

## MORPHOSTRUCTURAL AND MICROMETRIC ASPECTS OF DIGESTIVE TUBE IN CULTURE CYPRINID SPECIES

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### Abstract

The researches had advanced the study of some morphostructural and micrometric aspects at the level of different regions of digestive tube (anterior post-oesophagus intestine, anterior distal intestine, medium and posterior intestine), as correlated with both age and main type of food for the species under study. To effectuate the study were sacrificed each five individuals of bighead carp (*Aristichthys nobilis*) and silver carp (*Hypophthalmichthys molitrix*) of different ages (one summer-old, and, respectively, four summer-old), the fragments of epithelial tissues being then processed through histological technique methods. Morphologically, it was observed that both on bighead carp and on silver carp, because of stomach default, the oesophagus is too short and goes directly into the intestine being difficult to delimitate them, being presented as a short tube, extensible, whose walls are made of striated muscles. Whereas the oesophagus is a segment of passing it wasn't taken into account in our histological researches. On the base of the observations made at the microscope, can be affirmed that, in general, there are little structural differences at the digestive tube level in the segments taken into study, those consisting in the first place in the much more numerous presence of lymphoidal infiltrations and lymphatic nodules at the bighead carp comparatively with the silver carp.

**Key words:** digestive tube, bighead carp, silver carp, lymphatic follicle

### INTRODUCTION

The aquaculture of any species can not start with only the study of optimum physiologic demands in regard with the environment factors, especially the food, by virtue of which are established the technologic parameters, including those referring to alimentation, in cyprinids the long intestine offering a big surface of the nutrients absorption and a good food valorization [1, 6].

### MATERIALS AND METHOD

The digestive tube has been taken over from 5 silver carp and bighead carp individuals of various ages, namely: one- and four-old summer ones, the digestive tractus being unfolded along its whole length, after

which rectangularly-shaped fragments were taken over and processed by methods of histological techniques; thus, the nuclei were colored with hemalaune, while the cytoplasm - with eosine. Thickness of the mucous and muscular tunics was measured by the micrometric method, with a micrometric objective thin plate lamina and an ocular micrometric lamina [5].

Unlike the common carp in which the literature data [4] mention that there is a portion more dilated of digestive tube in the esophagus right away region (post-oesophagus) compared with an eventual „stomach”, in Asian cyprinid species taken into study we didn't highlight this macroscopic aspect (Figs. 1 - 2).



Fig.1. Macroscopic aspects of digestive tube in one summer-old *Hypophthalmichthys molitrix* (original photo)



Fig.2. Macroscopic aspects of digestive tube in one summer-old *Aristichthys nobilis* (original photo)

## RESULTS AND DISCUSSION

In what concerns a possible interspecific variability on the base of the realized observations, it can be affirmed that, in general, there are little structural differences at the digestive tractus level in segments

taken into study, these consisting mainly in the presence more numerous of the lymphoid infiltrations and of the lymphatic nodules in the bighead carp comparatively with the silver carp (Figs. 3 - 18).

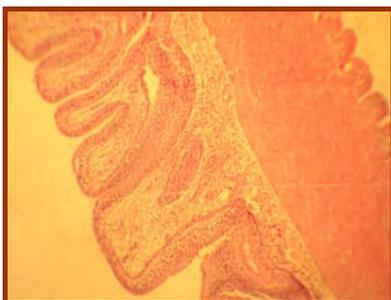


Fig.3. Cross-section through the anterior post-oesophagus intestine of one summer-old *Hypophthalmichthys molitrix* (assembly; 100x) (original photo)

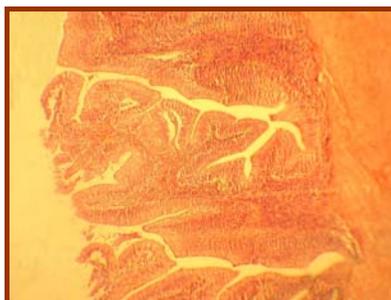


Fig.4. Cross-section through the anterior post-oesophagus intestine of four summer-old *Hypophthalmichthys molitrix* (assembly; 100x) (original photo)

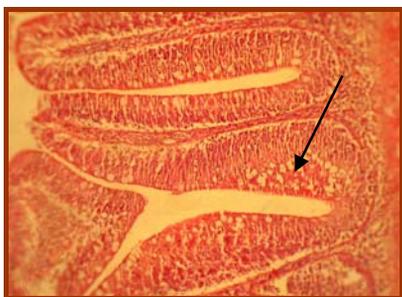


Fig. 5. Cross-section through the anterior distal intestine of one summer-old *Hypophthalmichthys molitrix* (detail: epithelium with calix-shaped cells; 200x) (original photo)

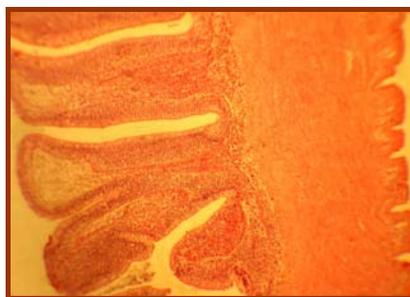


Fig.6. Cross-section through the anterior distal intestine of four summer-old *Hypophthalmichthys molitrix* (assembly; 100x) (original photo)

In *Hypophthalmichthys molitrix*, for which the food is done from phytoplankton (soft consistence), lymphocytary infiltrations

are mild, and the lymphatic follicles are very infrequent or almost absent.

