SOME PRELIMINARY DATA ON THE TOTAL DNA CONTENT IN *HYPOPHTHALMICHTHS MOLITRIX* AND *ARISTICHTHYS NOBILIS*

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Abstract: The work presents a comparative study between the total amount of DNA from five different types of tissues (gills, muscle, liver, spleen, kidneys) in two cultured cyprinids species from the Ezăreni accumulation, namely - silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*Aristichthys nobilis*). The results obtained show that for both Asian cyprinids species the highest average value of the total amount of DNA is to be found in the spleeny tissue comparatively with the muscular tissue, which has the lowest average value, confirming that the spleeny tissue has a more intense division activity, comparatively with the muscular one.

INTRODUCTION

It is unanimously known that fish represents an aliment with a high biological value, assured by its high protein content, its digestibility and absence of any unfavorable secondary effects upon human health; fish is also an important source of raw materials for various economic branches, such as: pharmaceutical or chemical industries, workmanship etc.

The special nutritive value of the fish meat is given by its high content of proteins, glucides, lipids, mineral salts and vitamins.

From the viewpoint of its chemical composition, fish meat evidences quite large variations, closely related to the species and age, significant differences being noticed - as to the quality and quantity of food - within one and the same species (BUD *et al*., 2004).

Structurally, the deoxiribonucleic acid (DNA) is a polydeoxiribonucleotide, that is, a macromolecular compound made of a large number of basic structural units, defined as deoxiribonucleotides (COJOCARU *et al*., 2004).

The studies devoted to the quantitative dosing of DNA in various fish tissues are quite recent. Thus, in *Carassius auratus gibelio* Bloch., it was found out that, in the three tissues (muscle, blood and spleen) taken into study, the DNA takes quite different values, from a quantitative point of view, the lowest value being recorded in the muscular tissue, while the highest one is to be found in blood (GORGAN *et al*., 2002; GORGAN *et al*., 2003; GORGAN, 2005 a; GORGAN *et al*., 2005 b).

MATERIALS AND METHOD

For the experiments, five, 2-year old individuals of *Aristichthys nobilis* (bighead carp) and *Hypophthalmichthys molitrix* (silver carp), from the Ezăreni (the district of Jassy) accumulation have been utilized.

DNA dosing was performed spectrophotometrically, on 5 different types of tissues (gills, muscle, liver, spleen, kidneys) (AUSUBEL *et al*., 1995).

RESULTS AND DISSCUSION

A first objective considered in the determination of the amounts of total DNA in the species under study was plotting of the standard curve for converting the extinction units. To this end, a series of reference samples - in which the concentration in DNA varied between 10 - 60 micrograms - has been employed. The values of extinction have been read at a wavelength equal to 270 nm.

On the basis of the graph, the regression straight line has been drawn and its regression equation has been calculated. According to the equation, the amounts of DNA corresponding to

the samples subjected to analysis have been subsequently established, and the values obtained were referred to the amount of tissue employed (Fig. 1).

