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Impact of Toxic Sediment on Gills of *Channa Punctatus*

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Abstract:- In this study we procured toxic sediment from Amlakhadi water channel in Bhuj where paper, dye and textile industries were dumping their toxic wastes. We took Channa punctatus to test the toxicity of the sediment in the lab to find the NOEC for their gills.

I. AIM OF THE EXPERIMENT

To find the NOEC for gills of *Channa punctatus.*

II. INTRODUCTION

Gills are highly sensitive organ to toxic external environment in fishes. Gill tissues consist of branchial arch primary lamellae and secondary lamellae. It acts as respiratory organ and absorbs dissolved oxygen in water and is in direct contact with external medium.

III. METHOD

The organs like gills were taken out from the fish *Channa punctatus* at three different concentrations on 0, 5th, 10th, 20th and 30th days, in triplicate, to observe gross anatomical changes, such as, hemorrhages, congestion, dropsy, necrosis, depigmentation and textural changes. These tissues were fixed in 10% formalin for 48 hours. They were then dehydrated in 90% alcohol for an hour and three times in absolute alcohol for 45 minutes separately. The samples were then cleaned two times in xylene for 30 minutes and embedded in paraffin thrice each time for 45 minutes. The samples were then blocked, allowed to cool, cut on a rotary microtome at 7 µm and mounted sections were dewaxed in xylene and dehydrated serially in alcohol and then stained sections were washed in tap water, dipped in 2% acid alcohol and washed in tap water, followed by Scotts for water substitute. The sections were dehydrated through 50%, 70%, 90% alcohol for 2 minutes each. Then stained in eosin for 4 minutes and dipped in absolute alcohol for on minute each. Finally, stained sections were cleaned in xylene for 5 minute each and mounted on a slide with DPX. Prepared section were examined and photographed under a light microscope.

IV. RESULTS

Gill lamellae shows severe loss of primary as well as secondary filament in the highest concentration i.e 1.2 gm/l for *Channa punctatus.* Moderate changes in architecture of tissue was found in medium concentrations, i.e. 0.8 gm/l for *Channa punctatus.* Lower concentration i.e 0.5 gm/l for *Channa punctatus* showed no alteration in gill structure at all.

Nutrient & Organic Load	
Organic carbon (%)	2.72
Organic matter (%)	4.7
Total Nitrogen (mg/100 gm)	245
Total Phosphorus (mg/100 gm)	49.5
Heavy Metal Concentration (in mg / 100 gm)	
Cadmium	6.0
Chromium	7.18
Copper	58.27
Lead	6.19
Iron	2763.5
Manganese	47.4
Zinc	109.75

Table 1:- Nutrient, Organic Load and Heavy Metal Concentrations in Composite Sediments from Amlakhadi water Channel

- *Histopathological slides of gills Channa punctatus*

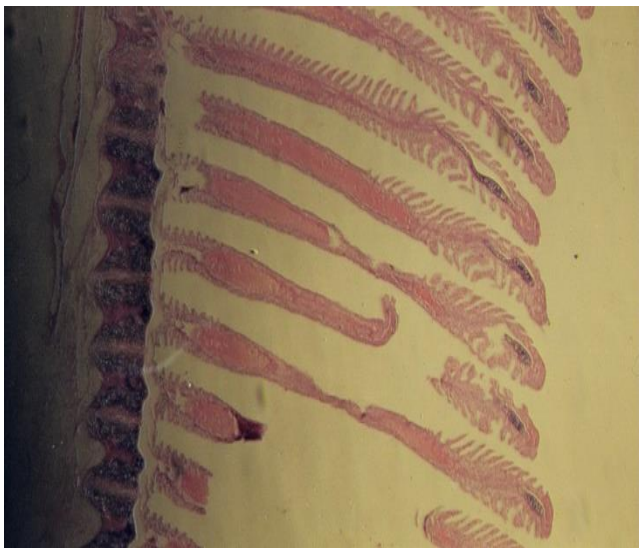

Fig 1:- 5 Day Channa 1.2 gm/l showing gill with loss of lamellae at the base of the filament

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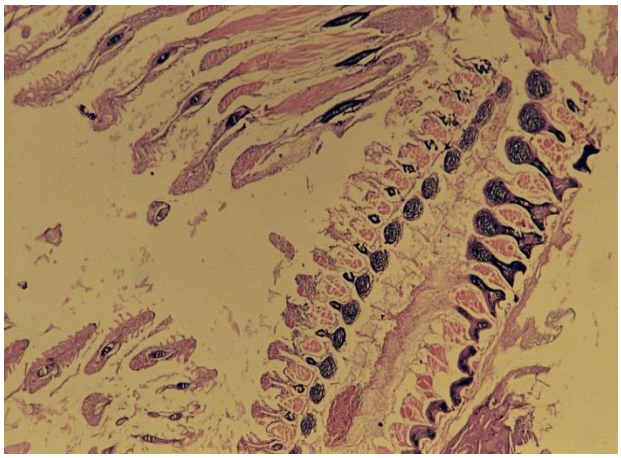

