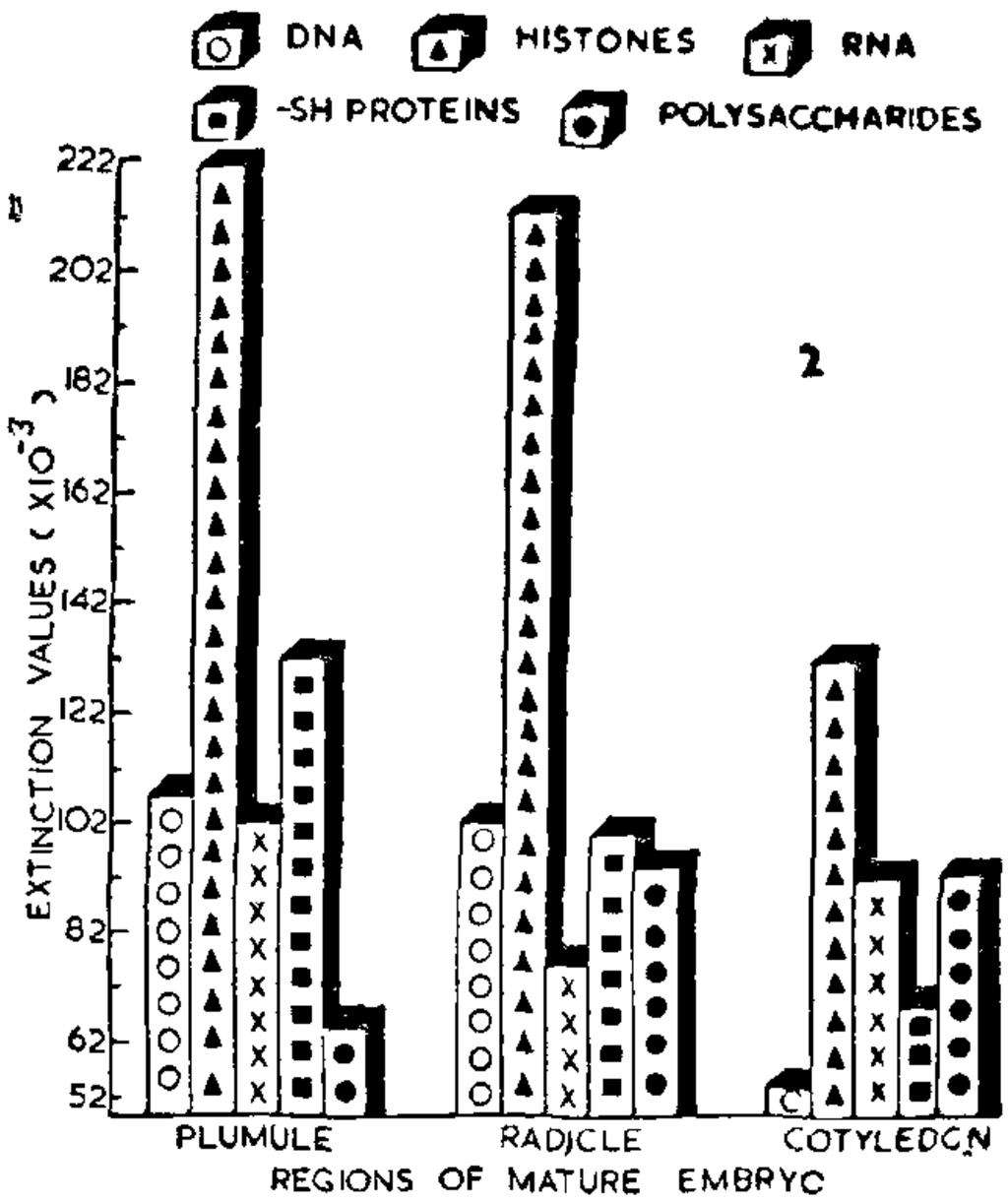

FIG. 2. The extinction values of various metabolites are plotted in different regions of mature embryo, *i.e.*, plumule, radicle and cotyledon. Plumule and radicle cells show the higher extinction values compared to the cotyledonary cells. All the regions of mature embryo show the maximum histone extinction values.

in *Stellaria media* (Pritchard[16]) whereas the plumule is entirely devoid of them. Starch grains are sparse in the radicle.