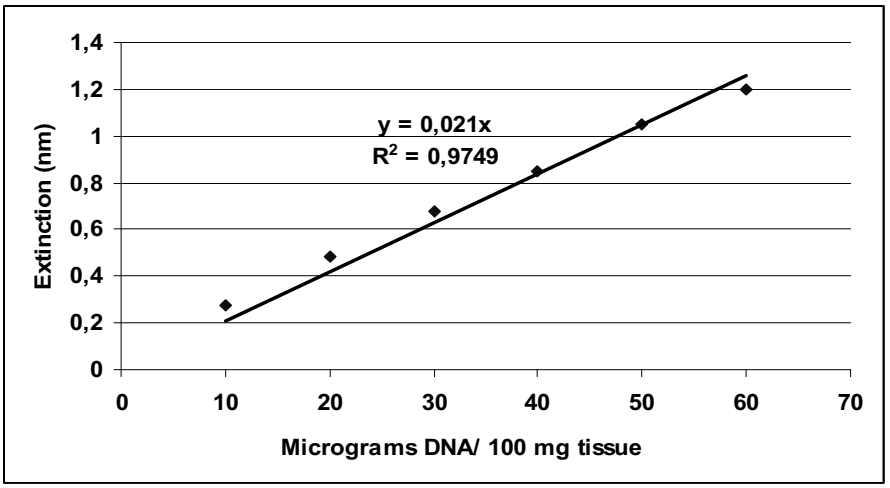

Fig.1. Standard curve for dosing DNA

It was observed that, in the individuals belonging to the *Hypophthalmichthys molitrix* species, the maximum average value is of 190.498 μg DNA / 100 mg tissue for the spleen, while the minimum one is of 65.493 498 μg DNA / 100 mg tissue for the muscle, which confirms that the spleeny tissue develops a more intense division activity, comparatively with the muscular tissue, which shows, too, quite low amplitudes of variability (Fig. 2).

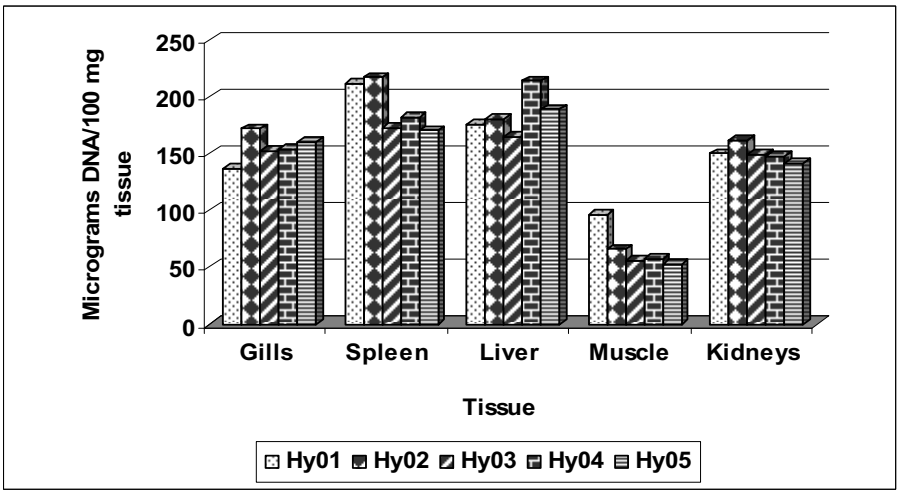

Fig.2. Individual values of the amounts of total DNA in the representatives of the *Hypophthalmichthys molitrix* species

Fig. 3 shows that the limits of the confidence intervals of total DNA are generally narrow for all types of tissue, which demonstrates the uniformity of such amounts in various tissues. The largest confidence intervals are recorded (as also evidenced by the graph of the individual values) in the spleeny tissue, the limits of which range between 217.925 - 163.070 μg DNA / 100 mg tissue.

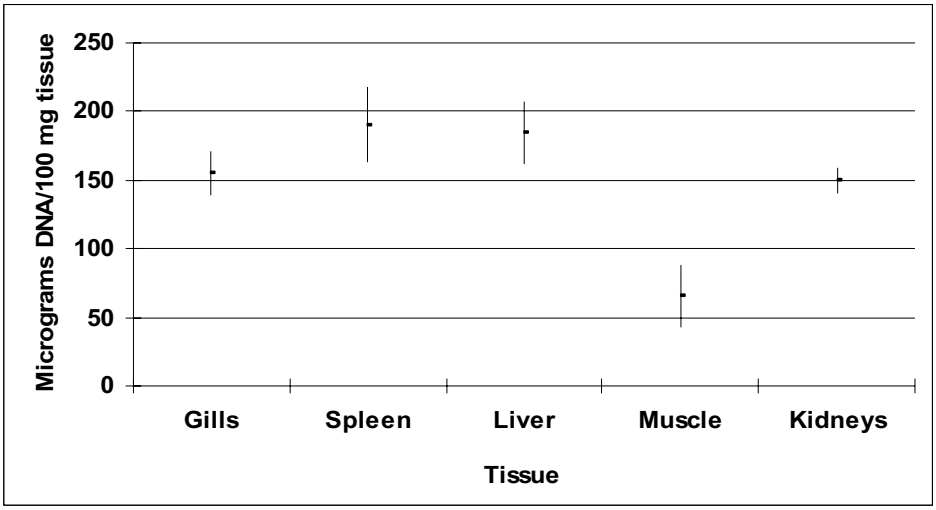

Fig.3. Confidence intervals of the amount of total DNA at *Hypophthalmichthys molitrix*

