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SEM Study of the Scales of Freshwater Snakehead, *Channa punctatus* (Bloch) upon Exposure to Endosulfan

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During the last three decades, use of insecticides, fungicides and herbicides is on the increase to combat attack of insects, fungi and weeds. Though the use of these chemicals has helped to increase the agricultural production manifold, yet it has altered the ecology of most waterbodies. These chemicals indiscriminately affect the nontarget aquatic organisms, which are of great significance to man.

Endosulfan is one of the commonly used pesticides in agriculture for the control of insect pests. Endosulfan has induced remarkable changes in both superficial and internal tissues of exposed fish, and its toxicity is primarily due to sulphar (Kanuf and Schulze 1974). The present communication describes lepidological changes in the freshwater snakehead *Channa punctatus*, exposed chronically to sublethal levels of organochlorine pesticide endosulfan.

MATERIALS AND METHODS

Adults of *Channa punctatus* were procured from local waterbody and transported to the laboratory. The fish was acclimatized to the laboratory condition for 7d at $25 \pm 3^{\circ}C$. The fish were then exposed to 0.0022 mg/L and 0.0035 mg/L of technical grade of Endosulfan, representing 32% and 50% of the 96-h LC50, respectively. A parallel control group was maintained in the toxicant free tapwater (pH 6.8; dissolved oxygen 8.91 mg/L and total hardness 86 mg/L). Fish was fed on zooplanktons once a day. Scales were removed with tweezers from the lateral side of the alive fish and were cleaned with water. These clean scales were sputter coated with gold in a gold coating unit (thickness = $100A^{\circ}$). These were then studied under vaccum using JEOL JSM-6100, Scanning Electron Microscope at an accelerating current of 15-20 kv.

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RESULTS AND DISCUSSION

The normal scale of *Channa punctatus* consists of usual parts, viz., anterior, posterior and lateral (Fig.1). Maximum number of circuli are present on the anterior side; hence they show foldings in the form of radii. The circuli do not run all along the sides of the scales; rather, they end on the posterior and lateral margins. The circuli are comparatively thicker on the posterior side of the scale (Fig.1). Each circulus has teeth-like structures on the outer margin, called lepidonts (L) which probably help the scale in anchoring to the body (Fig.2). The presence of lepidonts on the circuli has been described by Hollander (1986) on the scales of Poeciliid fishes.

It seems that lepidonts start to develop only after the circulus involved has been fully formed, since the most recently formed circuli were never seen to carry denticles. This position of the lepidonts suggest that they act as minute hooks preventing movement or detachment of the scale (Lanzing and Higginbotham 1974). The microscopic size and the covered position of lepidonts make them function as contact organs (to facilitate contact between males and females during reproduction) highly improbable (Wiley and Collette 1970; Collette 1977).

Drastic effect of Endosulfan on the structure of scale was recorded when the fish was exposed to Endosulfan concentration of 0.0022 mg/L and 0.0035 mg/L for 5d. The margins of the scale were disorganized and disruption of circuli was recorded when fish was exposed to 0.0022 mg/L (Fig.3). On exposure to higher concentration of 0.0035 mg/L, there was extreme disruption at the base of circuli and the entire calcareous material became disorganized (Fig.4). This resulted in the loosening of hold of the scales on the body of the fish.

The hard parts especially scales and otoliths have been used for the classification, identification and growth studies of different fishes. (Chu 1935; Lagler *et al.* 1977; Kimura *et al.* 1979; Hecht 1980; Wysokinski 1983; Papaconstantinou 1984; Bagliniere and LeLouran 1987; Johal and Tandon 1992). But so far these have not been used as indicators of the presence of toxic compounds in the medium. From the present observations, it is suggested that the hard parts especially the scales can be successfully employed as reliable biological indicators of pollution.

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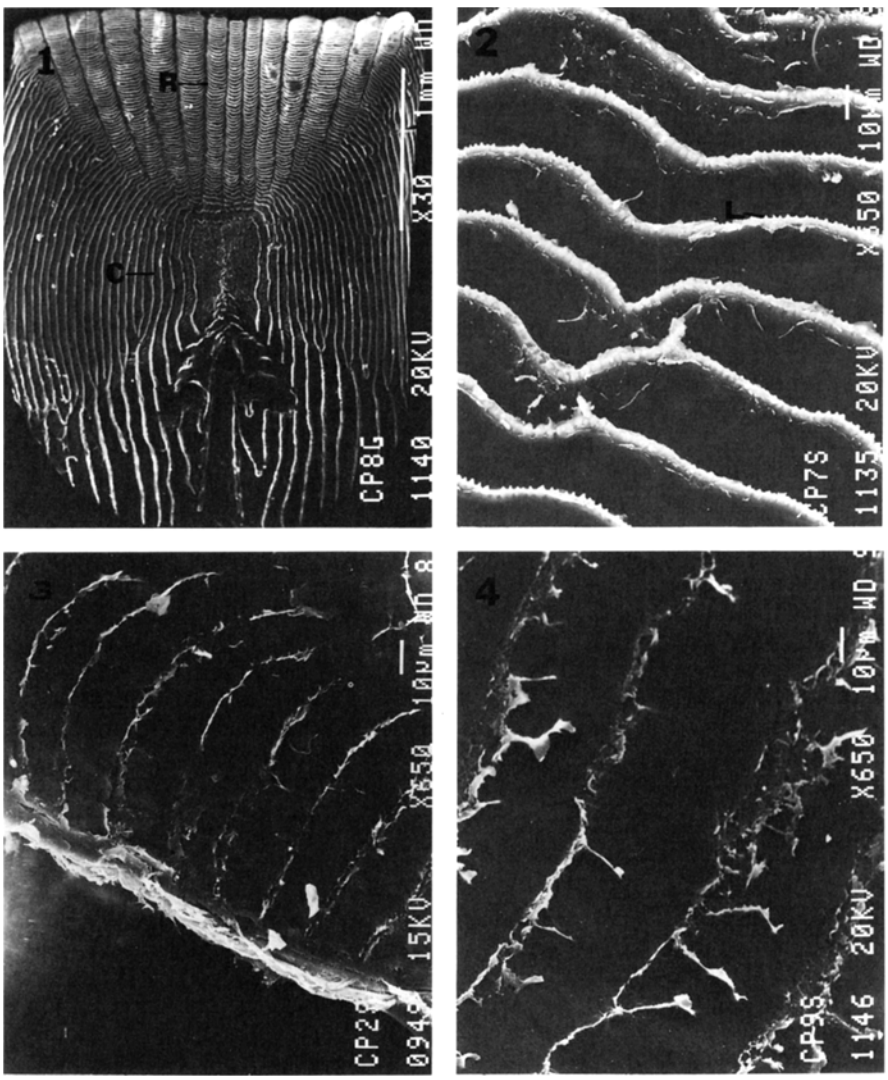

Figure 1. Normal scale of *Channa punctatus*.
(C= Circulus, R=Radii)
Figure 2. Lepidonts (L) on the outer margin
of circulus
Figure 3. Disruption of circuli
(5 days; 0.0022 mg/L Endosulfan)
Figure 4. Extensive damage of circuli
(5 days; 0.0035 mg/L Endosulfan)

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