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STUDY OF HISTOPATHOLOGICAL CHANGES CAUSED BY A TREMATODE PARASITE IN THE STOMACH OF FISH *LUTJANUS ARGENTIMACULATUS* (FORSK., 1775) OF KARACHI COAST

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ABSTRACT

Trematode parasite collected from the fish *Lutjanus argentimaculatus* (Forsk., 1775) of Karachi coast belonging to the genus *Erilepturus* (Woodcock, 1935) were studied. Histopathologic effects of this trematode on host stomach has been studied and reported here.

Histopathology is the study of tissue damage, causes of tissue damage are of varied nature including protozoan and helminth infections. In Pakistan fish histopathology caused by trematode parasites has not been studied previous. Here an attempt is made to discuss the histopathologic changes in stomach of fish infected with trematode parasites. Several histological sections were prepared and stained by routine procedure with haematoxylin and eosin and mounted permanently in Canada balsam. Photographs of selected portions were prepared in support of the damage caused by the trematode parasites. The histopathologic changes observed during the present studies include changes in submucosal layer and infiltration of cells at the sites of penetration of trematode sucker. Clogging and ulceration of gastric mucosa.

Key words: Fish, *Lutjanus argentimaculatus*, histopathology, trematode, stomach, Karachi coast.

INTRODUCTION

Fishes have immense economic value all over the world including our country. Marine fishes are important source of protein, without deposition of cholesterol. Fishes are highly valuable because of their delicious taste. Doctors' recommend fish meat to the patients suffering from heart diseases and hypertension.

Fish meat become affected by various pathogens like viruses, bacteria and parasites like protozoans, nematodes, cestodes, acanthocephala and also by most important parasite called trematodes. Trematode parasitize mostly in the intestine of fish and sometimes may also in the stomach and liver of fishes. The metacercariae may also infest the muscles of fishes and results in changes in the size or structure of fish.

Trematodes are highly pathogenic and may have impact on the economically important fishes. In heavy infections the parasite penetrates in the muscularis externa of stomach and in turn reduces its nutritional value.

Trematodes also have a zoonotic importance for human. If the infected fish parasitized by trematode parasite is consumed by man, which is not cooked properly can cause diseases in man. Infected fishes have much lesser nutritional value as compare to the normal one.

Fish histopathology is not fully known in our country. Very few people in Pakistan are working on this aspect of fish diseases. Histopathology of fish is relatively a neglected field of study, specially the histopathology caused by various parasites. Here an attempt is made to discuss the histopathological changes in stomach infected with trematode.

MATERIALS AND METHODS

Lutjanus argentimaculatus (Forsk.,) were purchased from different fish markets in Karachi and selected organ (stomach) was taken from the fish to examine parasite in it. A total of 180 fishes were dissected out of these 48 were found infected with trematode parasite.

Sections of infected stomach were selected, tissues were fixed in 05% formaline for 24 hrs., then washed with graded series of alcohols. Tissues were than cleared by cedar wood oil by placing them for 6-12 hrs., and then bath in xylene to remove excess oil.

After the removal of excess oil the tissue were embedded in paraffin wax (melting point 60^{o}) for 24 hrs., wax blocks were made and the sections were cut (5-7 microns), stained with haematoxylin and eosin by standard techniques and mounted permanently in Canada balsam. Photographs of selected portions of sections were taken with Nikon photomicroscope using Fuji colour film.

RESULTS /OBSERATIONS

The trematodes in the stomach of fish were identified belonging to the genus *Erilepturus* Woodcock, 1935.

Histological sections of the stomach of the fish *Lutjanus argentimaculatus* infected with these digenetic trematodes were observed. Some of the trematodes were found attached in the stomach wall while others were

found free in the lumen of the stomach. Histopathological investigations confirmed that the mucosal layer of stomach was severely damaged and lost its upright architecture (Figs. 1, 4, 7, 8). It was also observed that serosa was separated from the muscularis externa (Fig. 6). Circular and longitudinal muscles layers showed degeneration and atrophy which resulted into shrinkage of muscle fibres which were separated from each other and appeared as small compartments (Fig. 7). Submucosa was swollen and most of it has been replaced by homogenous pink stained material with fibrinous exudates (Figs. 1, 2, 3, 5).

