Histopathological effect of *myxobolus* on Indian major carp, *catla catla* collected from Washim, Maharashtra

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Abstract
The present study was undertaken to study the histopathological effect of Myxobolus parasite on Indian major carp, *Catla catla. T*he results of the present study indicates heavy infection of *Myxobolus* on gill surface followed by kidney and gall bladder showing number of cysts and parasites on the gills with a slight hyperplasia of the cells and epithelium. Severe infection caused hyperplasia of the basal epithelial and goblet cells leading to increase in mucus production.

Keywords: Catla, Myxobolus, Washim, Histopathology, Parasite

1. Introduction
Fish serve as hosts to a range of parasites that are taxonomically diverse and that exhibit a wide variety of life cycle strategies [1]. Myxozoa are parasites that are widely dispersed in native and pond-reared fish in the phylum *Myxozoa*. During the last decade extensive work was carried out by many workers on the Myxosporea reporting many species belonging to genera *Myxobolus*, *Thelohanellus*, *Henneguya* and *Myxidium* from Indian fishes [1-15]. These parasites can be found in every organ of fish and have been known to cause serious diseases in both cultured and wild fishes resulting in heavy economic losses. Histopathology of freshwater fishes in relation to parasites is relatively less studied area, Therefore the present study was carried out to study the effect of *Myxobolus* Butschli (1882) species on host fish *Catla catla* with the help of histopathology tool.

2. Materials and Methods
The host fishes for the present study were collected from various dams and local fish market of Washim from 2010 to 2014. The collected fishes were brought to laboratory for necropsy procedure for examination of Myxozoan parasites. As such when cysts or abnormalities in the organs were noticed, myxozoans were suspected. For histopathological analysis, the cysts were fixed in 10% buffered formalin for 24 h, embedded in paraffin, cut into 4 µm thick sections and stained with hematoxylin and eosin. The photographs of the histopathology slides were taken with the digital camera of microscope. Identification of Myxosporea parasites in tissue sections was done using standard literature [16, 17]

3. Results and Discussion
In the present study, the gills were found to be more infected by *Myxobolus* spp. Such higher infection in the gills might be due to the suitable habitat of Myxobolus spp. The gills of fish are an important site for disease production, because they are rich in source of blood, important media for infectious agents. Since gaseous exchange takes place through the gills, they may easily become contaminated from external sources. Histopathological analysis of gills infected with Myxobolus indicates mild to moderate congestion of gill lamellae. The plasmodia of Myxobolus were seen to occupy various sites on the gills, in the distal end as well as proximal end. The smaller developing cysts were seen at the tips of secondary lamellae surrounded by epithelial cells. In heavy infestation, the cyst were found overall length of secondary gill lamellae and heavily infected gill shows large number of cysts of Myxobolus occupying almost the whole length of gills. The Myxobolus parasite cysts feed on gill filament tissue and grow in size causing retraction of neighboring cells. Hyperplasia of the gill epithelium was seen with proliferation of the interlamellar epithelium and partial fulfillment of the spaces between lamellae causing its fusion as a result there occur reduction in the surface available for gas exchange. The plasmodia may grow heavily beyond the gill lamellae and get ruptured releasing spores in water and causing haemorrhage and destructions of adjacent blood sinusoids. Most of the gill filaments were damaged as a consequence, leaving only their cartilage rods.

Similar infection of *Myxobolus pavlovskii* develops within the epithelium between the gill lamellae and the plasmodia compressed against the gill capillary walls only in a later stage of growth [18]. Similar histopathological changes due to presence of Myxobolus species were reported by many researchers [19, 22]. They found cysts of *Myxobolus* spp. at the tip of the primary and secondary gill lamellae. In Indonesia, myxobolus infection in common carp is reported to result in lesions, inflammation, congestion and hyperplasia in the gills [23].

Myxobolus koi, on common carp resulted in the fusion of neighboring plasmodia [24]. Carps infected with myxoboliasis caused by myxozoans in the gills of *Catla catla* and gible carp exhibited hemorrhagic condition with necrotic changes in the epithelia and in the connective tissues of gills [25, 26]. Histopathological study of the gills showed number of cysts and parasites in the gills with a slight hyperplasia of the cells and epithelium. Severe infection caused hyperplasia of the basal epithelial and goblet cells leading to increase in mucus production. The intrafilamental as well as intralamellar location of cysts was recorded to be associated with hyperplasia and inflammation. These cellular changes led to the fusion of adjoining secondary lamellae. Some authors have also described severe lesions caused by various species of *Myxobolus* in carp leading to gill necrosis and gut

degeneration [21, 25]. Histological analyses of gills infected with myxozoan parasites revealed presence of numerous large cysts in the gill filaments, but no pronounced inflammatory response was found in the infection site as also evident from the present study [26]. The structural alterations in the gills are similar to structural changes reported for other myxosporean species [27].

4. Conclusion

The result of the present study indicates that Myxosporean parasites are potentially pathogenic, and that a high parasite load could compromise normal functioning of fish. Therefore extensive study should be carried out on the Myxozoan parasites otherwise: the pathogenecity caused by them by damaging the tissue and decreasing the nutritional value, will lower the productivity of fish. The main principle of fish disease control should be based on all round prophylaxis and prevention is better than treatment approach as treatment in such water bodies become impractical and uneconomic.

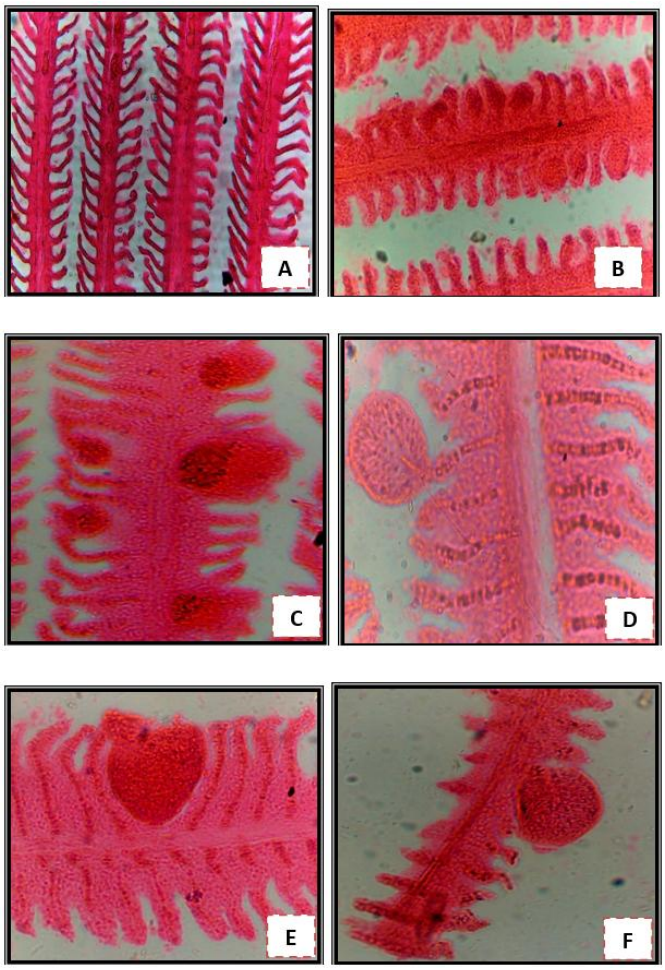

Fig 1: A: Histology of Healthy Gills of *Catla catla* B-F: Histopathology of infected gills of *Catla catla* (Eosin and Haematoxylin staining)

5. References

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