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Histology of some freshwater fishes of Kajali River, Ratnagiri, MS, India

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ABSTRACT

The present study was aimed at the assay of histopathological changes in some fresh water fishes. Tissues of some fresh water fishes like Indian major carps- *Catla-catla, Labeo calbasu*, *Puntius sophore, Mystus malabaricus, Heteropneustes fossilis, and Cyprinus carpio*, *etc. Organ* tissues*, viz.,* skin, gills, liver, kidney, Intestine, etc. Were examined for histo-pathological study. Gills tissues showed some parasitic changes on blood vessels. Respiratory epithelial wall and damage cells due to parasites. Whereas disorganization was observed to be caused due to multiple infections by parasite. Here, Histopathological changes of fish tissues are infected due to water pollution, a number of organic and inorganic wastes in industrial and domestic effluents are responsible for water pollution, and that's why fishes are infected and changes are comes to in tissue. In this study, We examine the various changes in fish tissues found in some fresh water fishes for understanding the relationship between human being for public health.

Key words: *fresh water fishes, Histology*.

INTRODUCTION

Freshwater aquaculture provides the largest source of farmed fishes in India. Carp production is concentrated in China, India, and Bangladesh accounting for 95% of world carp production. Fishes are one of the most important groups of vertebrates, which benefit human beings in various ways. Fishes were used even at prehistoric ages and it was supposed to be beneficial to long life and intelligence. Fishes are rich in protein, vitamins, and mineral salts and are also known as valuable protective food. Histology is the study of the microscopic structures of cells and tissues of plants and animals. . Histology is an essential tool of biology medicine and veterinary medicine. Histology slides are often used in teaching laboratories to help us learn about the microstructure of animal biological tissues.

The Indian Major carps *Catla, Labeo,* and *Cirrhinus* are the most important commercial fishes in India audit a maximum market demand and acceptability as load by the consumers by due to their taste and flesh. They contribute about 67% of total freshwater fish production. The major Carps of India fall under three genera, *Catla, Labeo*, and *Cirrhinus*. under the genus Catla, the species *C. catla*, under the genus Labeo fall the species *L. rohita, L. calbasu, L. fimbriatus, L. bata, L. gonius,* and under the genus *Cirrhinus* fall the species *Cirrhinus mrigala, C. reba, C. Cirrhosa*.

Indian catfish's *ompok bimaculatus, Notopterus notopterus, mastacemalus armatus* are cultivable species that have been widely used in aquaculture practices throughout India. Catfish are easy to farm in warm climates, leading to inexpensive and safe food at local grocers. Catfishes are a diverse group of ray-finned fish. Named for their prominent barbells, which resemble a cat's whiskers, despite their name, not all catfish have a prominent barbell. Members of the siluriformes order are defined by features of the skull and swim bladder. Catfish are of considerable commercial importance. Many of the smaller species, particularly the genus corydarus are important in the aquarium hobby. Many catfish are nocturnal but others are crepuscular or diurnal.

Studies have been made by several authors on various aspects of Indian major carps like taxonomy, morphology, distribution, food and Feeding, Growth, maturity, Fecundity, and Pawing, Larval development. it is important to first examine and investigate the histology of the same organ of healthy, unexposed (normal) specimens, assumed to reflect the normal histological structure of that organ on histological aspects of Indian major carps and catfishes which is the basic need for study on fishery biology and fish culture.

Suzan *et al.,* (2009) studied comparative histological and ultra structural of liver and pancreas of *Schilbe mystus* and *Labeo niloticus..*

Shankar and Kulkarni (2006) studied the effect of cortisol on female freshwater fish *Notopterus notopterus* and they found the Histological studies of the ovary in a control fish during the preparatory phase consist of oocytes belonging to 9 oogenetic stages, majority of them are at the stage of development transforming young oocytes into previtellogenic oocytes.

