

## STUDIES ON SOME MORPHOLOGICAL CHARACTERS IN FRY SILVER CARP

## STUDII PRIVIND UNELE CARACTERE MORFOLOGICE LA PUIETUL DE SÂNGER

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*The present paper investigates some morphological characters (total length, standard bodily length, head length, maxim height and bodily circumference) in representatives of silver carp (*Hypophthalmichthys molitrix*) occurring in their first growing summer. Biometric analyses were performed on 100 individuals, in the end the morphological characters under investigations being statistically processed. Explanation of the experimental results evidences low values of the standard error of the mean, which is indicative of a grouping of all external bodily variables under investigation close to the average value.*

**Key words:** morphological characters, biometry, silver carp

### Introduction

Through introduction of planktonophag fishes are achieved the growth productions, the reserves capitalization of unused food and struggle against waters eutrophization. Through waters eutrophization, the biologic production of them in continuous growing is not transformed in fishy flesh by the indigene species than in interest of 0.3%, most big part returning to primary consumers or directly in the matters circuit. The phytophagous fishes have turned to good account the primary waters production and to transform it in superior animal protein, through their brachial filter constitute from fine pores, filtering most little particles of organic food, which remain unemployed by indigene fishes, changing in the fishy valuable food (Manea, 1985; Matei and Matei, 1990).

### Materials and Methods

The researches point out a study of the bodily external variables like: total length, standard bodily length, head length, the maxim height, the circumference and the bodily weight in a number of 100 individuals belonging to the species of one summer-old *Hypophthalmichthys molitrix* (silver carp), species of culture

which belongs to Chinese carps complex acclimatized in our country (Voican *et al.*, 1974; 1975; Pojoga and Negriu, 1988).

All obtained result due the biometric study were statistically analyzed, being calculated the media, the standard error, the standard deviation, median, mode, range, the mean and precision coefficient variation, as well as lower and upper limits of the confidence intervals in which oscillates each corporal character in part (Dragomirescu, 1998; Gomoiu and Skolka, 2001; Varvara *et al.*, 2001).

## Results and Discussions

In silver carp total bodily length average is classified on last place as the value concerning in the coefficient of variation (5.705%), and the bodily weight average (19.376%) on first place (table 1).

Table 1

Values of the main statistical indices of bodily variables  
in one summer-old *Hypophthalmichthys molitrix*

| Statistical indices    | Bodily variables |         |         |        |         |        |
|------------------------|------------------|---------|---------|--------|---------|--------|
|                        | L (cm)           | ls (cm) | lc (cm) | H (cm) | Ci (cm) | G (g)  |
| Mean                   | 12.37            | 10.37   | 3.25    | 3.38   | 6.88    | 17.3   |
| Standard error         | 0.07             | 0.075   | 0.025   | 0.021  | 0.053   | 0.335  |
| Median                 | 12.25            | 10.25   | 3.25    | 3.5    | 7       | 19.25  |
| Mode                   | 11.5             | 10      | 3.5     | 3.5    | 7       | 19.5   |
| Standard deviation     | 0.705            | 0.75    | 0.251   | 0.214  | 0.537   | 3.352  |
| Variance               | 0.498            | 0.563   | 0.063   | 0.046  | 0.288   | 11.237 |
| Range                  | 2                | 2.5     | 0.5     | 0.5    | 1.5     | 9      |
| Minimum                | 11.5             | 9       | 3       | 3      | 6       | 12     |
| Maximum                | 13.5             | 11.5    | 3.5     | 3.5    | 7.5     | 21     |
| Confidence level (95%) | 0.14             | 0.148   | 0.049   | 0.042  | 0.106   | 0.665  |
| Upper limit            | 12.51            | 10.518  | 3.299   | 3.422  | 6.986   | 17.965 |
| Lower limit            | 12.229           | 10.221  | 3.2     | 3.337  | 6.773   | 16.634 |
| CV%                    | 5.705            | 7.24    | 7.731   | 6.349  | 7.806   | 19.376 |
| m%                     | 0.57             | 0.724   | 0.773   | 0.634  | 0.78    | 1.937  |

L = total length, ls = standard length, lc = head length, H = maximum bodily height,

