



## Histopathological Studies of Monogenean Parasite Diplozoan *Paradoxum* (Nordmann, 1832) in the Gills of Fresh Water Fish *Osteobrama Vigorsii* (Sykes) from Nira River, Bhor District, (Maharashtra). India

## KEYWORDS

*Osteobrama vigorsii*, gills, monogenean parasite, aneurism, necrotic changes

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**ABSTRACT** A histopathological studies was carried out to investigate the influence of monogenean parasite (*Diplozoon paradoxum* (Nordmann, 1832)) irritation on the gills of fresh water fish *Osteobrama vigorsii* from Nira river Bhor district, (Maharashtra), India. *Osteobrama vigorsii* is endemic to Western Ghats of Maharashtra and is commonly consumed by local population in fresh form as well as dried and preserved form. Histopathology provides a rapid method to detect effects of irritants and pathogens in gills and it can be considered as the indicator for abnormal condition for fish environment. The collected fish specimens were subjected to full clinical, parasitological and histopathological examinations. The histopathological alterations due to diplozoan parasite lead to hyperplasia followed by complete sloughing of secondary gill lamellae, the infected fish gills showed pathological alterations such as proliferative, necrotic as well as degenerative changes in the epithelium of gill filaments. Aneurism in secondary lamella was clearly seen. The cartilaginous tissues of gill filaments displayed severe proliferation causing deformity and thickening of gill filaments.

### INTRODUCTION:

The main organ for gaseous exchange in fishes is carried out by gills. Fish gill is very sensitive to physical and chemical alteration of the aquatic medium. Fish gills play a vital role, as they are the main sites of gaseous exchanges, which involve osmoregulation, acid-base balance, excretion of nitrogenous compounds (Pereira and Caetano, 2009) and harbors many microbes because of their contact with aquatic medium. From physiological point of view gills play an important role in nitrogenous waste excretion such as ammonia and urea (Shimpei et al., 2008). Fish may be infected by the parasites as final or intermediate hosts in a parasitic life cycle (Hoffman 1999; Smith & Roberts 2010). Parasites of fish can either be external or internal. Parasitic infections often give an indication of the quality of water, since parasites generally increase in abundance and diversity in more polluted waters (Poulin 1992; Noga 2010). The monogeneans are common ectoparasites with direct life cycles mainly parasitizing fish gills and fins (Jiri et al., 2004). The present study concentrates on the gill parasite *Diplozoon paradoxum* which belongs to phylum *Platyhelminthes*, class: *termatoda*, order: *Polopisthocotylea* family: *Diplozoidae* Genus: *Diplozoon* Species: *paradoxum*. Polyopisthocotyleans are almost exclusively gill-dwelling blood feeders. The impact of monogenean on fishes can be seen only when their number increases due to poor water quality in the aquatic medium (Reed et al., 2009). Histopathology provides a rapid method to detect effects of irritants and pathogens in different organs (Johnson et al. 1993) and it can be considered as the indicator for abnormal condition for fish environment (Roberts 2001). The present study was undertaken to record the histopathological lesions of gill associated with external parasites.

### Material and Methods:

*Osteobrama vigorsii* is an endemic species from Western Ghats of Maharashtra. Freshly collected 50 fishes from Nira River (Bhor District, Maharashtra), with 18° 10' 0" N Latitude / 73° 51' 0" E longitude. Stored in prewashed polyethylene bags in ice and brought to laboratory on the same day of capture. Biometry was performed and wet mount was prepared from gill mucosa. For histopathological study, the tissue specimens of gills were excised, rinsed in normal saline and fixed in formalin buffer (10%) for 24 h. After fixation, the tissues were dehydrated in an alcohol series of ascending concentration (70%, 80%, 90% and 100%, respectively), embedded in paraffin and sectioned at 5µm. The tissue sections

were stained with haematoxylin-eosin (H&E) and were examined by light microscope. Standard histological procedure was followed as described by Ogundiran et al. (2009).

### Result and Discussions:

The process of gaseous exchange in fishes is carried out with the help of gills. Skin also plays a role in the exchange of gases. Fish gills also carry out important physiological functions such as respiration, osmoregulation and excretion and remain in close contact with external environment and it is particularly sensitive to changes in the quality of the water (Mazon et al. 2003; Camargo & Martinez 2007).

The fish infected with monogenean parasite, *Diplozoan paradoxum* (NORDMANN, 1832) showed clinical symptoms including lethargy, unilateral swimming and erosion on gill filament and scale loss (Longshaw & Feist 2001; Baker et al. 2007).

