

centromere increased until anaphase I and dominated the activity of the original centromere. The centromere was seen to reorient and start co-orientation with the neocentromeres of the same chromosome. This activity resulted in precocious movement of some chromosomes to poles. In the light of earlier reports and the present observations it can be suggested that heterochromatic knobs on the chromosomes act as neocentromeres in *P. orientale* also.

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TOXIC EFFECTS OF CADMIUM ON THE LIVER OF A FRESHWATER TELEOST *GARRA MULLYA* (SYKES)

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INCREASING use of cadmium in various industrial and technical processes has considerably added to the problems of nutrition and particulate pollution. Cadmium is now recognised as a serious environmental pollutant which has considerable toxic effects on aquatic animals. So far, very few attempts have been made to study the effects of cadmium on target organs of fish^{1,2}. The present study was undertaken to examine the effects of sublethal concentration of cadmium on the liver of *Garra mullya*, a foodfish commonly available in the freshwater bodies of Maharashtra.

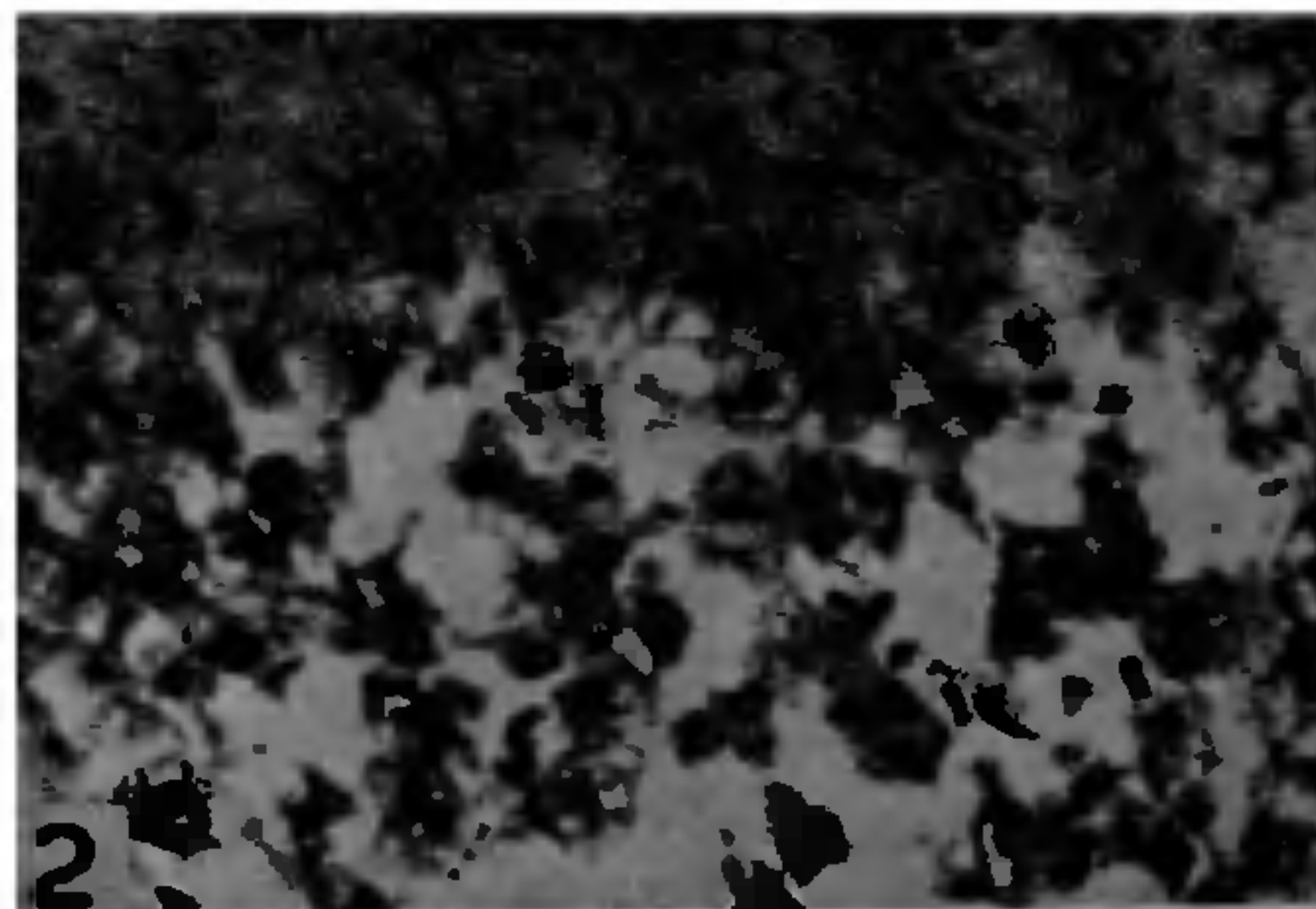
Garra mullya was collected locally and acclimated to laboratory conditions for two weeks. Static bioassay studies were carried out according to standard methods³. The 96hr LC₅₀ value of cadmium was 5.4 mg/l.