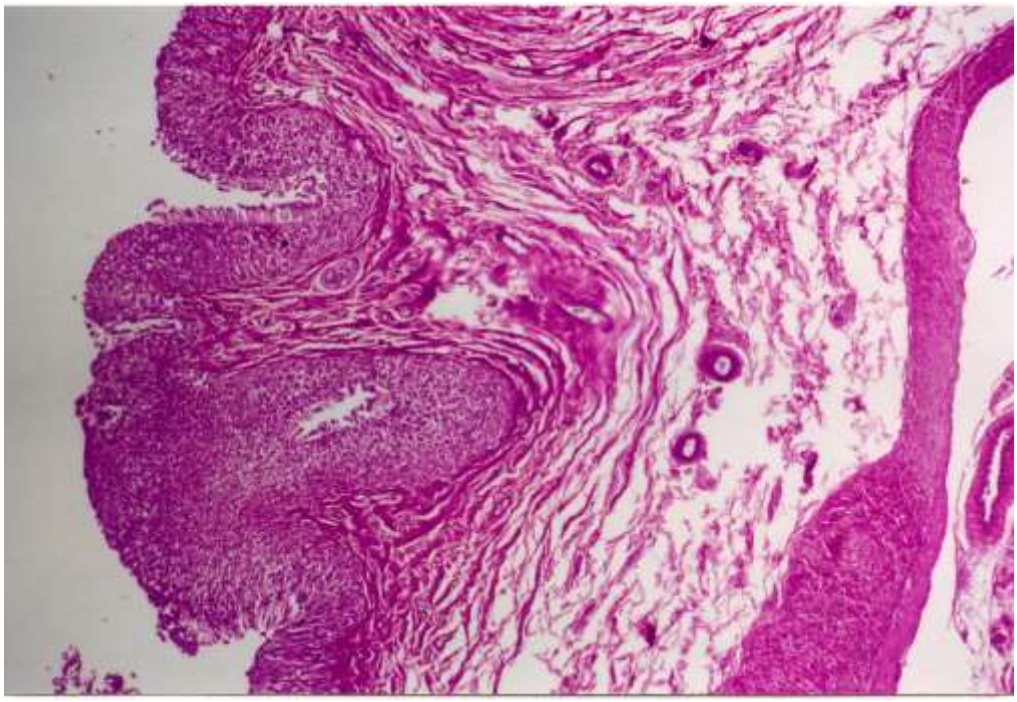

Fig. 1. Section of a portion of stomach infected by trematode *Ectenurus* sp., deformed and coagulated mucosal region, atrophytic and fibrotic submucosal region, mucularis externa also appear abnormal X10.