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ACUTE HISTOPATHOLOGICAL EFFECTS OF LINDANE [γ-BENZENE HEXACHLORIDE] ON THE LIVER OF *COLISA LALIA*

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ABSTRACT

The effect of 96 hr sublethal (0·1 mg/l) and 24 hr lethal (0·37 mg/l) concentrations of lindane on the liver tissue of *Colisa lalia* was studied. Sublethal concentration (exposure time 96 hr) of lindane caused more damage in the liver tissue in the form of histolysis, nuclear enlargement, pycnosis, vacuolation and necrosis. Above changes were observed to a lesser degree in lethal concentration (exposure time 6 hr) indicating that the duration of exposure is more important in bringing about histological damage in the tissues.

INTRODUCTION

PESTICIDES accumulate to varying degree in the tissues of the fish exposed to them[1,2]. Since liver is the centre of pesticide metabolism, they accumulate to a greater extent in that organ[2]. Though histopathological changes in liver and other tissues have been well documented[3,4], the nature and the extent of damage depends on the fish, the pesticide and its concentration. Allison *et al.*[5] examining DDT chronic effects could not detect any pathological change in cutthroat trout but Eisler[6] reported the changes in

northern puffers exposed to methoxychlor and methyl parathion. Degenerative liver lesions were caused by aqueous heptachlor but only at a concentration close to 24 hr LC_{50} (0·035 mg/l). In the present study, 96 hr sublethal and 24 hr lethal concentration effects of lindane (γ-BHC) on *Colisa lalia* have been examined.

Materials and Methods

A batch of 100 specimens of *C. lalia* was obtained from local fishermen. The fish belongs to the family Anabantidae, order Acanthopterigii and is commonly called as Siamese Goramy. The fish varying in length from 40 to 50 mm and in the weight range 1·5 to 1·8 g were selected for the study. The selected fish were transferred to a different aquarium containing acroflavine. They were regularly fed with pieces of boiled rice and egg and acclimatized to the laboratory conditions for 15 days. The feeding was stopped two days before the commencement of the experiment to minimise the excretory material which may adsorb the pesticide or may increase the toxicity of the ambient medium.

A stock solution of 500 mg technical grade lindane (γ-BHC in the form of amorphous powder) in 10 ml of acetone was used to prepare the desired concentrations of test water. Well water (with the following composition: Dissolved oxygen, 7·0 ppm; salinity, 0·4 ppm; alkalinity, 258 mg/litre as $CaCO_3$; hardness 375 mg/litre as $CaCO_3$; pH, 7·6, temperature, 28 ± 1° C) was used as diluent.

A batch of 10 fish was exposed to 96 hr sublethal concentration (0·1 mg/l; exposure time 96 hr) and another batch of 10 fish to 24 hr lethal concentration (0·37 ml/l; exposure time 6 hr) of lindane. Simultaneously controls were maintained by adding maximum aliquot of acetone (0·1 ml/l) alone in the water. Livers of treated and control fish were isolated and immediately fixed in Bouin's fluid. After 24 hr, the livers were processed through conventional histological procedures, embedded in paraffin wax (56–58° C), sectioned at 8 μ, stained with Heidenhain's haematoxylin using aqueous eosin as counter stain following the staining procedure described by Gurr[7]. The sections were mounted in DPX.

