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Histological Study Some Organs of the Cyprinus Càrpio from the Wastewater Storage Sorbulak

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Abstract: In the article the results of histological examination of morphological functional features of the internal organs *Cyprinuscarpio* (gills, liver and an intestine) are conducted fromthe wastewater storage Sorbulak, Almaty city, Kazakhstan.

Key words: Cyprinuscarpio · Wastewater

INTRODUCTION

Wastewater storage Almaty,Sorbulak–is one of the largest reservoirs of its kind in the world. Here are reset past the mechanical and biological treatment of wastewater of the Almaty, Talgar,Kaskelen and some other towns of the Almaty region.

However, the degree of wastewater treatment industry, the agricultural sector and transport and community facilities is insufficient, resulting in high levels of water pollution in Sorbulak various organic and inorganic compounds. Some of itisprecipitated and therefore, in particular, the content of the individual species of heavy metals in sediment several tens of times greater than their concentration in water. The average oil content of the wastewater storageSorbulak according to State-owned utility "Water canal" is from 3.73 to 5.06 mg /l. Reducing oil occurs in the summer, because at higher temperatures some of it disappears. According to the calculationsS.D.Tyumenev in the period from 1973 to 1998 in the wastewater storage Sorbulak received 80.784 tons of suspended solids: 1400 tons of iron, copper - 42.1 tons, 26.2 tons of zinc, lead - 28.9 tons, 26.9 tons of strontium, cadmium - 26.9 tons, 29 tons of the chromium [1,2].

The problem of studying the influence on living organisms of heavy metals in the aquatic environment has recently become a universal biological value, with great attention paid to toxicological studies. At present, the priorities for research on the impact of water pollution on aquatic organisms are changing. In connection with the conducted conservation initiatives and drop in industrial production sharp exogenous toxemia of aquatic animals have become relatively rare. However, in many large reservoirs hydrobiontsrich, particularly in the Balkhash Lake, in the wastewater storage Sorbulak are always present substances in concentrations often exceed the maximum permissible concentration [3-6].

In Environmental Toxicology pathological changes of the fish internal organs are one of the objective criteria for the assessment of the adverse effects on the fish fauna of the aquatic environment, which acts bioindicator of pollution [5-9]. In this regard, we have carried out a histological study of morphological and functional features of the vital organs of common carp (gills, liver and an intestines) in the current environmental conditions wastewater storageSorbulak.

MATERIALS AND METHODS

The materials of this study were the gills, liver and intestines of mature individuals *Syprinuscarpio* in the amount of 5 individuals from the wastewater storage Sorbulak, the average weight of which was about 900g.

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Selection of the internal organs as the object of the study was dictated by the fact that usually all water contaminating xenobiotic often concentrated in the internal organs. To determine the pathological changes in the organs of the above processing has been performed by conventional histological methods material with fill paraffin and hematoxylin and eosin paint. Analysis of the preparation and photographing performed on microscope Leica DM - LB2, at different magnifications.

RESULTS AND DISCUSSIONS

Histological study of the gills of the common carp showed that the gill filaments are covered with stratified epithelium, which is identified in the different cell types. In the basal layer of the gill epithelium petals detected swelling to form extensive intercellular spaces.

Marked signs of swelling are the adaptive response to the action of water pollutants. In the surface layer of the gill epithelium petals noted an increased number of mucous cells (Figure 1), characterized by large size, offset in the basal part of the nucleus, oxyphilic cytoplasm. The increase of the number of mucous cells was compensatory and adaptive response that increases the protective mucus layer on the surface of the gills in contact with contaminated water environment.

Gill lamellae were covered with two layers squamous epithelium. There was a separation of external and internal cells of the epithelium layers of lamellae to form cavities. Separations of the outer and inner cell layers of the epithelium were observed to a greater extent in the bottom of the lamella and at its ends. In individual lamellae observed cell death and destruction of the columnar epithelial cells (Figure 2).

Furthermore, in some gill petals observed inflammatory infiltrates and exfoliation desquamation of the secondary epithelium partial denudation lamellae.

