

## Evaluation of Fresh Water Sponges *Lacustris* as Pollution Indicator

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### Abstract

Sponges are distributed both in marine and fresh water ecosystem. They are important in maintenance of ecological balance of aquatic ecosystem due to their peculiar characteristics. The present study emphasizes on histopathological alteration in *spongillialacustris* exposed to sub lethal concentration of organo-chlorine for thirty days. The electron microscopy of test experimental and control animal was conducted.

The changes and the accumulation of pesticides observed at cellular level, affects on the growth and survival of *S.lacustris*.

**KEYWORDS:** Organochlorine, Histopathology, Pollution indicator, Electron-microscopy

### INTRODUCTION

In the toxicological studies the histological observations has been employed as diagnostic tool in medical and veterinary science.

Any damage in the tissue is manifested in the abnormal metabolic activities of the concerned organism. Therefore structural organization of a tissue is an ideal tool for the diagnosis of effects of extrinsic and intrinsic environmental factors which causes metabolic disorders that results change in the basic structure of the tissues.

Only few reports are available on the ultra structure study of sponges (Sukdohol-1985, Longenbmch-1987). Some reports are available about ultra structure of the cells of fresh water sponge *S.carteri* (Kantha-1978). About 10000 -species of sponges were reported (John-1995).

Fresh water family consist 150 species out of which 29 has been reported in India (Tonapi-1980). These are related to the recognition of specific difference in the structure of contact tissue may provide a mean to correlate the cellular

interaction and structural basis of communication for the regulation of pattern reconstruction.

Though few reports on histological studies of fresh water sponges under stress of pollutants are available in detail investigation at cellular level is scanty. This study also aims to interpret the cellular toxicity of insecticides in *S. lacustris*

### Materials and methods

The fresh water sponges were available at Latipada dam at Pimpalner, Dist.Dhule (M.S.) India. The dam is on Panzara River with Mangi-Tungi hills of Western ghat. It is located at latitude 20° 55' N and longitude 74° 5' 30' E at 532MSL. Fresh water sponge were collected and acclimated to the laboratory conditions as per CPESCA guide lines. Control group of animal was maintained simultaneously in water at P<sup>H</sup> 7.4±0.2 and temperature 26.0±2 °C

The tissues of fresh water sponge *S. lacustris* exposed to sub-lethal concentration of organochlorine insecticide at 5 ppm for thirty days.

The Electron microscopy was done with the ultra thin sections were scanned and photographed on JEOL, JEM1010 Electron Microscope at JASLOK HOSPITAL, Mumbai, India.

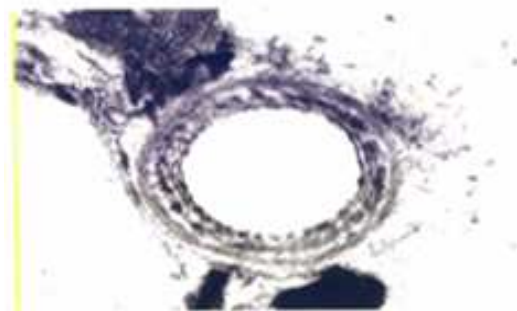
**Results**

The electron microscopy study of the tissues of organisms exposed to sub-lethal concentration showed that the organochlorine have apparently resulted in dose dependent destructive changes, than control tissues.

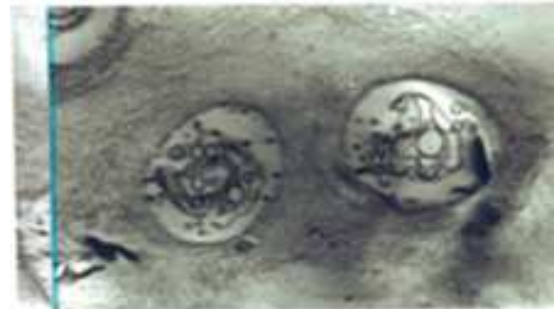
The protective wall like formation of amoebocyte was observed. Amphidisk spicules were disturbed, inclusion in gemmule and the inner and outer pinacoderm were mixed together and become dense due to orgochlorine accumulation.

The pigment particles were also loaded. Rupture of archaeocyte was observed(plate 1,2,3,4 for control *S. lacustris* and plate 5,6,7,8 for experimental *S. lacustris*).

**Electron microscopy of control animal tissues:**



- 1- Control(30000X)CC-Central Canal
- 3- Control(50000X)amphidiskspicules,
- P-Pinacocyte , M-mesoglea Matrix Pinacoderm , inner membrane of cell ,
- A-archaeocyte , V-vesicle .
- Outer membrane of cell.



- 2-Control (25000X)Archaeocyte , amoebocyt
- 4- Control(40000X)Flagellum , Central Fibers

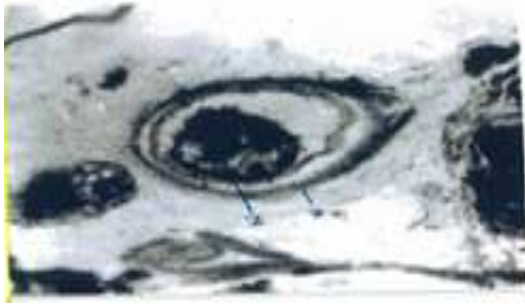
Mesoglea Matrix  
 Periferal Fibars

**EM of test Animaltissues:**

3



4



**5-Exposed-25000X-inclusion in gemmule , 6-Exposed-40000X-Nucleus rupture ,**

**Pinacoderm inner and outer layer. Archaeocyte rupture.**



**7-Exposed(20000X)Archaeocyte showed 8-Exposed(25000X)Empty pinacocyte .**

**thick wall formation.**

### **Discussion**

The above observations showed that the organochlorine induced the structural changes in the tissues of *S. lacustris*. The destructive changes like nucleus rupture, gemmule, canal system mesoglea matrix, vesicles, amoebocyte, pinacocyte, pinacoderm were observed in the present study. Similar histopathological changes in

tissues of aquatic animals due to pesticides have been reported.

Eller-(1971), observed hyperplasia, hemorrhage and intercapillary congestion in the gills due to chronic exposure of aquatic organism to DDT.

Same reports were available damage in crustaceans and molluscs , (Amaldos-1991 , Ghate-1979) with pesticide , some reports (Biswas-1986 , Nagabhushanam-1987) were available destructive changes in digestive gland of bivalve, mollusks, exposed to pesticides (Sathe-1995 , Muley-1986) . Similar changes were observed in the animals exposed to pesticides. The results correlate the structural changes in the tissues of *S. Lacustris* with that of fish and invertebrates like crustaceans, mollusks, and oyster as observed by different investigator. Loss of normal structure may affect function of gaseous exchange resulting in hypoxia or anoxia in the exposed animals.

### **Conclusion**

The histological alterations resulting from exposure to organochlorine may lead to reduction in the functional efficiency of activity leading to malfunctioning of several organ systems of *S. lacustris*

This in turn may lead to several behavioral, bio-chemical, enzymatic alternations & disturbances in various tissues.

These alteration at cellular level affects the health of the animal making them unfit in the struggle of survival, which is ecological important to the fresh water ecosystem.

As the sponges are able to tolerate a wide range of pollutants, hence a group

of spongilla can be considered as a pollution indicator.

This study will help formulate the strategy for insecticidal pollution monitoring from agriculture sector and to take mitigation measures accordingly. .

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