5, LLPC-7.5, BLPC-4.6, LSPC-6.6, BSPC-3.6]. However, _M. drijagini_ have a smaller spore size, unequal polar capsule and anteriorly more expanded spore than the present species. _M. iucundus_ have a smaller spore size, and longer and narrower capsule than the present species. _M. hendricksoni_ also have a smaller spore size than the present species. Moreover, its ovoid or spheroid spore differs from the leaf-like spore of the present species. _M. magnaspherus_ have larger and broader spores than the present species. _M. makhayeri_ have an unequal sized polar capsule whereas the present species have equal sized polar capsules.

**CONCLUSION**

Considering all these differences, we propose the _Myxobolus_ species we have obtained from Manipur as new to science and name it as _Myxobolus leafa_ sp. nov.

**Conflict of Interest**
No conflict of interest was declared by the authors.
REFERENCES