Thus, in the common carp gills were observed compensatory- adaptive processes and destructive nature. Processes of the compensatory- adaptive nature manifested in hyperplasia of mucous cells, the phenomena of swelling and inflammation, as well as the appearance of a rather numerous mucous cells in the secondary gill epithelium. Destructive changes were detected in the form of lamella in necrosis and columnar and an epithelial cells, leading to degradation of whole lamella. The changes of destructive nature prevailed over the reactive-compensatory, indicating about high levels of xenobiotic in Sorbulak Lake.

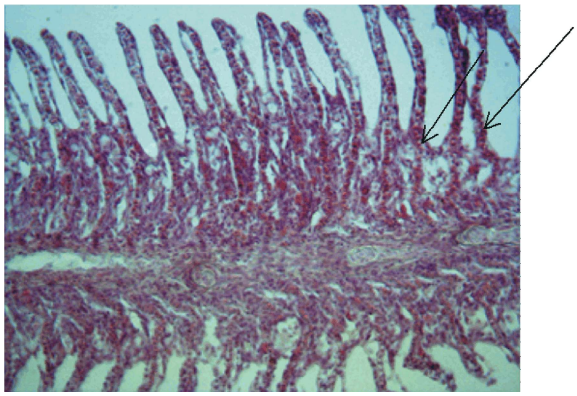

Fig. 1: The increased number of mucous cells

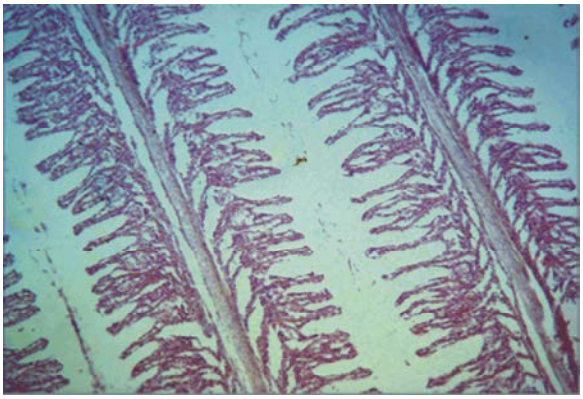

Fig. 2: Separation of the outer and inner cell layers of the epithelium, cell death and destruction of the columnar epithelial cells

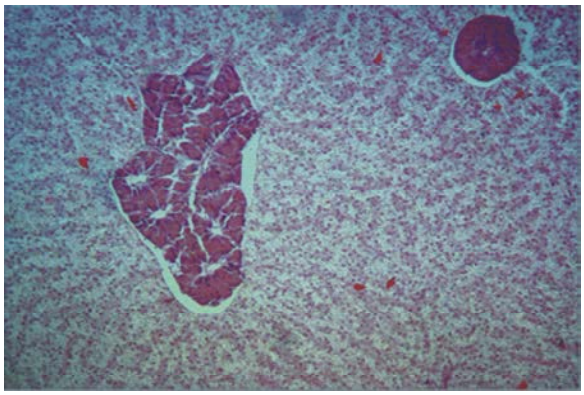

Fig. 3: Pancreas inclusion in liver tissue.

Parenchyma of liver common carp, like other species, has a tubular structure. The tubes consist of a few hepatocytes surrounding the bile capillary. In the interior of the liver, there are areas of the pancreas.The cytoplasm of hepatocytes was examined specimens common carphas grain structure by keeping a moderate amount of lipid inclusions. The large, round and basophilic nucleus located in the center of the cell.

