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STUDY POLLUTION STRESS OF INDUSTRIAL WASTE ON RESPIRATORY GILL OF *PARREYSIA FAVIDENS*

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ABSTRACT
Respiration is the vital phenomenon of life. In the aquatic invertebrates and vertebrates, gills are the most common type of respiratory organ. In aquatic animals gill may be a specialized area where epithelium is folded into a projecting finger-like structure called gill lamellae. The lamellae show linings or ciliated epithelium with connective tissue, supportive gill bars and the underlying thin-walled blood vessels or sinusoids containing body fluids through which exchange of gases takes place. The highly folded gill lamellae increase the surface area of the gill epithelium to facilitate the efficiency of gases exchange. Even the metabolic reactions also depend on the efficiency of gills for the supply of dissolved oxygen from the water. Present study investigated the effects of the polluted water on the gill lamellae of the Bivalves. The critical histopathological changes have been observed in test experimental animal treated with industrially polluted water whereas comparing with control bivalve no significant changes observed.

KEYWORDS: Muscularis, Bivalve, gill, pesticide, effluents, mantle.

INTRODUCTION

Mollusca is among the most ancient phylum on the earth today. It is an extraordinarily varied phylum with estimates of 80,000 to 1,00,000 described species and total diversity possibly as high as 2,00,000. Molluscs are also among the most successful of all the animals and are only second to arthropods species richness. The large molluscan classes i.e. Gastropoda and Bivalvia have repeatedly and successfully colonized continental 'fresh' waters (Strong *et al.*, 2007). Gill or the Ctenidium is a simple monitoring apparatus for respiratory studies in the aquatic organisms (Lingaria *et al.*, 1980).According to (Dalela, et al., 1980) the respiratory changes are good indicators of alteration in respiratory organ and metabolic processes with exposure to pollution stress. The alteration in the gill structure followed by hypoxia, has resulted in mortality in different aquatic animals after exposure of stress by various pollutants. Huges and Morgon (1973) reported the altered gill structure due to pollution stress in fishes.

The histological studies in gills of bivalves *Corbicula astriatella* after exposure to some selected pesticides was made by Jadhav (1993), and the similar observations were reported by Bhamare (1993), for the *Parreysia favidens* after exposure to same heavy metals. Chaudhary (1999) studied the altered gill structure followed by the reduced oxygen consumption in freshwater bivalves *Parreysia cylendrica* associated with heavy metal stress. The *Parreysia favidens* is a common species of the family Unionidae with many forms. It is found in the silt of running water such as low land, streams, and rivers. It is used as food in countries like India, Bangladesh, and Nepal. Due to agricultural intensification use of fertilizer and pesticides, fish poisoning, as well as the collection for consumption, are inferred threats to this species. The estimation rates of aquatic secondary production in a given ecosystem are possible with the knowledge of shape and size, differential body growth and population ecology of organisms (Wilber and Owen, 1964). The size of the shell is more affected than their shape by the fluctuation of ambient environmental parameters. (Wilbur and Owen, 1964; Seed, 1968) thus shape rather than size generally provides more accurate knowledge on the dimensional relationship. Present study was particularly focused on studying the effect of industrial effluent on the gills. This study mainly shades light on the histopathological changes in the gill morphology post treatment with the industrial effluent.

MATERIALS AND METHODS

The medium sized freshwater bivalves *Parreysia favidens* were collected from the river Godavari and Darna near Nashik city and brought to the laboratory and acclimatized. The animals were kept in plastic troughs of 15 L capacity containing dechlorinated or aged tap water for three days to get acclimatized to the laboratory conditions. The healthy maximum sized bivalve was taken for the experiment. The experiment bivalves were exposed to two groups. i.e. Control group (No effluent waste) and experimental group. After 96 hours, gills were dissected and removed from both test and control group bivalves and fixed in Bouin's fixative for 24 hours. After 24 hours, the gills were placed in alcohol for dehydration and then cleaned with xylene; afterwards it was embedded in paraffin wax. By using rotary

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microtome 5µ sections were made and then stained by Eosin-haematoxylene. Finally they were mounted in DPX for further examination under the microscope.

Observations:-

(A) The gills of control group gill plate No.1 and 2,

Plate No -1

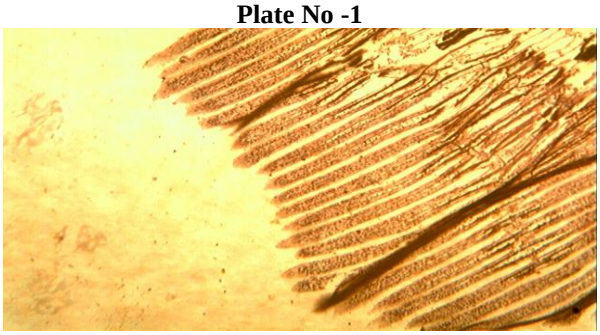
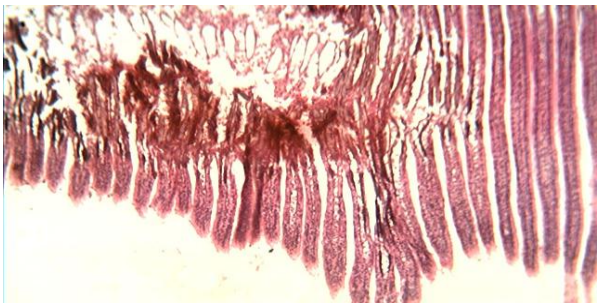