Plate A shows the histological section of gill filament without parasitic infection shows healthy gill arches without any excess deposition of mucous. While the histological section of parasitic infected gills shows the fusion of gill filaments due to hyperplasia where there is rapid cell growth, along with this pathological change there is excess of mucous accumulation.

Plate B shows the histological section of the parasite anchoring the gill lamellae with the help of its sucker, which helps in anchoring at the same time to absorb nutrients.

Gill filament fusion, secondary filament hyperplasia and aneurism were reported in fishes which were infected by *Dactylogyrus* sp. after Jalali & Barzegar (2005), which is in agreement with results obtained from this study.

Hyperplasia and aneurism were observed in the gill tissue of all of these infected cases. Epitheliocystis disease is a common condition that has been observed in various teleosts as an incidental finding (Bradley et al 1988; Turnbull 1993; Groff et al 1996; Polkinghorne et al 2010). This incidental form of the disease has been characterized as a nonlethal or chronic condition because of the apparent mild infection and associated host response that is typically absent or limited to a mild epithelial hyperplasia (Roberts 2001; Noga 2010; Polkinghorne et al 2010).

A severe form of the disease has also been documented and characterized as a hyper infection because of severe infection and the associated host response, which has been described as a diffuse, severe, proliferative epithelial hyperplasia often with branchial lamellar fusion and excessive mucus production (Bradley *et al* 1988; Groff *et al* 1996).

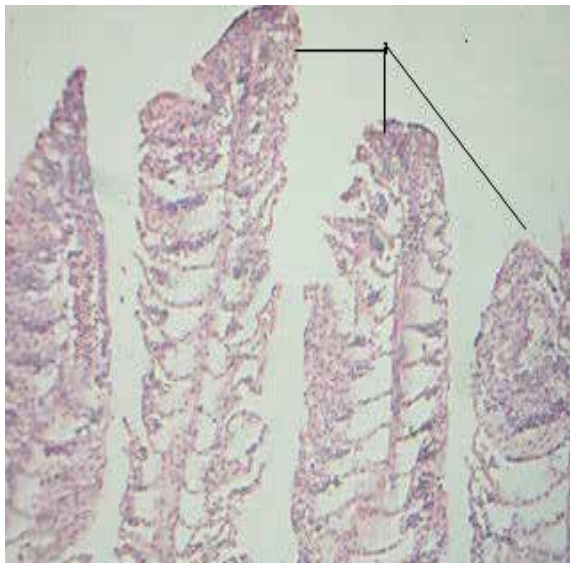
The infected fish showed lethargy and erosion on gill filament. However the hooks is potentially harmful if it is in large number especially to gill tissue where gas exchange may be impeded by the large numbers of parasites physically covering the gills. It is not known to kill or damage fishes, but may slightly reduce their productivity (Bunkley Williams & Williams 1994).

**Acknowledgement:**

I express my thanks to Dr. Sharayu D. Sathe, Head, Botany department, Abasaheb Garware college, Pune for providing laboratory equipments. Special thanks to Prof. Atishkumar S.Gavit and Miss. Mansi M. Malgaonkar for their help in photography of the histological slides.

**PLATE-A**

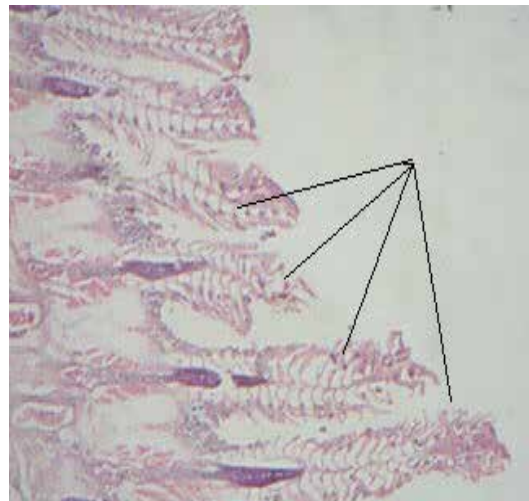
All measurement were taken at 30X of light microscope



Gill filament fusion Gill 0. 231541mm



Secondary filament hyperplasia 0.246152mm  
Ratio of Infected gill to normal-0.123076:0.0461535



Infected Gills showing aneurism 0.153845mm



Normal gills 0.06153mm  
Ratio of Anuerism gill to normal-0.0769225:0.03076

**PLATE-B**

All measurement were taken at 30X of light microscope





*Diplozoan paradoxium* anchoring to gills with the help of hooks Length of the parasite-0.92307mm



**DIPLOZOAN PARADOXUM ANCHORING THE GILLS OF OSTEOBRAMA VIGORSII (SYKES)**



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