As to the representatives of the *Aristichthys nobilis* species, it was observed that the individual values manifest the same variation tendency as in the preceding species, although they are more homogeneous and better grouped around the average value - which is the proof of a pronounced central tendency. The highest amount of total DNA (204.465 μg DNA / 100 mg tissue) is to be recorded in individual Ay05, in the renal tissue, while the lowest value (90.935 μg DNA / 100 mg tissue) in Ay02, in the muscular tissue. The highest average value, of 168.049 μg DNA / 100 mg tissue, is to be found in the spleeny tissue, which also evidences a quite large amplitude of the variations, comparatively with the muscular tissue, which records, as well, the lowest average value (99.997 μg DNA / 100 mg tissue) (Fig. 4).

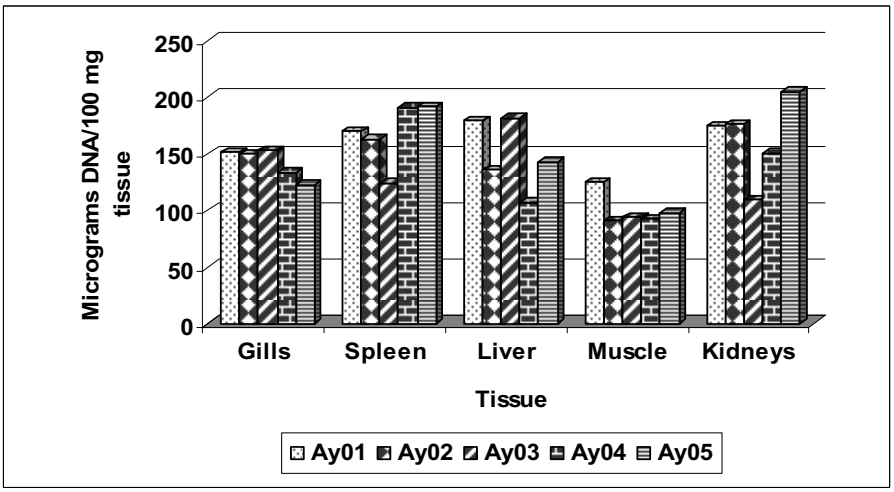

Fig.4. Individual values of the amounts of total DNA in the representatives of the *Aristichthys nobilis* species

Generally, the confidence intervals take quite narrow values. In this case, the largest interval is to be observed for the renal tissue, the limits of which range within the 118. 841 - 207.170 μg DNA / 100 mg tissue interval, while the tissue with the narrowest confidence interval and, implicitly, the lowest fluctuations in the concentrations of total DNA, but not the lowest amounts of total DNA, is the branchial tissue (Fig. 5).