Plate No – 2



(B) The gills of Treatment group gill plate No.3 and 4,

Plate No – 3

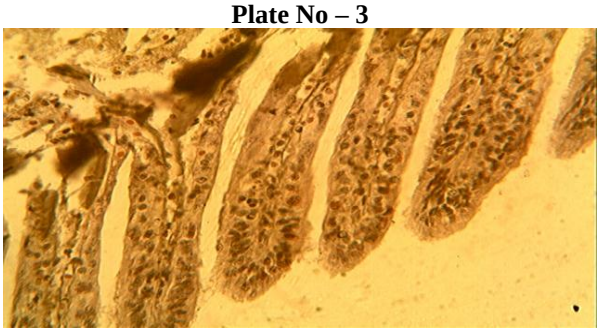
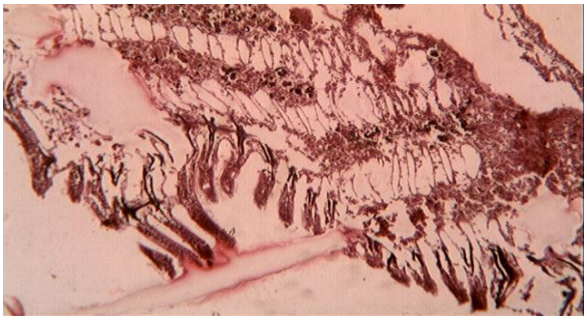


Plate No – 4



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RESULTS AND DISCUSSION

The gills are the vital organ in all aquatic animals. It serves as functions like respiration, osmoregulation. Even the metabolic reactions also depend on the efficiency of gills for the supply of dissolved oxygen from the water. Histopathological changes observed in test experimental animal as compared with control bivalve.

(A) Control Bivalve gill slides didn't show major changes. The gill lamellae were identical with elongated and rectangular lamella. The gill lamella was made up of 'V' shape gill filaments which vertically arranged in a specific sequence in plate no.1 and 2.
(B) Experimental treatment Bivalve gill slides showed changes in plate no.3 and 4.
The histological observation of gill slide showed pollution stress effect with,
(i) Degeneration of epithelial and connective tissue,
(ii) Destruction of skeletal chitinous rods,
(iii) Due to fusing gills filaments distortion seen in adjacent gill lamellae.
From the present study it is evident that the industrial effluent has severely affected the gills of the bivalves. The distorted morphology of the gills affected its osmoregulation and respiration function.

REFERENCES

Bhamare P.R. (1993). Impact of pollutants on some physiological aspects of freshwater bivalve, *Parresia favidens*.Ph.D. Thesis, Marathwada University, Aurangabad.
Chaudhari R.T. (1999). Some physiological activities of the fresh water bivalves, *Parresia cylindrica* associated with heavy metal stress. Ph.D.Thesis. B.A.M. University. Aurangabad.
Dalela R.C., Rani S., Kumar V. and Verma S.R. (1981). In vivo haematological alteration in fresh water teleost, *Mystus vittatus* following subacute exposure to pesticide and their combinations. *J. Environ. Biol.* 2(2):79.
Jadhav S.M. (1993). Impact of pollutants on some physiological aspects of the fresh water bivalve, *Corbicula striatella*. Ph.D.Thesis.Dr. B. A. Marathwada University ,Aurangabad.
Jolicoeur P. and Worimann J. E. (1960). Size and shape variation in the painted turtle. A principal component analysis. Growth, 24:339-354.
Lingaraja T., Salvakumar R.A. and Venugopalan V.K. (1980). A simple monitoring apparatus for respiratory studies in aquatic organism. *Indian J. Expt. Biol.*18:413-415.
Ramesha M.M. and Thippeswamy S. (2009). Allometry and condition index in the fresh water bivalve *Parreysia corrugate* (Muller) from river Kempuhole, India. Asian fish.sci., 22:203-214.
Seed R. (1968). Factors influencing cell shape in *Mytilus edullis* L.J.Mar.Biol.Ass. U.K. ,48: 561-584.
Strong E.E., O. Gargioniny W. F. Ponder and Bouchet, P. (2007). Global diversity of gastropods (Gastropoda: Mollusca), in fresh water. *Hydrobiologia* 595:149-166.
Wilbur K.M. and Owen G.(1964): Growth. In : Wilbur, K.M. and Yonge, C.M. (Eds), Physiology of molluscan, Vol-1:Academic press, New York, USA, P.211-242.

