

TABLE I  
Activity of  $\alpha$ -amylase in the intestine of *Peretima posthuma*

Normal	Treatment phosphamidon tech. (ppm)	Exposure time			
		30 min	1 hr	2 hr	4 hr
0.24 $\pm$ 0.007	10	0.229 $\pm$ 0.011 N.S.	0.220 $\pm$ 0.001 < 0.02	0.14 $\pm$ 0.003 < 0.001	0.115 $\pm$ 0.003 < 0.001
0.258 $\pm$ 0.033	25	0.175 $\pm$ 0.028 < 0.05	0.125 $\pm$ 0.004 < 0.01	0.075 $\pm$ 0.001 < 0.001	0.030 $\pm$ 0.001 < 0.001
0.242 $\pm$ 0.008	50	0.162 $\pm$ 0.008 < 0.001	0.091 $\pm$ 0.001 < 0.001	0.044 $\pm$ 0.002 < 0.001	0.0144 $\pm$ 0.001 < 0.001

N.S. = Not significant

Mean value calculated from 4 determinations  $\pm$  S.E. Probability evaluated by student 't' test.

Unit of enzyme— $\mu$ mol of maltose liberated/min/g fresh tissue equivalent.

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### HEPATIC HYPERPLASIA IN A CATFISH, *MYSTUS GULIO* (HAM), COLLECTED FROM VISAKHAPATNAM HARBOUR

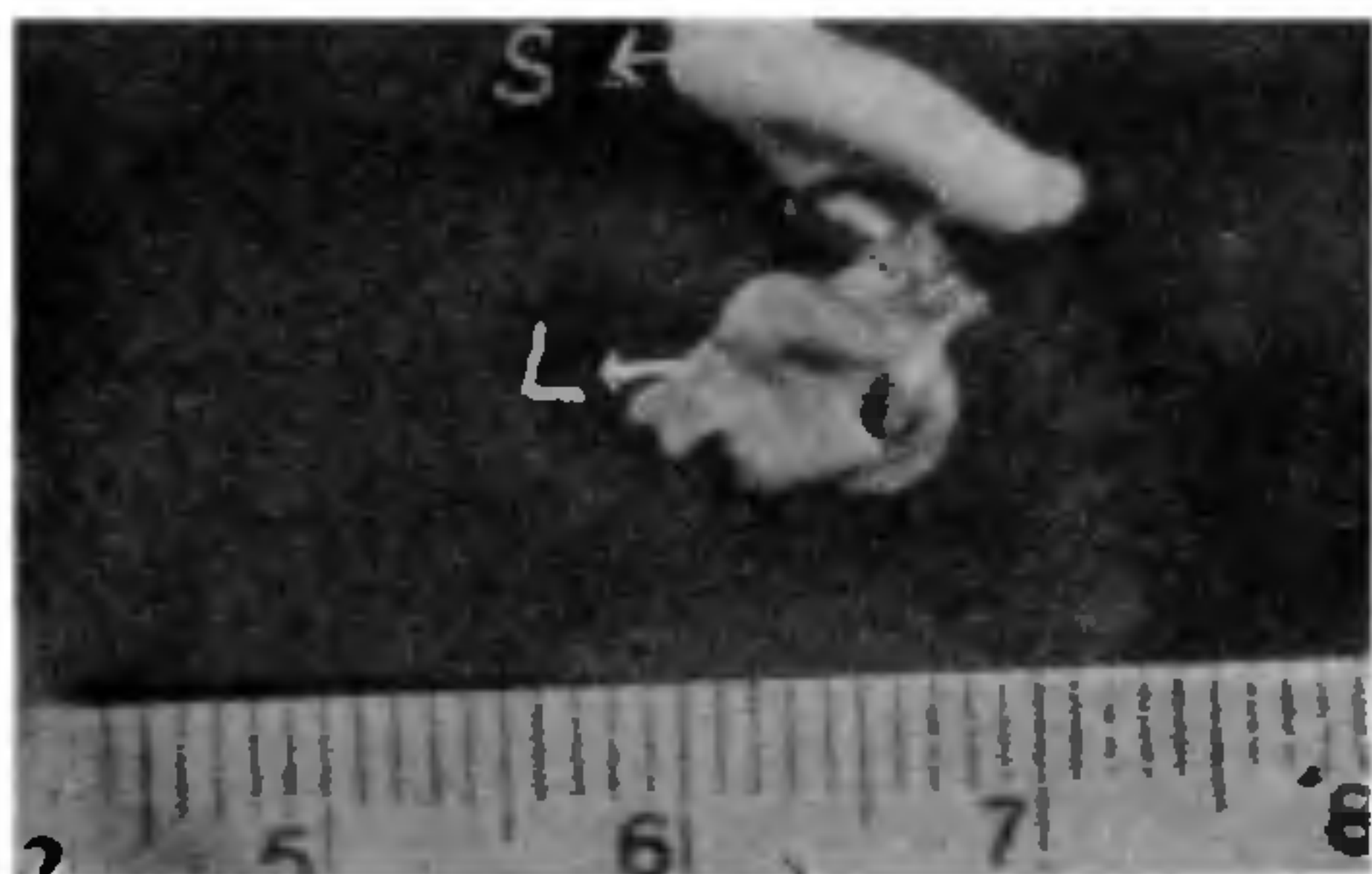
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AN unusually large specimen of *Mystus gulio* (total length 26 cm) was collected in a castnet along with 12 other specimens of the species (less than 19 cm) on 20 January 1983, from the Visakhapatnam harbour waters. The large-sized specimen was different from the others in having a bloated abdomen and emaciated tail. *M. gulio* lives up to a maximum of 6 years