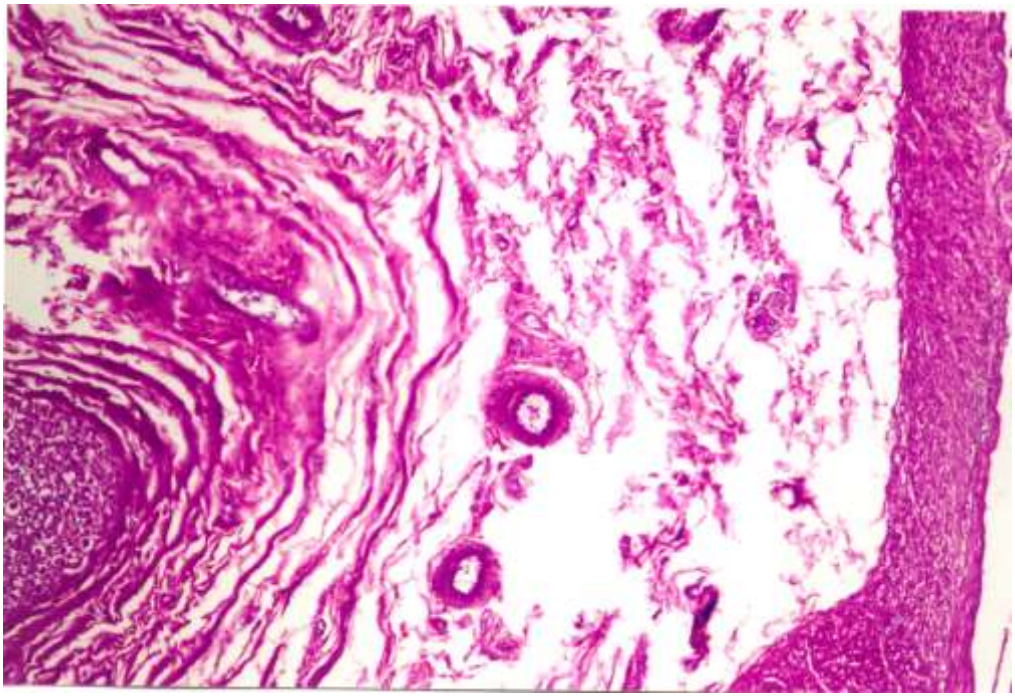

Fig. 2. Section of a portion of stomach as in Fig. 1 showing arterioles which show arteriosclerosis surrounded by fibrinous exudates casceous necrotic area on the left in the gastric region is obvious X20.

Abnormal thick walled blood vessel was prominent in the submucosal region (Figs. 2, 3). Granulomatous lesions were also seen in the degenerating gastric submucosa (Figs. 4, 5). Ulcerative lesion with abnormal blood vessel with distortion of muscular layers was prominent in the outer surface of the stomach wall (Fig. 6).

Erosion and atrophic condition of gastric mucosa and the gland cells in the process of necrosis was a common finding in severely affected sections of the stomach. Section of trematode was also seen beneath the degenerating gastric mucosa (Fig. 9). Here gastric mucosa was showing fusion of gastric glands and vacuolation.

DISCUSSION

Bullock (1963) has reported enlargement and inflammation of intestine of salmonid fishes infected with acanthocephala. Total destruction of the epithelium at the point of attachment and paramucosal lumen consisting of large numbers of detached cells of epithelial and connective tissue origin was described by him. Thickening of lamina propria was also noted by Chaicharn and Bullock (1967). Present observations are basically similar to those reported by Bullock (1963) and Bilqees and Fatima (1992) for nematode and acanthocephalan infections. But greater damage and total destruction of mucosal and serosal layers were noted during present investigation. This could be due to the strong muscular and toxic sucker penetration and toxic secretions of the trematode. This might have provoked traumatic and toxic tissue reactions which resulted into destruction of mucosal layers and underlying tissues.

Capsule formation around the penetrated acanthocephalan and nematode was observed by various workers. No capsule formation was observed around the trematode but muscular degeneration and necrosis was prominent. It was also observed that gastric mucosa was destroyed and fused to such an extent that they appeared just like a mass of vacuolated tissue with the trematodes in between gastric mucosal tissue and muscular layer. The muscular layer also appeared as a homogenous mass of tissue. Gorge and Nadakal (1981) reported extensive mucous secretions in the stomach of *Rachycentron canadus* infected with acanthocephalan parasite. But during the present study trematode infection does not appear to provoke much mucous secretion.

It is concluded that trematode infection in the stomach of fish can cause noticeable tissue damage. This may be more harmful if large number of trematodes infect a fish.

Previously histopathology of trematode infection was described in the stomach of fish *Muraenesox cinereus* of Karachi coast (Khatoon *et al*., 1998). This report indicated major changes in the mucosa, submucosa, and practically in the whole stomach wall, complete distortion of gastric mucosa was also described. Inflammation and necrosis were the common findings. More or less similar tissue damage was observed during the present studies.