The water in which the fish were lodged was characterised by the following physicochemical properties: Temperature 24 ± 1°, pH 7.4 ± 0.2, total hardness 50 ± 2 ppm as CaCO₃, total alkalinity 62 ± 3 ppm as CaCO₃ and dissolved oxygen 6.6 ± 0.4 ppm.

Over 80 fish were selected as experimental animals (mean weight = 10.5 g and mean total length = 10 cm), and divided equally into two groups: control and experimental. Experimental animals were exposed to 25 ppb cadmium chloride for 30 days. Appropriate controls were kept in the conditioned tap water. At the end of the experiment the liver from the living specimens from both the groups were removed washed and weighed and fixed in Bouin's fluid for 24 hr. The sections were cut at 5 μ and stained with haematoxylin eosin. The hepatosomatic index (HSI) was calculated from both the groups.

The control liver is comprised of a continuous mass of large hexagonal cells forming laminae or cords. Suspended in the hepatic labyrinth of laminae are seen a number of blood sinusoids. Two cell thick wall separates adjacent laminae (figure 1).

In the cadmium treated liver the damage was in the form of extensive vacuolation, liver cord disarray and nuclear pyknosis indicating necrosis (figure 2). What-



Figures 1 & 2. 1. T. S. of liver from control *G. mullya*. Note. polygonal hepatocytes with granular cytoplasm and a central nucleus. 2. T. S. of liver from cadmium treated *G. mullya*. Note vacuolation and destruction of hepatocytes. Normal architecture of the liver is completely demolished. H. & E. × 560.

ever was left of the nuclear material in the nuclei, it was seen precipitated towards the border. A significant decrease in the HSI values was observed.

Present studies on the cadmium treated liver of *G. mullya* shows severe histological damage when exposed for 30 days. It has been reported that cadmium exposure depletes liver glycogen of the fish⁴. It is possible that the reduction in the size of the liver may be related to glycogen depletion and further it might affect the capacity of liver to store glycogen. The mechanisms of cadmium toxicity is probably due to high affinity of cadmium with sulphhydryl and hydroxyl groups and ligands containing nitrogen^{5,6}. Thus binding with such groups in chemical systems might affect control functions of the organism through the chemical and physiological processes even at very low cadmium concentrations. The carbohydrate metabolism is also found to be impaired due to cadmium treatment^{7,8}. It is therefore likely that cadmium affects the metabolism of the hepatic cells by inhibition of the enzymes and damage to the organelles.

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ANNOUNCEMENT

NATIONAL SYMPOSIUM ON THEORY AND PRACTICE OF THERMALLY STIMULATED LUMINESCENCE AND RELATED PHENOMENA

A national symposium on Theory and Practice of Thermally Stimulated Luminescence will be organized by the Physical Research Laboratory, Ahmedabad, during 8-10 February 1984. The symposium will aim to consolidate Indian contributions in this area since the National Seminar on thermoluminescence and its applications organised by BARC at RRC, Kalpakkam during 1975. The focal themes of this symposium are:

1. Physics of thermally stimulated relaxations in solids including: (a) The role of defect states-colour centres and impurities in these processes. (b) Thermoluminescence kinetics and emission spectral studies, models for thermoluminescence for phenomena such as anomalous fading, supralinearity, pre-dose sensitization etc., thermally stimulated conductivity etc. (c) Other relevant luminescence studies including radio-photoluminescence, electro-, piezo- and triboluminescence etc. as also related optical absorption and electron spin resonance studies. (d) Mechanism of thermoluminescence in specific systems such as alkali-halides, minerals, biological materials etc.

2. Experimental techniques including preparation and properties of new thermoluminescent materials.
3. Applications of thermoluminescence in: (a) Radiation dosimetry-personnel and natural radiation environment, neutron dosimetry and fallout studies. (b) Nuclear medicine, *i.e.*, radiotherapy, *in vivo* dose measurements, forensic sciences and other biological materials. (c) Archaeology-chronology, provenance, thermal history etc. (d) Earth and space sciences-chronology of sediments, authogenic minerals, geological correlation, oreprospection, diagenesis, thermal and cosmic ray irradiation history of meteorites and lunar samples, electron spin resonance dating.
4. Other dating methods based on defect creation and retention such as electron spin resonance etc. The symposium is being supported by Indian Association for Radiation Protection and various other national institutions.

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