Srivastava (2011*)* studied the Vitamin D3 induced hypercalcemic response in threatened bronze feather back (*notopterus notopterus, pallas*). The control (0.0 IU.100 g BW-l.Day-l) fish serum calcium behaves like normocalcemia (8.25±0.21 mg.dL-l) in every sampling up to day 2. Results demonstrated that ip Vitamin D3 exerted a dose-dependent and pronounced hypercalcemic effect in freshwater threatened Bronze Feather back, *Notopterus notopterus.*

Abbas *et al.,* (2013) studied the body composition of Feather Back *Notopterus notopterus* and *Rita rita* from Balloki Head works-Pakistan and they concluded that if the body composition of *N. notopterus* and *Rita rita* is impracticably estimated directly, then water content will provide satisfactory estimates of fat and protein contents.

MATERIALS AND METHODS

To conduct the present work, fish were collected from the local fish market of Ratnagiri and various dams, Kajali river and around Ratnagiri, Fishes from various dams were collected and brought to the Department of Zoology, in large plastic bags containing the dam water in which oxygen was pumped before transport to provide less stress condition to the fishes. In the laboratory before necropsy of fish, the length and weight of fishes were noted. The used fish were ranging in weight from 150- 500 grams and the length was ranging from 46 to 57 cm.

In case a specific tissue is to be fixed, the animal should be dissected and the tissue is taken out with maximum speed. This is to prevent post-mortal change in the cells and tissues. Immediately after the tissue has been removing from the dissected animal it should be placed in the tube containing the fixative. It is also important at this stage to cut them in a square shaped measuring about 0.5 cm. on each side. After the fixation is completed, the fixative should be poured out in the sink and distilled water should be added to the tube counting the material.

After the fixation is completed, the fixative should be poured out in the sink and distilled water should be added to the tube counting the material. Be careful not to throw your material along with the fixative. The latter should be poured out slowly so that the Material remains in the tube. Do not collect the used fixative as

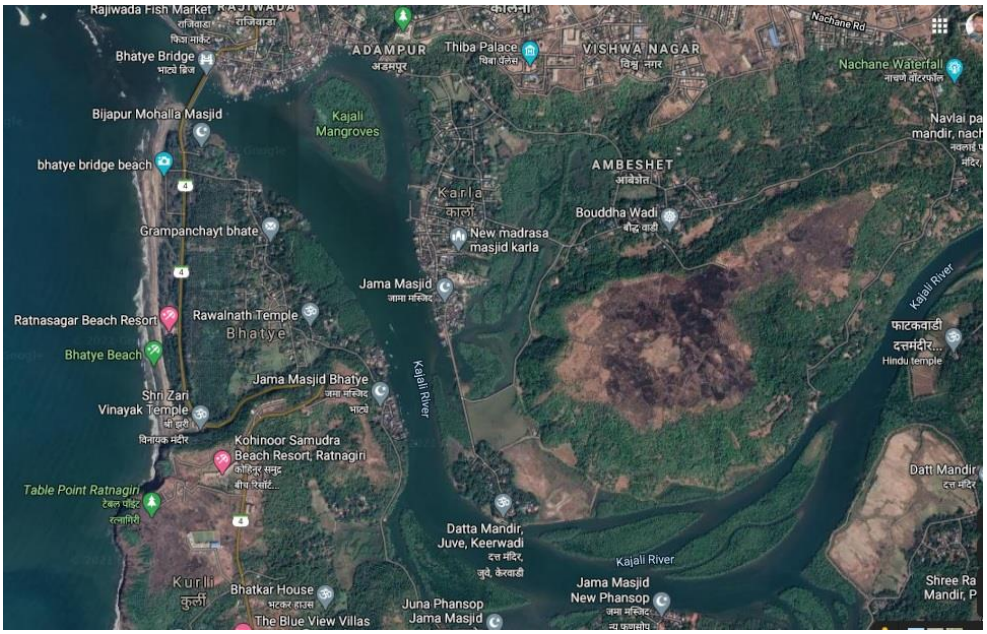


Fig. 1: Satellite View of Kajali River

the same cannot be used again. The material should be washed with distilled water by putting it in the tube containing the material and changing it after the through rinse many times. A world of caution at this stage is necessary. The dehydration should be completed in the same tube starting with 30% alcohol and then moving up to absolute alcohol through the stages of 50%, 70%, and 90% alcohol. At least 30 minutes should be allowed in each step for vertebrate tissue. If it is not possible to complete the dehydration on the same day, be sure to leave the tissue in 70% alcohol. Never live the tissue overnight in 30% or 50% alcohol. At least two changes of 30 minutes duration must be given in 90% and absolute alcoho After the dehydration has been completed, the tissue required to undergo clearing i.e., must become almost completely transparent. Methyl benzoate generally cleared tissue to the desired level in about 24 hours. Before the tissue is embedded in paraffin wax, the clearing agent must be removed completely.