Ci = circumference, G = weight, CV% = mean variation coefficient,

m% = mean precision coefficient

On the base of the standard error average and the *t* value given by  $\alpha = 0.05$  (probability of 95%) and a *n-1* degree of freedom (where *n* represents number of exemplary taking into study) was calculated interval of confidence limits for all bodily variables analyzed. According as is can noticed from the graphic representation of these are extravagantly reduced for all biometric parameters investigated, what means an uniformity of one summer-old silver carp individuals (fig. 1). Thus, total bodily length average is contained in the interval 12.299 - 12.51 cm, standard length average between 10.221 - 10.518 cm, head length average

between 3.2 - 3.299 cm, the height average between 3.337 - 3.422 cm, the circumference average between 6.773 - 6.986 cm, and the weight average in the interval 16.634 - 17.965 g.

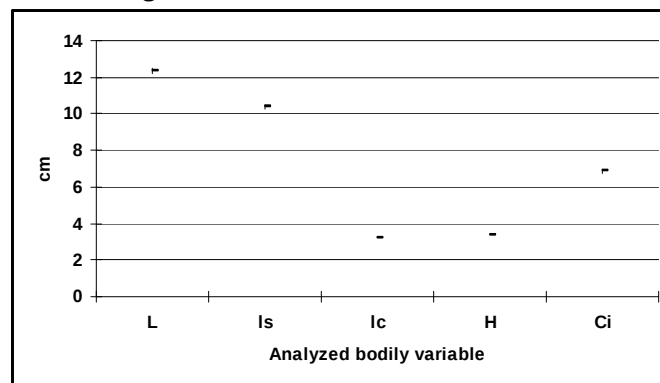


Fig.1. Confidence intervals of the external bodily variables in one summer-old *Hypophthalmichthys molitrix*

As to the correlation among standard bodily length and head length of one summer-old *Hypophthalmichthys molitrix* individuals, the Pearson coefficient of correlation has a negative value (- 0.026) indicating existence of a negative non-significant correlation from statistical point of view between two bodily variables.

The factor of determination ( $R^2$ ) express the fact that just in 0.07% from cases the values taken by the dependent variable (in our case head length) are determinate by the independent variable values (standard bodily length) and reciprocal (fig. 2).

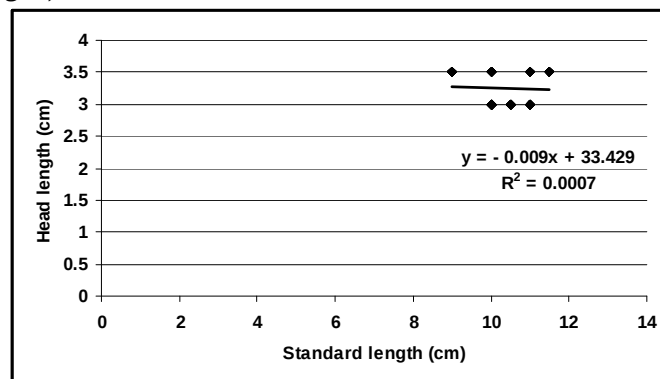


Fig.2. Graphical representation of the regression between standard bodily length and head length in one summer-old *Hypophthalmichthys molitrix*

Conversely, the coefficients of correlation testing for others bodily couples of variables led to the rejection of null hypotheses and the acceptance of alternatively hypotheses, according with exists positive correlations between morphological characters taken into study ( $t_{calculated}$  elder than  $t_{critic}$ ).

Between standard length and the bodily weight were established a value of the Pearson index of correlation of 0.753. The factor of determination notices that the values taken of two characters are determinate each other in 56.71% from cases (fig. 3).

According with the coefficients of regression calculated for two variables were evidenced that:

- to scale up by 1 cm of standard length, bodily weight scales up by 3.3 g;
- to scale up by 1 g of weight, bodily standard length scales up by 0.2 cm.