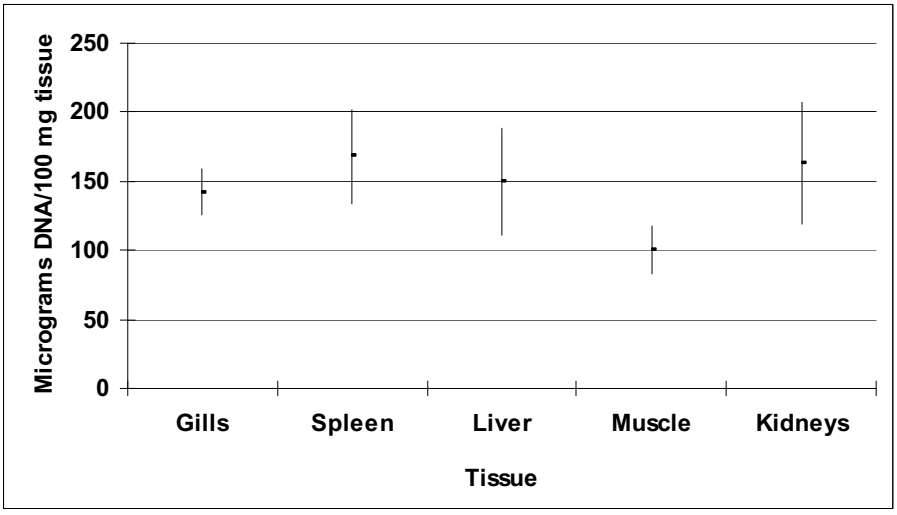

Fig.5. Confidence intervals of the amount of total DNA at *Aristichthys nobilis*

A comparative graphical representation evidences that, in the two species, the average values of the DNA amounts for the 5 types of tissue record a similar dynamics, and follow the

same curve. Thus, in its branchial tissue, the *Aristichthys* genus evidences a lower value (142.133 µg DNA / 100 mg tissue) comparatively with the *Hypophthalmichthys* genus, while, in the muscular and renal tissues, higher values may be observed (Fig. 6).

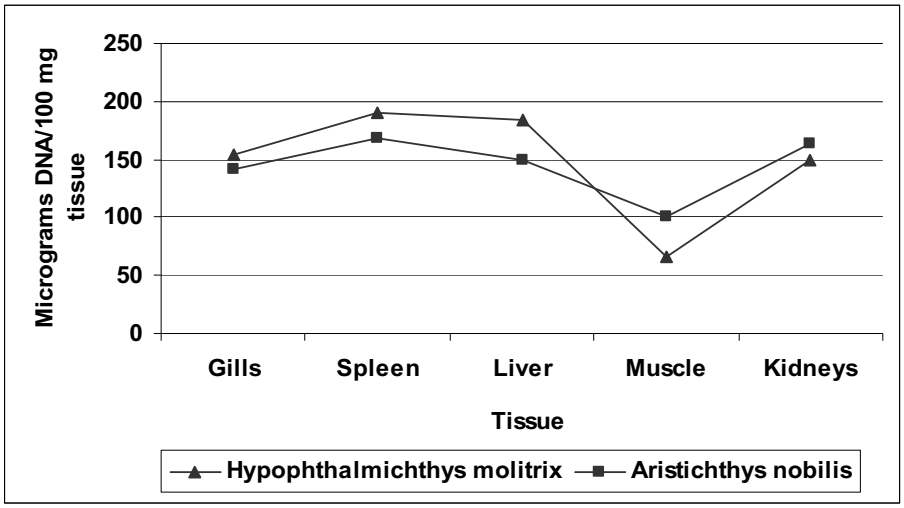

Fig.6. Comparative average values of the amounts of total DNA in the two species under study

In order to check the possible differences or similarities occurring between the amount of DNA in the two species under study, the Anova test - the bifactorial model, with an equal number of observations in the cell, has been applied, which permitted calculation of the square sums - on the basis of the (external, internal and total) variability sources, of the factor value as well as of its critical value (FOWLER *et al*., 2000).

Starting from the experimental results obtained, the null (H_0) and the alternative (H_1) hypothesis of the test have been formulated.

The results obtained statistically show that both factors (the species and the type of tissue) influence the amount of DNA, even if to various extents.

CONCLUSIONS

The results obtained in the study led to the following general conclusions:

- The highest average value of the total amount of DNA in the representatives of the *Aristichthys nobilis* species (168.049 µg DNA / 100 mg tissue), is to be found in the spleeny tissue, which also evidences a quite large amplitude of the variations, comparatively with the muscular tissue, which has the lowest average value (99.997 µg DNA / 100 mg tissue).
- In *Hypophthalmichthys molitrix*, the maximum average value recorded is of 190.498 µg DNA / 100 mg tissue for the spleeny tissue, while the minimum one, of 65.493 µg DNA / 100 mg tissue, is for the muscular tissue, which confirms that the spleeny tissue has a more intense division activity, comparatively with the muscular one, which also evidences quite low amplitudes of variability.

- In the representatives of both species taken into study, the limits of the confidence intervals of the total amount of DNA are generally narrow for all types of tissue, which demonstrates the uniformity of these amounts in various tissues.

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