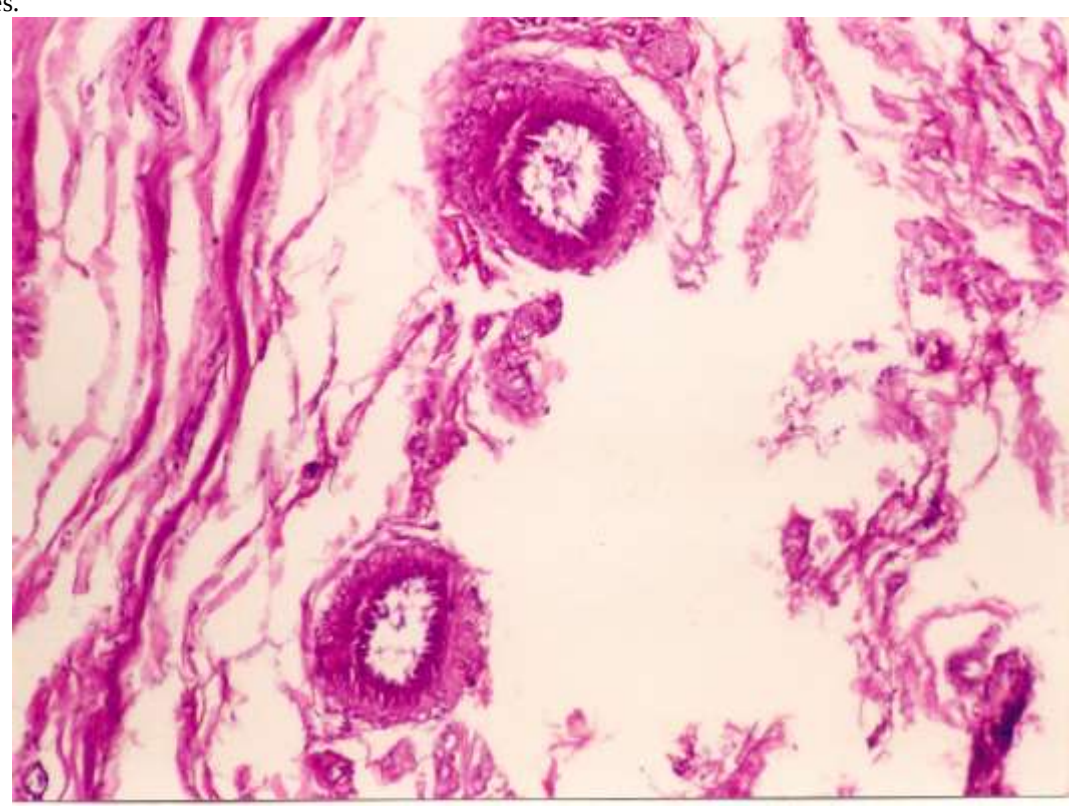

Fig. 3. High-power a section of portion of stomach as in Figure 2 shows artereosclerosis and fibrinous exudates in the vicinity X50.