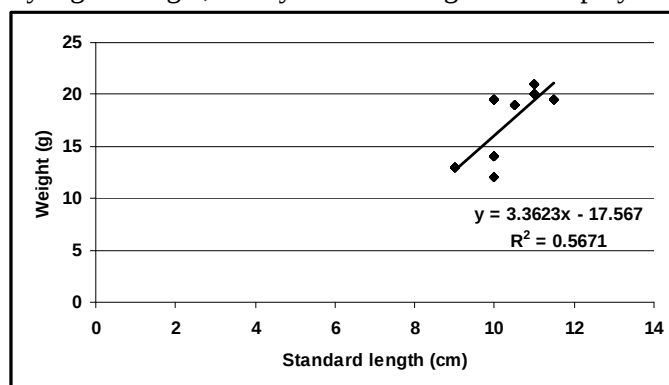


Fig.3. Graphical representation of the regression between standard length and bodily weight in one summer-old *Hypophthalmichthys molitrix*

The strongest correlation is registered between standard length and total bodily length, the index of correlation value being closer to the maximum one (0.939).

The coefficients of regression values calculated for two characters estimated that:

- to scale up by 1 cm of standard length, total bodily length scales up by 0.883 cm;
- to scale up by 1 cm of total length, standard bodily length scales up by 1 cm.

The coefficient of determination notices that the total bodily length values depending on the one of standard bodily length, and inversely, are determinate in 88.35% from cases (fig. 4).

A positive correlation was obtained, too, for standard length and the bodily height, the Pearson coefficient value being of 0.685.

The coefficients of regression calculated put into evidence that:

- to scale up by 1 cm of standard length, bodily height scales up by 0.196 cm;
- to scale up by 1 cm of height, standard bodily length scales up by 2.399 cm.

According with obtained value for the factor of determination, this type of relation is available in just 47.03% from cases (fig. 5).

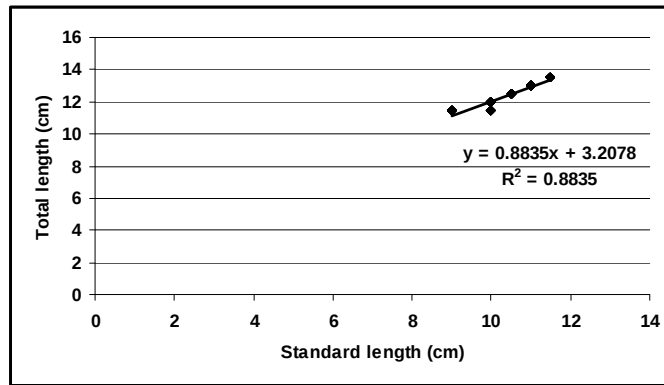


Fig.4. Graphical representation of the regression between standard length and total bodily length in one summer-old *Hypophthalmichthys molitrix*

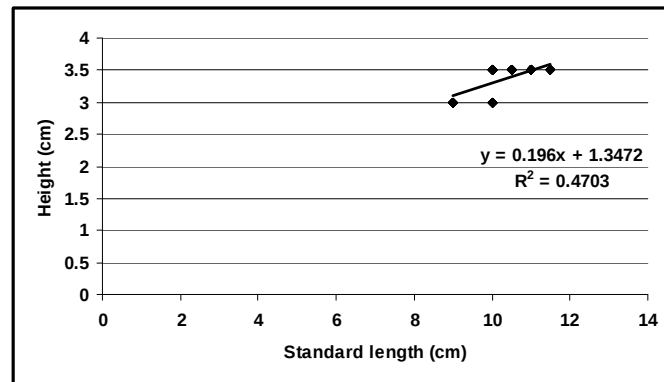


Fig.5. Graphical representation of the regression between standard length and bodily height in one summer-old *Hypophthalmichthys molitrix*

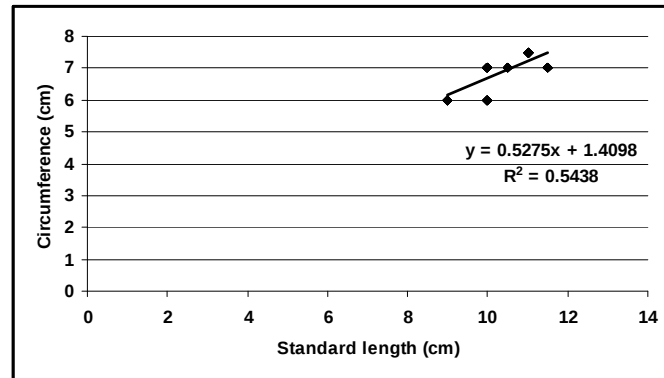


Fig.6. Graphical representation of the regression between standard length and bodily circumference in one summer-old *Hypophthalmichthys molitrix*