Fig 2:- 10 Day Channa 1.2 gm/l. Derrangement of the lamellae with severe atrophic changes

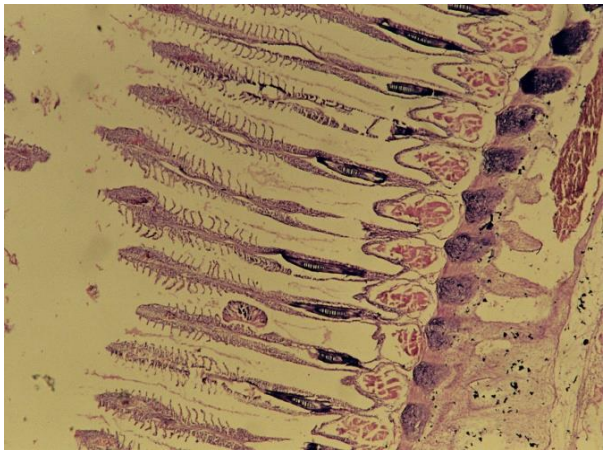

Fig 3:- 20 Day Channa 1.2 gm/l. Note moderate thickening of cartilaginous tissue in the primary lamellae and losing the secondary lamellae. Branchial arch showed moderate thickening.

Fig 4:- 30 Day Channa 1.2 gm/l. Severe degenerative changes in the primary and secondary filament with massive loss of secondary lamellae.

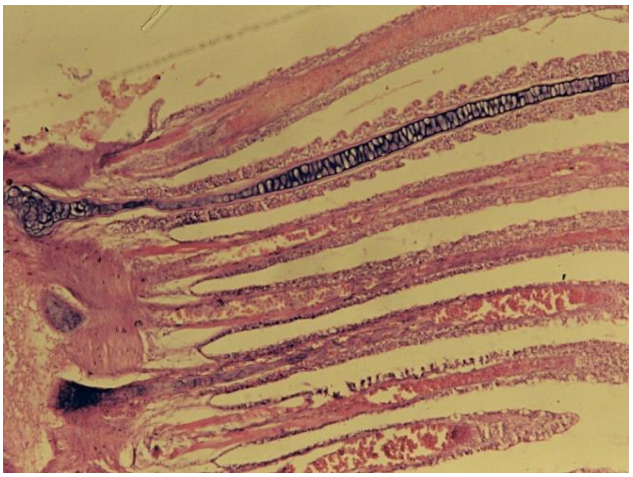

Fig 5:- Above slide in magnification.

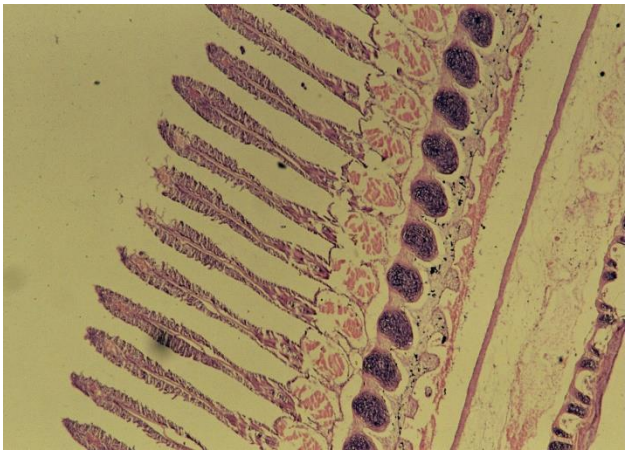

Fig 6:- 5 Day Channa 0.8 gm/l. Medium degeneraion of the secondary lamellae at the base of the filament