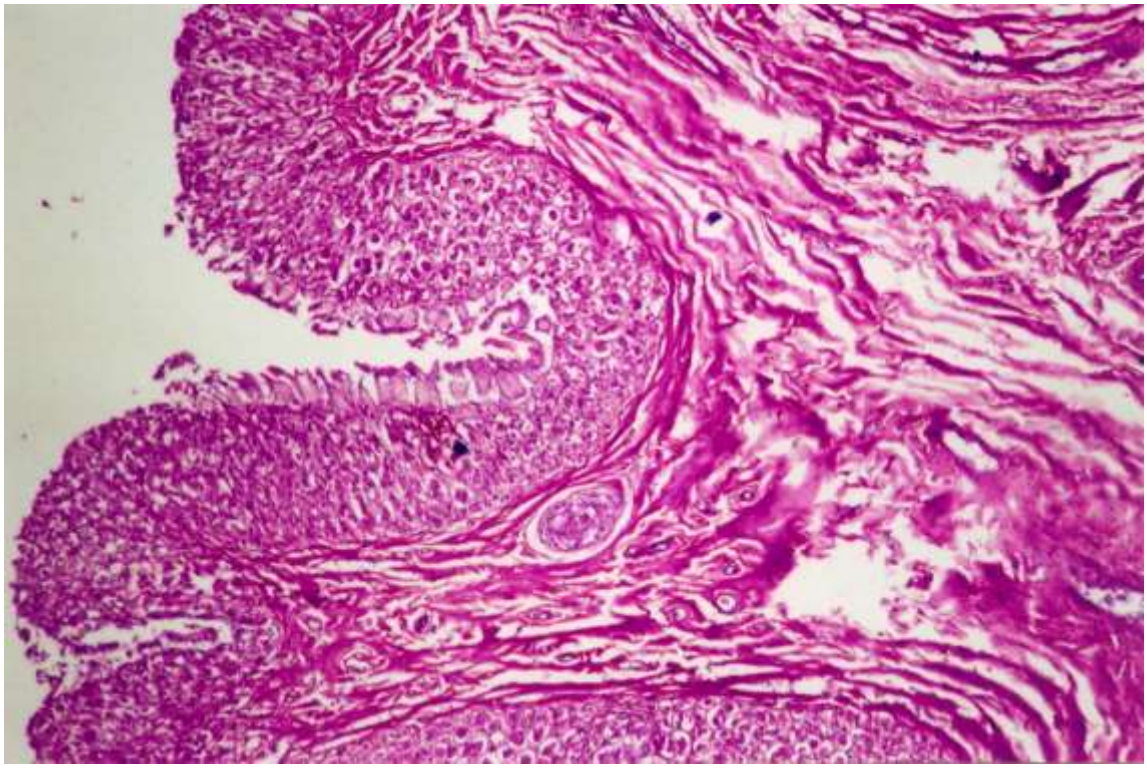

Fig. 4. Section of a portion of stomach showing hypertrophy of mucosal region, with ill-defined glands. Submucosal region shows fibrosis, granulomatous reaction at the bottom (arrow) also obvious beneath the mucosal region X20.

