

## BIOCHEMICAL CHANGES IN THE LIVER OF A FRESHWATER TELEOST, *HETEROPNEUSTES FOSSILIS* (BLOCH) EXPOSED TO ROGOR

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When the catfish, *Heteropneustes fossilis* was exposed to a sublethal concentration of Rogor (10 ppm) for 48 days, the protein content decreased, whereas the specific activities of acid phosphatase (ACP) and succinate dehydrogenase (SDH) showed an increased initially. However, a temporary recovery was observed between the second and third weeks of exposure. Thereafter the animals were released to normal water for 24 days. But they did not show any sign of recovery during this period.

### INTRODUCTION

Dimethoate, an organophosphorous compound is a systematic and contact phosphorothiolothionate pesticide. It is sold in India under the trade name of Rogor, and the pesticide is extremely used in tea gardens. Many workers have reported the toxicity induced by this insecticide on various organs of fish (Ishihara & Tamura, 1967; Dubale & Shah, 1979; Dubale & Awasthi, 1982). Liver and kidney being the worst affected organs by the toxicants (Brown, 1970).

The present investigation has been undertaken to assess the toxic effect of Rogor on protein content as well as enzymatic activities of ACP and SDH from the liver of an edible freshwater teleost, *Heteropneustes fossilis*. The present study has also been extended to see if there is any possibility of the animal regaining the normal conditions.

### MATERIALS AND METHODS

Adult healthy and live specimens of a freshwater catfish were obtained from local fish catchers of District Etawah. The fishes were treated with 0.1% potassium permanganate solution to remove dermal infection. They were acclimatized for a week and then transferred to the experimental aquaria. Specimens each of male and female (weight  $45.0 \pm 5.0$  g; length  $18.0 \pm 3.5$  cm) were used for this study. Fishes were fed regularly with dried shrimp powder. To assess the toxic effect, the fishes were exposed to a sublethal concentration (10 ppm) of Rogor. It may be mentioned here that earlier studies revealed 06 hr Tlm 50 to be 24 ppm by Dubale & Awasthi (1980).

Physico-chemical properties were checked regularly for ecological balance and the water was changed periodically to minimize variations in the medium. A minimum of six fishes were sacrificed separately alongwith control fishes at the end of 8, 16, 24, 32, 40 and 48 days of treatment, thereafter, the fishes were transferred to normal water and were kept under observations upto 24 days. The protein content and specific activities of ACP and SDH were estimated by methods of Gornall *et al.* (1949), Roles *et al.* (1964) and Beatty *et al.* (1966) respectively. In organic phosphate was measured by the method of Fiske & Subbarow (1925).

### RESULTS AND DISCUSSION

In the present investigation, it is clearly evident that the fishes which are exposed to sublethal concentration of Rogor, the protein content shows a decrease by the end of the first week of

treatment. However, a tendency was observed towards recovery and the protein content reached normal value by the end of the third week. Thereafter, the protein value increased gradually upto 40 days of treatment. After 48 days of exposure, the fishes were removed from the toxic medium and transferred to normal water. During the next 16 days the protein content continued to show an insignificant decline (Table I).

**Table I :** Protein composition, activities of ACP & SDH in a freshwater teleost, *H. fossilis*.

Parameters	Exposure period (in days)						
	Normal	8	16	24	32	40	48
Protein (mg/100mg fresh wt.)	24.41 ± 1.63	19.80 ± 0.44***	22.25 ± 1.47	24.98 ± 1.26	28.43 ± 3.86	28.77 ± 3.19	26.36 ± 0.72
ACP ( $\mu$ mole pi lib/mg protein/hr)	2.02 ± 0.09	3.34 ± 1.5*	2.52 ± 0.08**	1.28 ± 0.018*	0.92 ± 0.04*	0.99 ± 0.00*	1.16 ± 0.05*
SDH ( $\mu$ g formazon/mg protein/hr)	44.39 ± 1.68	62.42 ± 4.37**	65.27 ± 1.85*	24.37 ± 1.53*	27.67 ± 1.33*	18.79 ± 0.88*	44.28 ± 2.04*

**Table II :** Biochemical composition after the removal of fish from polluted water to normal water.

Parameters	Exposed period (in days)		
	8	16	24
Protein (mg/100mg fresh wt.)	23.69 ± 2.80	22.93 ± 2.51	26.71 ± 0.68
ACP ( $\mu$ mole pi lib/mg protein/hr)	1.74 ± 0.04***	1.54 ± 0.09**	1.20 ± 0.00*
SDH ( $\mu$ g formazon/mg protein/hr)	30.95 ± 0.89	26.70 ± 2.41	22.07 ± 1.29

Data are mean ± SD/SE of six sample; Significant at \* <0.001, \*\* <0.01, \*\*\* <0.02; Figures without \* indicate non significant from control.

The specific activity of ACP showed an increase by the end of first week in treated fishes. But this activity almost became normal between second and third weeks of exposure. During the next two weeks the ACP activity started decreasing. After 48 days of exposure the fishes were transferred to normal water. An increase was found in the ACP activity during the first week followed by a gradual decrease during the next two weeks.

The activity of SDH showed a sharp rise upto second week in the treated animals. This was however, followed by a severe decline at the end of 40 days. Soon after, the fishes were transferred to nonpolluted water, but the activity of SDH continued to show decline until the last day of experiment. After 48 days of exposure when the fishes were transferred to normal water, SDH activity did not reach a normal value (Table II).

The toxic effects were visible with a week of the freshwater teleost, *H. fossilis* to a sublethal concentration of Rogor. It resulted in a slight depletion in the quantity of protein. It may be mentioned here that a similar reduction in protein contents has also been reported earlier in the liver of *Channa punctatus* exposed to malathion by Shah (1980). It is likely that the a sharp rise in ACP activity seen resulted in depletion of protein during this period could be due to the effect of insecticides on the lysosomal membrane resulted in the increased activity of ACP. A similar stimulate activity was also reported by Thomas & Murthy (1976) in ACP activity in the liver, muscle and kidney of *H. fossilis* exposed to organic pesticides. Another noteworthy feature observed during the period was an enhanced activity of SDH indicating the stress to which the fishes were exposed.

At the end of 48 days of exposure, the fishes were removed from the polluted water and maintained in normal conditions. This brought a slight rise in ACP activity followed by a gradual decline once again.

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