Results and Discussion

Figures 1 and 2 show the effect of sublethal (96 hr) and lethal (24 hr) concentrations of lindane on the liver of *Colisa lalia*. After exposure to 96 hr sublethal concentration of lindane, extensive vacuolation, enlargement and pycnosis of nuclei were observed (Fig. 1). Similar effects had been reported for various fishes exposed to different pesticides by many investigators[4–6]. When the fish was exposed for 6 hr to 24 hr lethal concentration of lindane, changes similar to those of sublethal exposure were noticed (Fig. 2). However, when compared to the effects of 96 hr sublethal exposure, the damage is less pronounced in lethal exposure. This may probably be due to accumulation of less pesticide in the tissues of fish. Greater damage to liver at the sublethal exposure against lethal exposure was obviously due to the difference in the duration of exposure which was 4 days for sublethal concentration whereas it was 6 hr for lethal concentration. Available evidences[8–10] also suggested that continuous exposure to low concentration for a longer duration leads to accumulation of more pesticides in the tissues of fish. Hence, it may be concluded that, the duration of exposure is more important in bringing about histological damages in the tissues of fish exposed to pesticide.

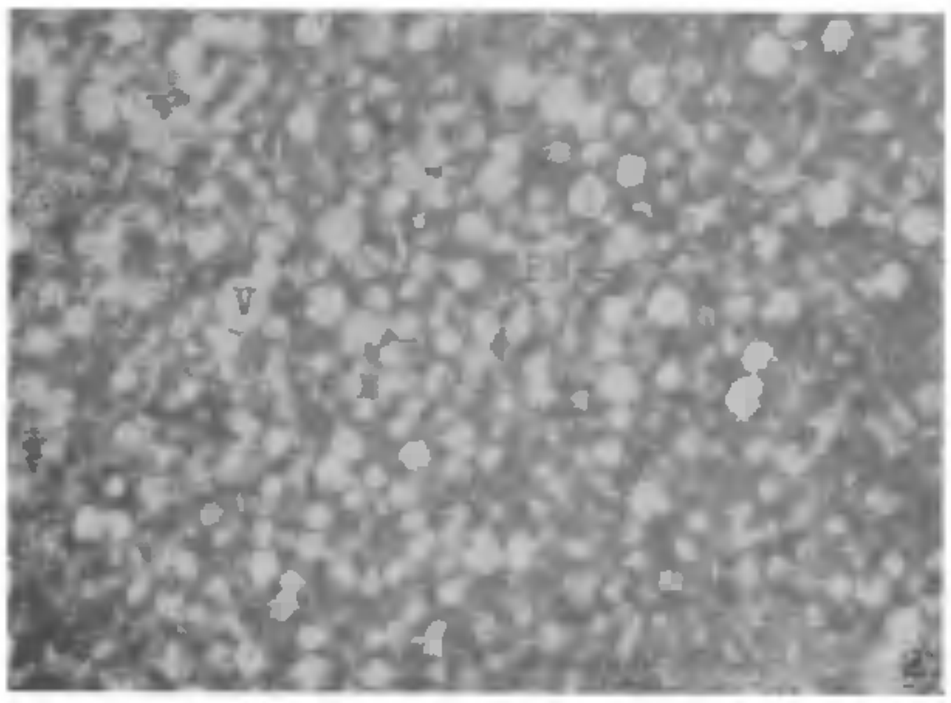

Fig. 1. T.S. liver of the fish, *Colisa lalia*, exposed to sublethal concentration (0·100 mg/litre) of the pesticide, lindane, for 4 days. Note the extensive cellular damage, severe vacuolization (V) and pycnotic nuclei (PN). Bouin's 8 μ, Heidenhain's haematoxylin-eosin (× *ca.* 320).

Fig. 2. T.S. liver of the fish, *Colisa lalia* exposed to lethal concentration (0·37 mg/litre) of the pesticide, lindane, for 6 hours. Note loosely arranged cells with vacuolation and enlarged nuclei (EN). Bouin's 8 μ, Heidenhain's haematoxylin-eosin (× *ca.* 320).

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