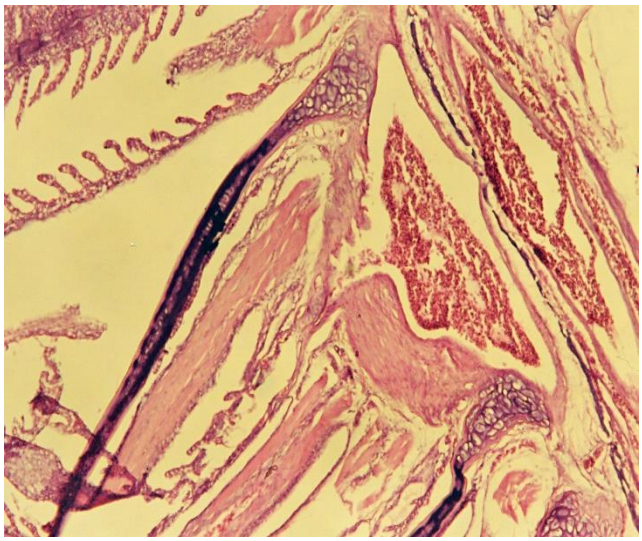

Fig 7:- 10 Day Channa 0.8 gm/l. Branchial tissue of gill showing areas of haemorrhages lamellar disintegrtion at the base .(magnified)

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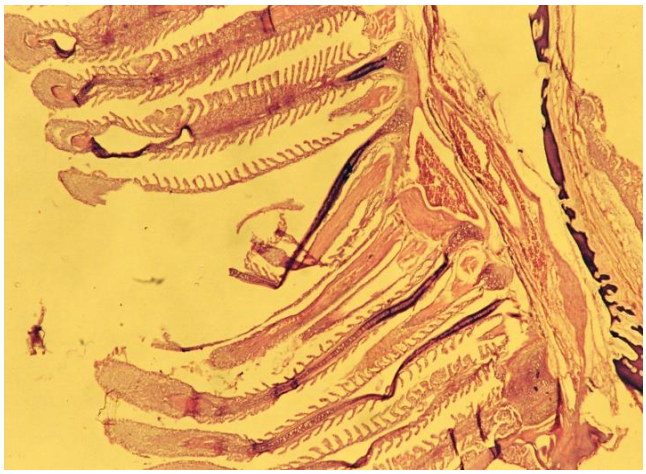

Fig 8:- 10 Day Channa 0.8 gm/l. Branchial tissue of gill showing areas of haemorrhages lamellar disintegrtion at the base.

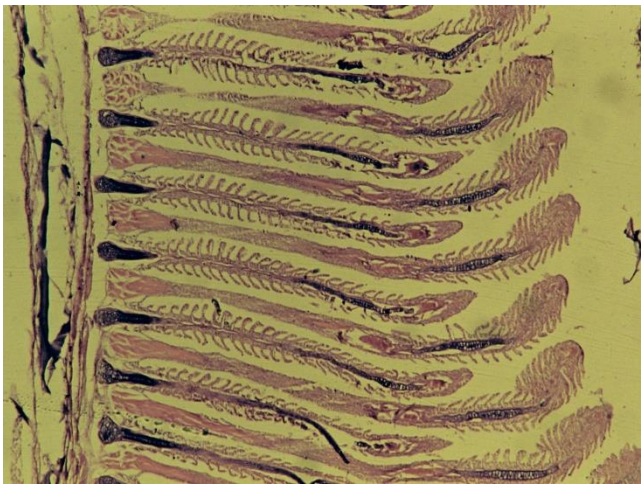

Fig 9:- 30 Day Channa 0.5 gm/l showing normal gill lamellae

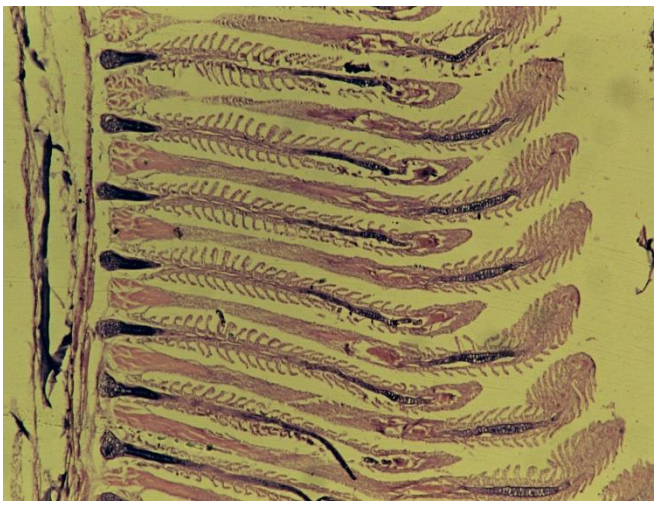

Fig 10:- 30 Day Channa control showing normal gill lamellae

V. DISCUSSION & CONCLUSION

Histopathological changes were severe in case of highest concentrations in both the fishes as evident from detrimental changes in gills. Medium concentrations of fishes, exhibited moderate histopathological changes in different organs while no abnormality is seen in lower concentrations.

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