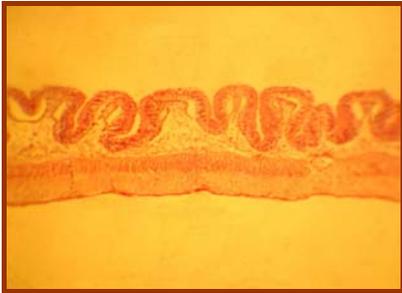


Fig.7. Cross-section through the medium intestine of one summer-old *Hypophthalmichthys molitrix* (assembly; 100x) (original photo)

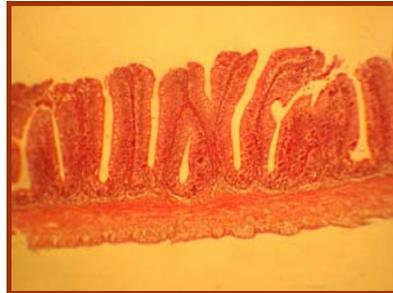


Fig.8. Cross-section through the medium intestine of four summer-old *Hypophthalmichthys molitrix* (assembly; 100x) (original photo)



Fig.9. Cross-section through the posterior intestine of one summer-old *Hypophthalmichthys molitrix* (detail: tall epithelium with weak lymphocytary infiltrations; 400x) (original photo)

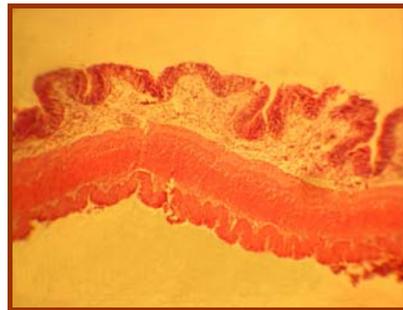


Fig.10. Cross-section through the posterior intestine of four summer-old *Hypophthalmichthys molitrix* (assembly; 100x) (original photo)

Given the fact that, the *Aristichthys nobilis* species has a nourishment diet predominantly zooplanktonophagus [2, 3], consisting mainly in cyclops, copepodes, cladoceres, kelicerates (with tough keratinous shell and who can produce lesions at the intestinal epithelium mucous) and in phytoplaktonophagus secondary (in lack of

zooplankton), it was ascertained that the lymphocytary infiltrations are strong, and the lymphatic follicles have, in general, big dimensions, being present in big number on the hole digestive tractus layout implicated in the digestion process fact that gives to this species an accentuated immune activity.

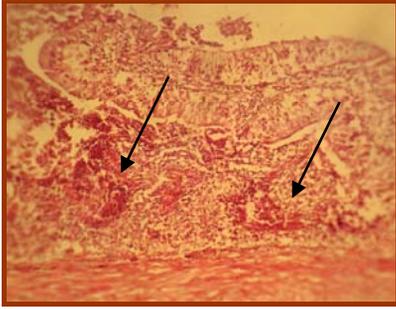


Fig.11. Cross-section through the anterior post-oesophagus intestine of one summer-old *Aristichthys nobilis* (detail: lymphatic follicle from the corione mucous thickness; 200x) (original photo)

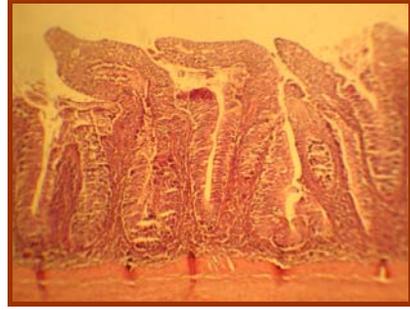


Fig.12. Cross-section through the anterior post-oesophagus intestine of four summer-old *Aristichthys nobilis* (assembly; 100x) (original photo)



Fig.13. Cross-section through the anterior distal intestine of one summer-old *Aristichthys nobilis* (assembly; 200x) (original photo)

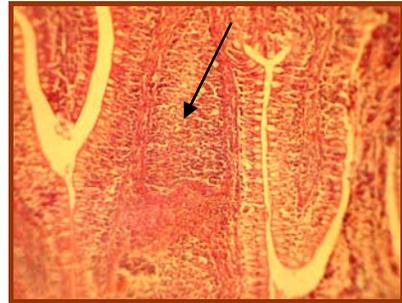


Fig.14. Cross-section through the anterior distal intestine of four summer-old *Aristichthys nobilis* (detail: lymphatic follicle; 200x) (original photo)