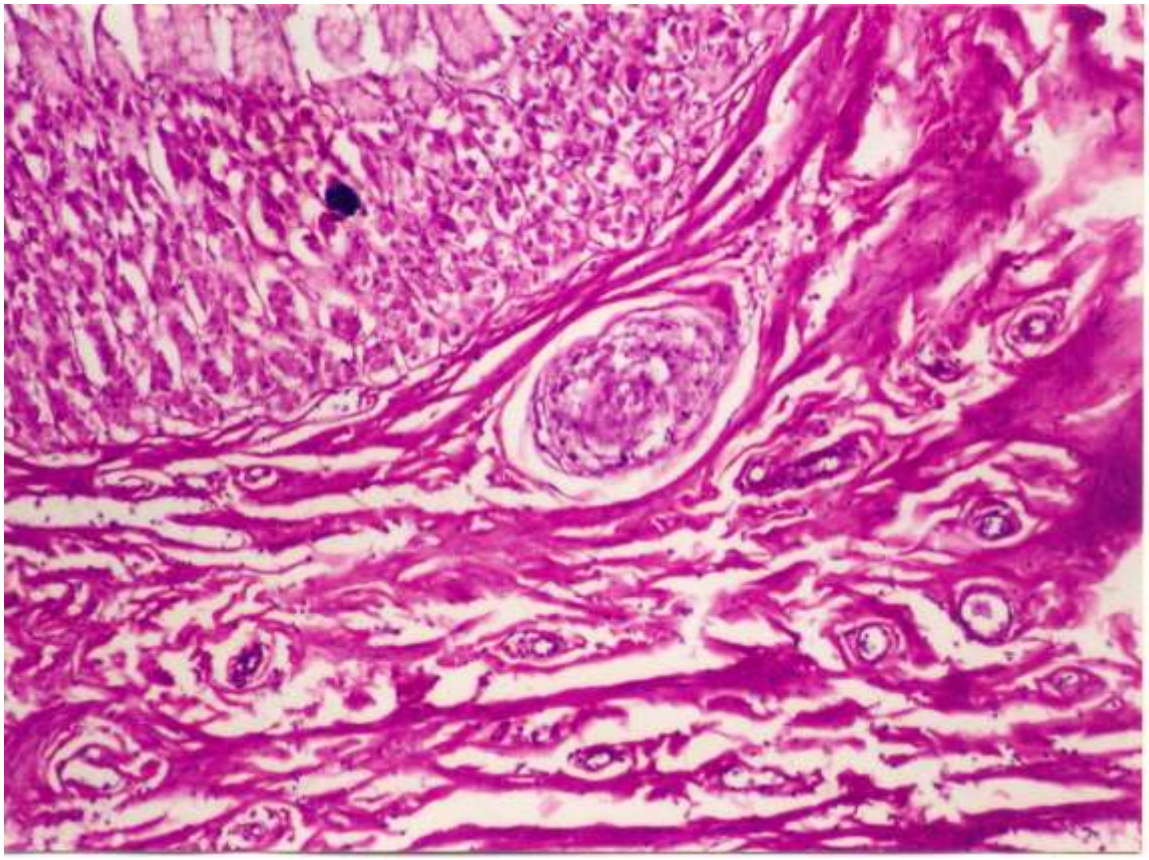

Fig. 5. High power section of a portion of stomach of Figure 4 showing submucosal granulomatous reaction (arrow), on the left mucosal region shows atrophy, nuclei are disintegrating. Several small lesions are also obvious and distorted general cellular morphology X50.

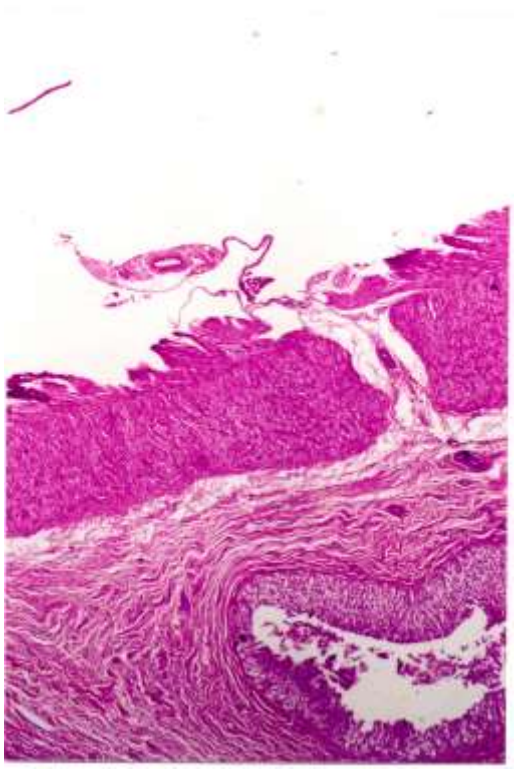

Fig. 6. Section of a portion of fish stomach infected with *Ectenurus* sp., showing ulcerative lesion, fibrosis and atrophy of all layers of stomach wall especially the serosa and muscle layer X10. A large blood vessel also indicate degeneration process.