In this developmental stage of silver carp individuals the Pearson index of correlation value between standard length and the bodily circumference is of 0.737. On the basis of the values obtained for the coefficients of regression results that:

- to scale up by 1 cm of standard length, bodily circumference scales up by 0.5 cm;
- to scale up by 1 cm of circumference, standard length scales up by 1.03 cm.

The coefficient of determination showed that the sizes of two characters are determinate each other in 54.38% from cases (fig. 6).

The relation type between the height and the bodily circumference were established by the valuable obtained in followed the calculation of the Pearson index of correlation. According with this ( $r = 0.925$ ), between two characters is noticed a correlation near maximum. The factor of determination established that the values taken by the bodily height are determinate by the one of circumference and reciprocal, in 85.63% from cases (fig. 7).

The coefficients of regression calculated in this case showed that:

- to scale up by 1 cm of height, bodily circumference scales up by 2.135 cm;
- to scale up by 1 cm of circumference, bodily height scales up by 0.369 cm.

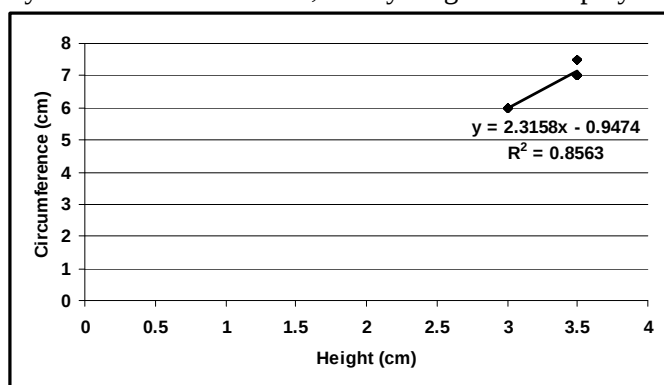


Fig.7. Graphical representation of the regression between height and bodily circumference in one summer-old *Hypophthalmichthys molitrix*

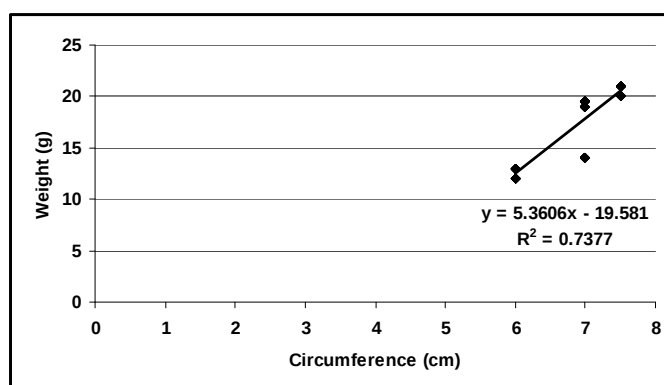


Fig.8. Graphical representation of the regression between circumference and bodily weight in one summer-old *Hypophthalmichthys molitrix*

For the circumference and the bodily weight, the Pearson index of correlation is 0.858, according with the coefficients of regression values obtained can mention that:

- to scale up by 1 cm of circumference, bodily weight scales up by 5.36 g;
- to scale up by 1 g of weight, bodily circumference scales up by 0.13 cm.

The coefficient of determination ( $R^2$ ) express that in 73.77% from cases the size of dependent variable (the bodily weight) is determinates by the bodily circumference (independent variable) and reversibly (fig. 8).

### Conclusions

➤ The statistical explanation of obtained results from the biometric determination reveals a uniformity of the silver carp population taken into consideration.

➤ Comparisons analyze between diverse couples of morphological characters in the fry silver carp evidences existence of a positive correlations between all bodily variables investigated, excepting the bind between length standard and head length, whereat the Pearson index of correlation has a value of - 0.026, this relation being statistically non-significant ( $R^2 = 0.0007$ ).

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