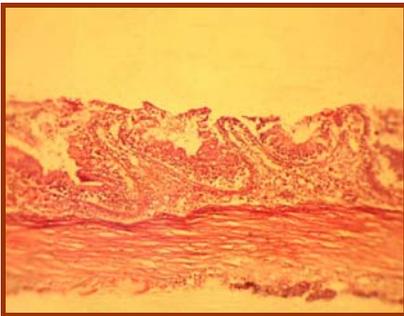


Fig.15. Cross-section through the medium intestine of one summer-old *Aristichthys nobilis* (assembly; 200x) (original photo)

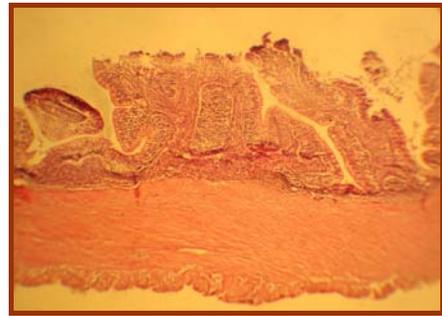


Fig.16. Cross-section through the medium intestine of four summer-old *Aristichthys nobilis* (assembly; 100x) (original photo)



Fig.17. Cross-section through the posterior intestine of one summer-old *Aristichthys nobilis* (assembly; 400x) (original photo)



Fig.18. Cross-section through the posterior intestine of four summer-old *Aristichthys nobilis* (assembly; 200x) (original photo)

Regarding the micrometric aspects of the digestive tractus tunic segments in bighead carp and silver carp, it is ascertained the existence of a variability between the two species taken into study. It is known the fact that, at herbivore organisms the digestive tractus musculature is better developed comparatively with those that consume food of animal origin.

Thus, the registered values in the case of the thickness of mucous tunic in one summer-old silver carp exemplars on whole digestive tractus layout are more superior to those met in the case of bighead carp. But in four

summer-old individuals, the situation changes in the sense that, only in the post-oesophagus anterior intestine segment the thickness of mucous tunic is bigger in silver carp (1375  $\mu\text{m}$ ) than in bighead carp (1062.5  $\mu\text{m}$ ), following that in the distal anterior intestine portion to take equal values (1000  $\mu\text{m}$ ), and in the medium and posterior intestine portion the bighead carp registers upper values (625  $\mu\text{m}$  and, respectively, 437.5  $\mu\text{m}$ ) comparatively with the silver carp (500  $\mu\text{m}$  and, respectively, 375  $\mu\text{m}$ ) (Fig. 19).

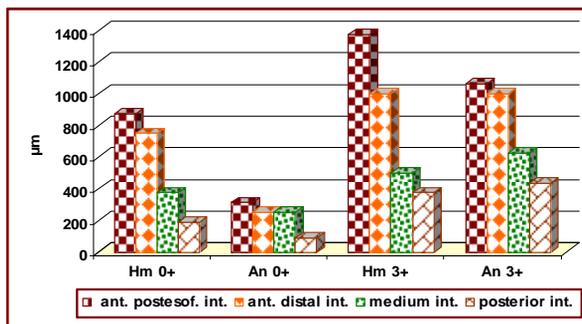


Fig.19. Comparative graphical representation of the thickness of mucous tunic at *Aristichthys nobilis* and *Hypophthalmichthys molitrix* in different stages of development

As regards the thickness of muscular tunic in one summer-old exemplars, the same as in the case of mucous tunic, on the whole digestive tractus layout presents bigger values in silver carp. In four summer-old population, in distal and post-oesophagus anterior intestine the muscular tunic is better developed in the case of

silver carp, but, in the medium intestine level takes place an increase in thickness of muscular tunic with 150  $\mu\text{m}$  in bighead carp, in posterior intestine segment registering bigger values, also, in the case of the silver carp (312.5  $\mu\text{m}$ ) towards those evidenced in the bighead carp (250  $\mu\text{m}$ ) (Fig. 20).

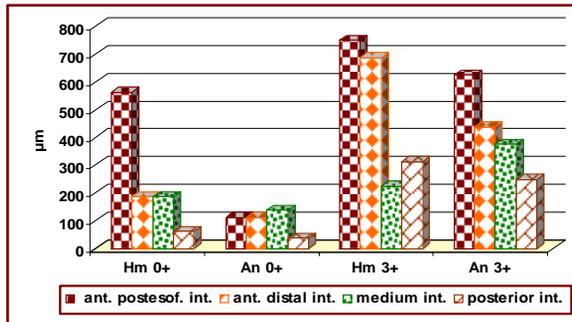


Fig.20. Comparative graphical representation of the thickness of muscular tunic at *Aristichthys nobilis* and *Hypophthalmichthys molitrix* in different stages of development

## CONCLUSIONS

The microscopic analyze of the different digestive tube segments evidences that, as well in bighead carp, as in silver carp, as in the case of other fish species, the morphology and structure of the digestive tractus are adapted in special to the type of consumed food, but also to age.

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