An oven, set at 62c must be available in the laboratory. Paraffin wax having a melting point of 60 -62 is generally used in our laboratories. Scrapping of this wax should be taken in a beaker which should be kept in a oven till the wax melts completely. After the wax has melted completely filter it in another beaker already kept in the oven. This is necessary to remove any dirt particle in the wax, which, if left in it may cause nicks in the razor while sections are being out. The filtered wax should be in molten state for at least 24 hours before it can be used for infiltrating the tissue. To start infiltration, the material should be taken out of benzene and placed directly in molten wax in the first infiltrating pan kept in the tissue in the mixture of wax and benzene as was previously done when xylol used for removing the clearing agent. After 45 minutes again, transfer the tissue and the labeled to the third infiltration pan leave the material again for 45 minutes in the oven.

In the meanwhile, preparations for block making should be started.

For making blocks of paraffin wax and embedding the tissue into it, Apply glycerin using the index finger on the upper surface of the glass plate and the inner surface of each of the two L moulds. To begin with, open the oven and pour molten filtered wax into the rectangular cavity in the L moulds, up to about 4/5 of the total height. Immediately take out the third infiltration pan containing the tissue. Warm forceps' on the flames of spirit lamp and take out the tissue from the pan and place it gently into the rectangular cavity of the L moulds which has just been filled with wax.

When the block is finally well set, it should be kept in a paper envelope, along with the original label which had been brought up by the third infiltrating pan. It is now necessary to trim the wax block to a proper size and remove excess of wax.The sections of the slides have to be dewaxed first of all, i.e. al the paraffin wax has to be removed. Xylol is used for this purpose.

After xylol the slide should be transferred to a coupling jar containing xylol and absolute alcohol in 1:1 ratio for 5 minutes.

Staining: These slides should now be kept in card board slide trays and kept in the oven at 60 degree c. A few hours in the Paper labels if necessary should be pasted on the right side of the slide at this stage.

A few hours in the oven are enough for DPX to dry completely. The photographs of the slide will be taken with digital camera set on the inverted microscope.

RESULTS AND DISCUSSION

To study each micro forms, very sophisticated instrumentation is required involving different techniques. These techniques are called micro technique. The different tissue likes skin, gills, liver, kidney, Intestine, etc. is processed for microtomy so as to study physiological structure of the tissue.The results of the above study are discussed as under:

SKIN

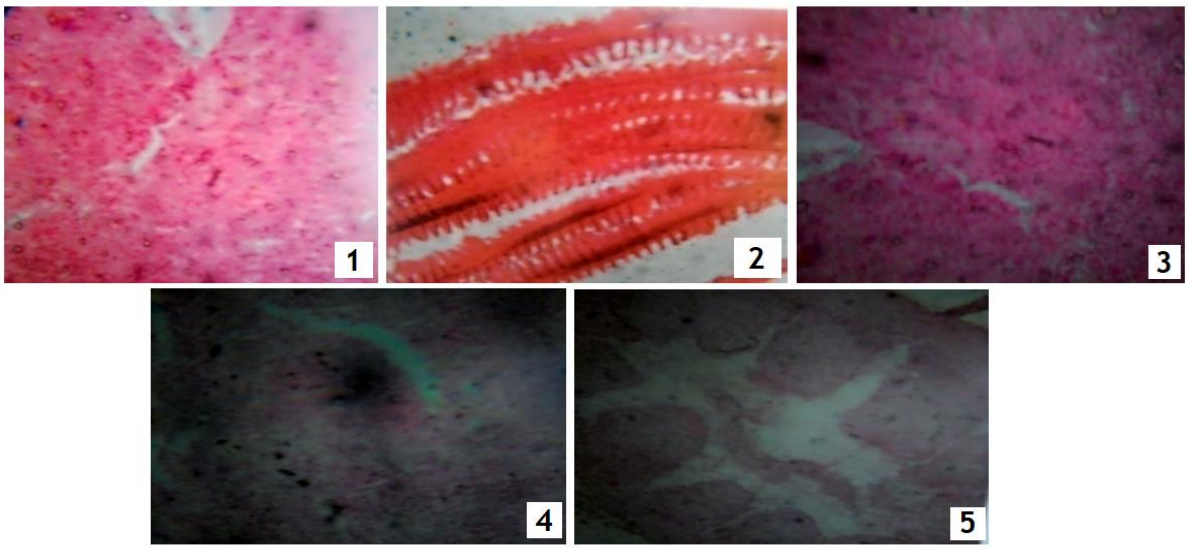
The skin is composing of an external layer or epidermis, colorless and completely transparent when healthy, and which does not measure more than a few fractions of a millimeter in thickness. Underneath the hard epidermis is found a compact dermis in which the scales are formed, and comes to the body surface after being covered by an epidermal sheath. In the epidermis are to be found numerous mucilage cells, the mucosity of which covers the surface of the fish, increases its power of movement, and at the same time performs a protective function.

GILLS

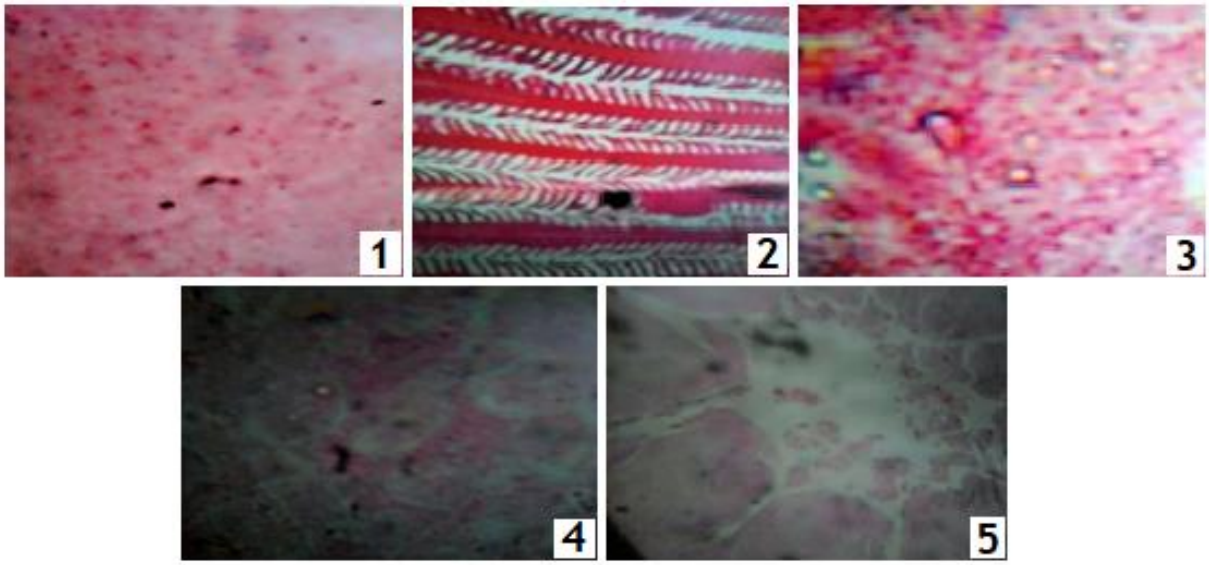
The gills are characterized by the presence of gills filaments, which themselves show numerous tiny folds which serve to further increase the efficiency of the respiratory surface. The gill filaments are connected to the branchial arches. The blood arrives at the gills by an afferent vessels and passes to the general circulatory system by means of an efferent branchial vessels break into small capillaries which are distributed throughout the respiratory folds of the gills.