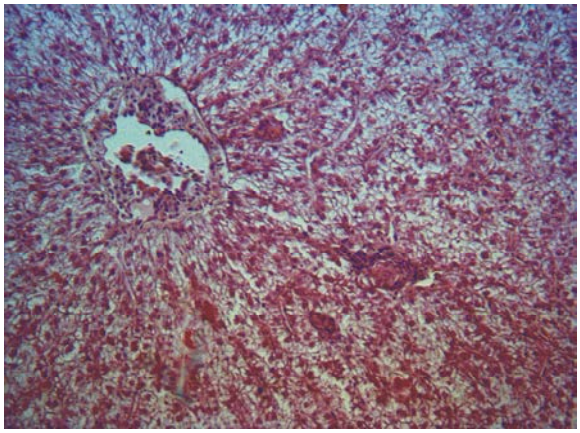

Fig. 4: Small pockets of inflammatory nature

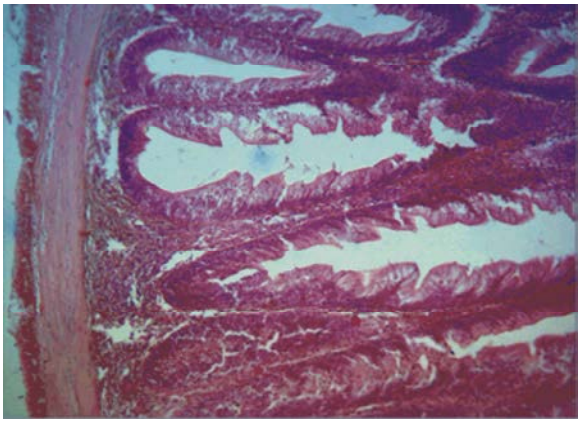

Fig. 5: Desquamation of the intestinal epithelium, Necrosis of the epithelium cells

Histologic examination of the liver common carp showed that the structure of the organ as a whole has preserved and had a typical kind. Sinusoid is narrow, poorly marked. In liver tissue pancreas inclusions are visible (Figure 3).

Noted the uneven blood supply vessels of the liver, which was reflected in the plethora and stagnation of liver vessels. In single species occur in small pockets of inflammatory nature (Figure 4).

Thus, it was noted in the liver of common carp pathological changes in mainly compensatory- adaptive nature and don't effecton the viability of this type of fish.

In the gut common carpmucosa forms numerous very high folds. The wall of the intestine is quite thick. The connective tissue in the gut wall is in mainly dense. Well-developed muscular layer consisting of smooth muscle tissue. The mucous membrane was covered with a single layer of multi-row cylindrical epithelium, which was attended by goblet cells. In mucosal shell was observed. The muscular shell was unchanged. In some areas there was desquamation of the intestinal epithelium in the deep and on top of folds and necrosis of the epithelium cells (Figure 5). In the less damaged areas of the intestinal mucosa was attracted attention increase of the number of goblet cells, which apparently was a defensive reaction to the action of damaging factors. On top of the folds of the intestine were observed inflammatory infiltrates.

CONCLUSIONS

Thus, the histological examination of the gills, liver and intestines of common carp revealed significant pathological changes in these organs by the means of plethora and stasis of vessels, swelling, inflammation and the appearance of partial necrosis in these organs. This indicated an unfavorable ecological situation in this pond but at the same time, the high adaptability of common carp to dirt of the wastewater storage Sorbulaktoxicants.

REFERENCES

1. Reshetnicov, Y.S. and O.A. Popov, 1999.Advances of the current Biology. 119(2): 165-177. [in Russian].
2. Kryuchkov, V.N., 2004. Ecological and morphological features of pathology and adaptation of organs and tissues of fish when exposed to toxicants. The Dissertation of the doctor biological sciences: 03.00.16. Makhachkala: 265. 71:05-3 / 1. [in Russian].
3. Shahgedanova, M., 2002. The Physical Geography of Northern Eurasia. Oxford University Press: 140-141. ISBN 0198233841.
4. Geraskin, P.P., 2006. Aquatic Ecosystems, 273-282. [in Russian].
5. Vasilyev, A.S. and I.A. Neporozhny, 2005. Morpho-patological analysis of fish as an indicator of the ecological state of water ponds. Actual problems of ecology of the Yaroslav region. Proceedings of the Third Scientific Conference, Yaroslavl, 1: 246-248. [in Russian].
6. Olga, S.S. and A.D. Natalia, 2013. World Applied Sciences Journal, 25(6): 886-891.
7. Jamilah, M.H., 2013. World Applied Sciences Journal, 23(10): 1351-1359.
8. Charmi, A., P. Parto, M. Bahmani and R. Kazemi, 2010. American-Eurasian J. Agric. & Environ. Sci., 7(5): 505-511.
9. Banan Khojasteh, S.M., F. Sheikhzadeh, D. Mohammadnejad and A. Azami, 2009. World Applied Sciences Journal, 6(11): 1525-1531.