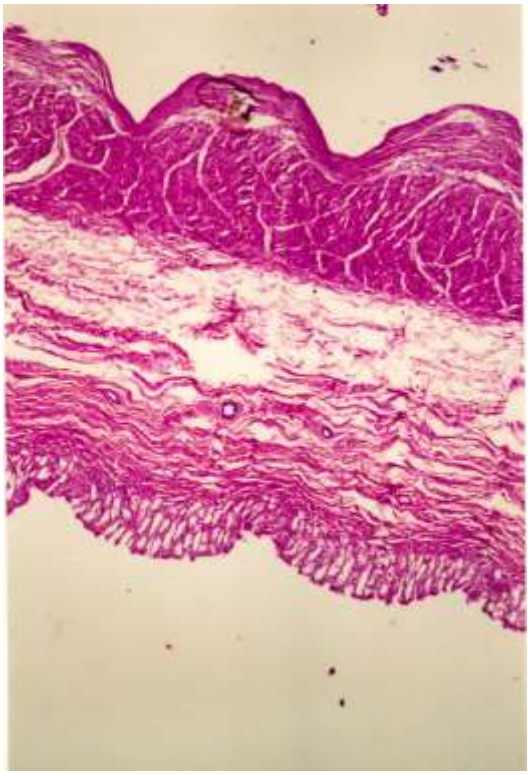

Fig. 7. Section of a portion of stomach showing marked distended muscularis externa. Atrophy of longitudinal muscles is obvious. Submucosal region replaced by fibrosis, normal morphology of lamina propria is lost. Gastric region shows empty spaces and nuclei are not visible X20.

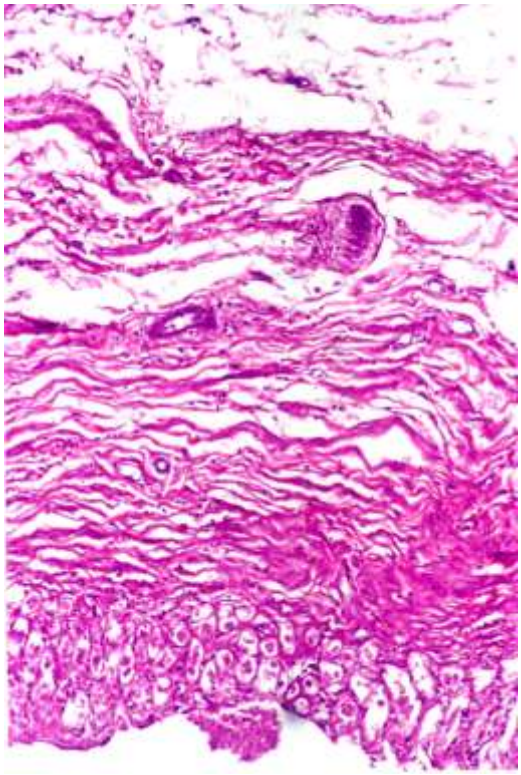

Fig. 8. Section of a portion of stomach wall showing atrophy and distention of submucosal region, distorted mucosal region. Submucosal granulomatous reaction is also obvious X50.

Fig. 9. Section of a portion of stomach wall showing coagulated necrosis in gastric region and lamina propria. Section of trematode is also obvious (arrow) X50.

REFERENCES

Bullock, W.L. (1963). Intestinal histology of some salmonid fishes with particular reference to the histopathology of acanthocephalan infection. *J. Morph*., 12: 23-44.

Bilqees, F.M. and H. Fatima (1992). Effect of acanthocephalan infection of the epithelium of *Muraenesox cineureus* (Forsk, 1775) Part-2. *Proc. Pakistan Congr. Zool*., 12: 661-668.

Khatoon, N., F.M. Bilqees and S. Huma (1998). Histopathological changes caused by trematode *Stomachicola muraenesocis* (Yamaguti, 1934) in the stomach of fish *Muraenesox cineureus* (Forsk, 1775). *Proc. Pakistan Congr. Zool*., 18: 181-186.

Chaicharn, Q. and W.L. Bullock (1967). The histopathology of acanthocephalan infection in suckers with observations on the intestinal histology of two species of catostomid fishes. *Acta Zool. Stomach*, 48: 19-42.

George, P.V. and A.M. Nadakal (1981). Observations on the intestinal pathology of marine fish *Rachycentron canadus* infected with the acanthocephalid, *Serrasentis nadakali* George and Nadakal, 1978. *J. Hydrobiol*., 78: 59-62.

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