LIVER

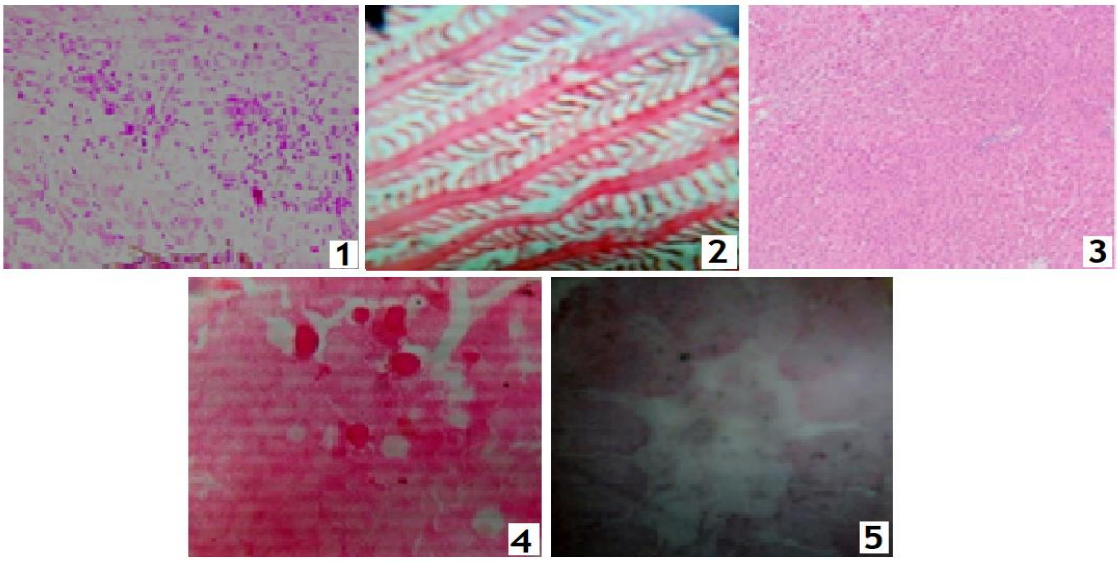
The color of the liver is reddish to light brown. In histological section numerous brackish brown colored nuclei of the hepatic cells are to be seen, as well as a few blood vessels, inside the red blood cells are especially stained. The liver is the most important organ of metabolism and for this reason it is particularly subject to metabolic dieses. Furthermore, because the liver is well vascularized many pathogenic organism becomes localized there. The hepatic cells in a normal state show well defined limits and from the hepatic string which are surrounded by blood capillaries. In the interior of this string of hepatic cells are found the *bile* caniculi. The normal intact hepatic cells always give a positive glycogen reaction.



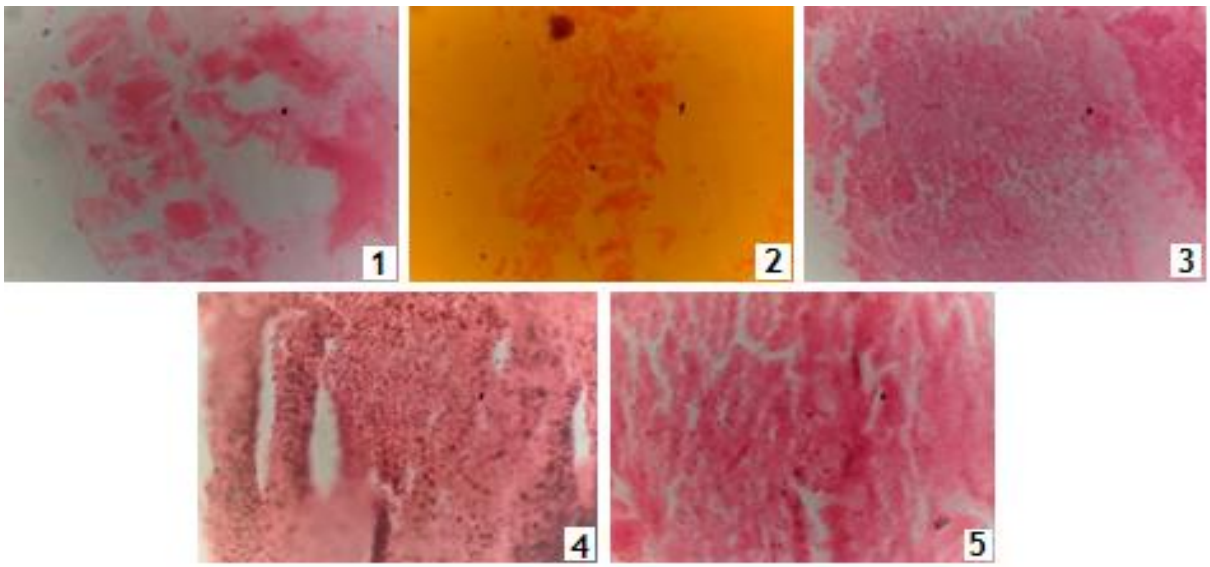
Photoplate 1: Histology of *Catla catla* 1: Skin 2: Gills 3: Liver 4: Kidney, 5: Intestine