when it reaches a total length of 19 cm only<sup>1</sup>. The specimen under study obviously lived upto a ripe old age, attaining perhaps the maximum size possible for the species. The cumulative effect of prolonged exposure to the toxic elements in the highly polluted harbour waters<sup>2</sup>, seems to have manifested in the abnormal appearance of the fish. A case of epidermal tumour on *Johnius aneus* caught from the nearshore waters off Visakhapatnam was attributed to the influence of harbour waters<sup>3</sup>. A total of 153 specimens of *M. gulio* have been observed so far during the routine collections for histological studies from the same area. All the other specimens were smaller than 22 cm. None of them manifested any kind of abnormality.

Immediate autopsy of the specimen revealed that among the internal organs in the viscera, the liver was egg shaped (figure 1) and very large in size (4.3  $\times$  3 cm), unlike the flat triangular (apex towards head) lobed organ (figure 2) measuring 0.9  $\times$  0.7 cm in a fish of 11.5 cm length. (Normally, the length of the liver is 2/3 of the length from the beginning of oesophagus to the tip of cardiac stomach and the width slightly exceeds the combined width of cardiac and pyloric stomachs). The length of the liver was about twice the combined length of oesophagus and cardiac stomach and the width was about four times the width of the entire stomach. The thickness of the liver slightly exceeded the width. The thickness was much too disproportionately high compared to any normal specimen.

In a normal fish the liver is flat, soft and brownish with distinct lobes. It is somewhat asymmetrical and situated ventrally extending from the middle of the oesophagus to the pyloric bend of the stomach. The



**Figures 1 & 2** 1. Hepatic Hyperplasia in *Mystus gulio*. 2. Normal size of liver in *Mystus gulio* (11.5cm) I = Intestine; L = Liver; S = Stomach.

margins of the lobes, which are thin and incompletely separate from one another, cover the anterior part of the stomach.

The abnormally enlarged liver had no distinct lobes. The entire liver was a hardened mass, greyish in colour, filling up the body cavity up to half the length of the intestine. There were nodules of different sizes on the surface of the liver. They were greyish white in colour. Obviously the enlargement of the liver is an instance of spontaneous hyperplasia.

The neighbouring organs, namely, the kidneys and ovaries also showed discolouration. Kidneys were grayish unlike the normal reddish colour. Gonads were also grayish compared to the normal yellow colour.

Earlier reports on liver tumours<sup>4</sup> were mostly from salmonids, sometimes reaching epidemic proportions (nearly 100%) in private fish hatcheries, due to the presence of aflatoxins in pelleted diet. Hepatic Neoplasia in bony fish other than salmonids were observed in bottom feeding *Catostomus commersoni*

and *Ictalurus nebulosus* of which the latter is a cat fish. *M. gulio* is also a bottom feeder. Liver tumours were experimentally induced to develop in *Brachydanio rerio* by adding diethylnitrosamine to aquarium water. The tumours developed between the 10th and 30th weeks of the experiment. Thus, although experimentally liver tumours can be induced to develop spontaneous Hepatic Neoplasia were very rare in teleosts other than salmonids.

In the present study the occurrence of Hepatic Hyperplasia in *M. gulio* may be attributed to the high concentrations of zinc and iron in the harbour waters, resulting from the effluents of neighbouring zinc plant and iron ore shipment. Zn is 100 times more concentrated (dissolved fraction) and Fe is 10-20 times more concentrated (particulate fraction) in harbour waters than in the costal waters<sup>5</sup>.

Further experimental studies on aquarium reared fish, subjected to high concentration of zinc and iron, may reveal the actual carcinogenic element responsible for the development of hepatic tumour in *M. gulio*.

Details of the histological investigations on the different organs of the affected fish are in progress. A preliminary study shows that the observed hyperplasia is a case of Neoplasia.

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## NANOPLANKTON: CHIEF PRIMARY PRODUCERS IN LAKE NAINITAL

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NANOPLANKTONS are not only the chief primary producers in aquatic ecosystems<sup>1-7</sup>, but also constitute an important component of the aquatic food webs<sup>8</sup>.