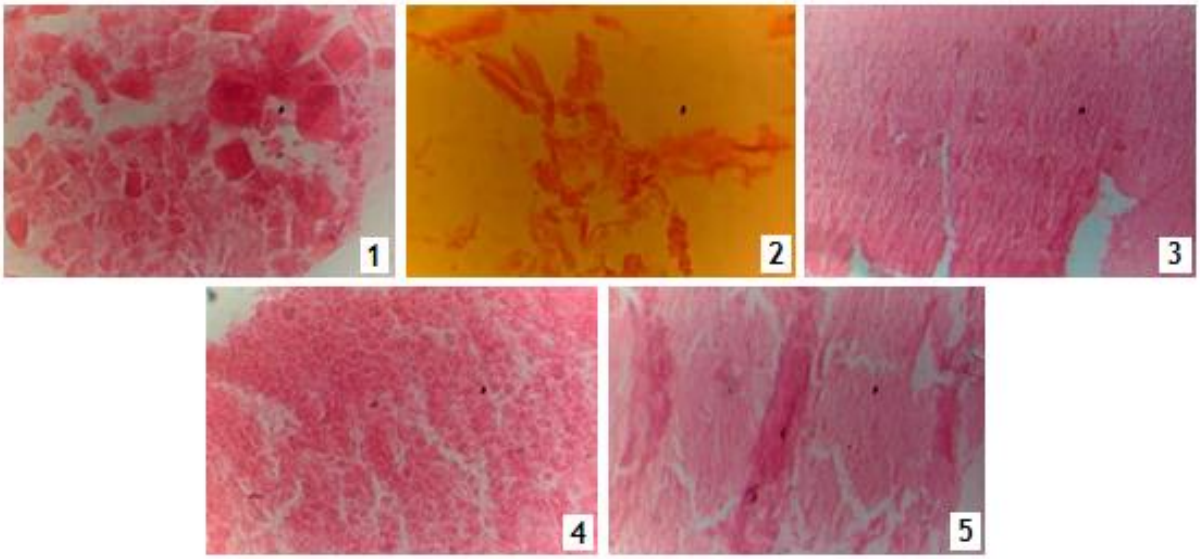
Photoplate 2: Histology of *Labeo calbasu :* 1: Skin, 2: Gills, 3: Liver, 4: Kidney, 5: Intestine



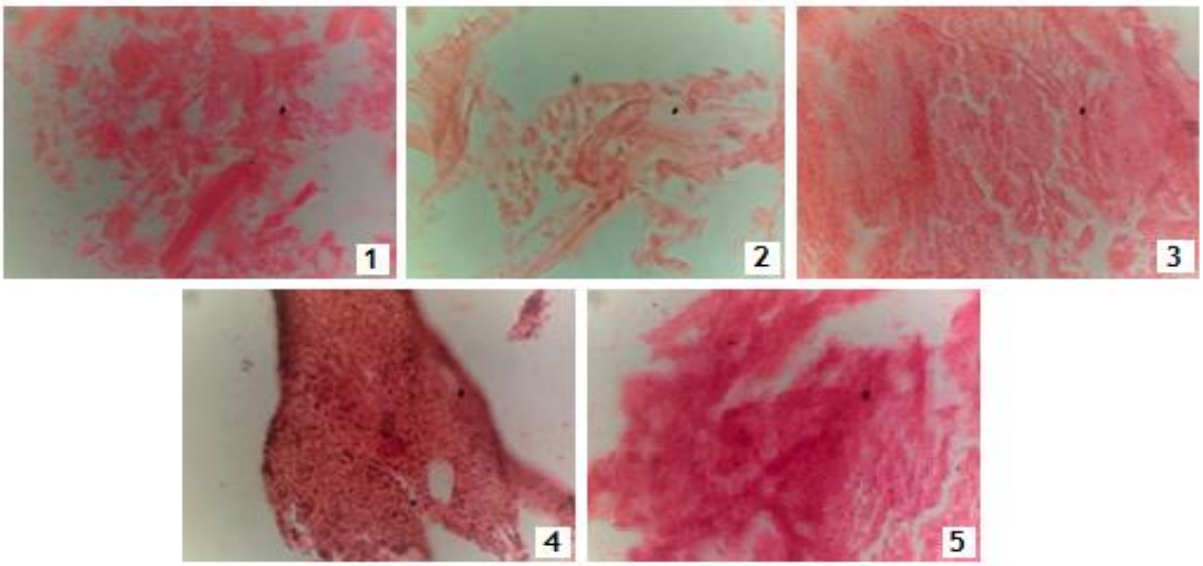
Photoplate 3: Showing Histology of *Puntius sophore:* 1: Skin, 2: Gills, 3: Liver, 4: Kidney, 5: Intestine



Photoplate 4: Showing Histology of *Heteropneustes fossilis:* 1: Skin, 2: Gills, 3: Liver, 4: Kidney, 5: Intestine



Photoplate 5: Showing Histology of *Mystus malabaricus* 1: Skin, 2: Gills, 3: Liver, 4: Kidney, 5: Intestine



Photoplate 6: Showing Histology of *Cyprinus carpio* 1: Skin, 2: Gills, 3: Liver, 4: Kidney, 5: Intestine

KIDNEY

The kidney is composing of renal tubules and interstitial lymphoid tissue. It also has abundant blood, and its cephalic or anterior portion is the organ of hematopoisis in bony fishes. Within its numerous pathogenic organisms become localized. The renal tubules commence in a glomerulus inside which is a small network of blood vessels when urinary secretion takes place. The urine is conveyed to the urethra by means of the uriniferous tubules.

INTSTINE

In the presence study it was found that the intestine is compose of a double muscular layer of smooth fiber, of smooth fibers, and an internal mucosa with folds or small crypts to increase the total surface area. Under the mucosa follows a submucosa of elastic connective tissue which is highly vascularised . In the muscular layer a ringed internal layer of and an external longitudinal one are seen. The serosa, highly vascularised, is a fibro elastic layer which serves to isolate the intestine from the peritoneal cavity. The squash preparations a marked from by the crypts is to be seen, and this differs in every species.

The present study was aimed on the assay of the histopathological changes in skin, gills, liver, intestine, kidney of some fresh water fishes. Histopathological changes of fish tissues are infected due to the water pollution, a number of organic and inorganic wastes in

industrial and domestic effluents are responsible for water pollution, and that's why fishes are infected and changes are comes to in tissue. The water parameters such as, high BOD, Ph, COD, TDS, nitrates, phosphates and free ammonia besides toxic metals cause deleterious effects on the aquatic biota. This complicated interaction between all these parameters affects the histopathological changes of the fishes. If the surrounding water of fishes is favorable for fish health, the market demand will be increases and healthy fishes available for us. These fishes histology will be un-infected.

SUMMERY AND CONCLUSION

Histopathological changes of fish tissues are infected due to the water pollution, a number of organic and inorganic waste in industrial and domestic effluents are responsible for water pollution and that's why fishes are infected and changes are comes to in tissues.

Conflict of interest

The author declares that there is no conflict of interest.

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