# INVESTIGATION OF THE RELATION BETWEEN BODY LENGTH AND BODY WEIGHT OF THE PIKE-PERCH (LUCIOPERCA LUCIOPERCA L.) IN THE TISZA-STRETCH AT TISZAFÜRED

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## Abstract

The correlation, reckoned on the basis of the data of 212 fish individuals collected in the years 1973 to 1975, is: $1 \text{ g } W = -5.6303 + 3.2837.1 \text{ g } L$, where W is body weight in g, and L is standard length in mm. The correlation is valid to the specimens above 27 cm.

Comparing the parameters of the equation to similar data on the population in Lake Balaton, it can be estalbiched that the average weight of the individuals in the Tisza, at 300 to 500 mm size, is about 2.5 decagram smaller than that of those in the Balaton. Although the tempo of growth of the individuals in the Tisza is faster and, therefore, in case of $L > 561$ mm the situation is already reversed, in practice it isn't of great importance because a larger size than that is achieved at most by 3 per cent of the fish caught.

## Introduction

In analysing the populations a consideable part is played by the allometric investigations. The allometries — following Röhrs (BERINKEY 1966) — are usually arranged in four groups: ontogenetic, supergenetic or evolutionary, interspecific and intraspecific allometries.

At investigating populations we strive for establishing the intraspecific allometries. From among these, from the point of view of production-biology — at least in case of the pike-perch populations — it is of the utmost importance to determine the allometric relation between body length and body weight.

## Material of investigation

I have used for investigating the weight and length relation of the pike-perch stock in the Tisza the data of 212 pike-perch individuals, collected in the river stretch at Tiszafüred between March 15, 1973 and October 22, 1975. The measures of length were changing between 27 and 77 cm, the body weights between 24 and 642 dkg. The body length of the individuals — from the tip of the nose till the beginning of the tail fin — was measured with 1 cm, and the body weights were determined with 1 decagram precision. I did not consider as justified to measure with 1 g and 1 mm precision, as these measurings could not take place under completely identical conditions. Thus the result of using smaller units of measure would have been but a sham accuracy.

## Method

I have reckoned the relation of weight and length on the basis of the formula suggested by TESCH (1968):

$$W = a \cdot L$$

respectively of the logarithmic form of that:

$$\lg W = \lg a + b \cdot \lg L$$

where W is the body weight of fish, L its body length, and "a" and "b" are the constants of equation. I adapted the function to the data with the least square method (SVÁB 1973).

I have reckoned the values of the condition factor according to Hile (1936), on the basis of the relation:

$$CF = \frac{W}{L^3}$$

where L is the body length in mm, and W is the body weight in g, as calculated from the allometric connection.

## Results

By analysing the relation transformed into a linear equation, I have obtained the following regressive equation:

$$\lg W = -3.3466 + 3.2837 \lg L$$

where W is given in decagram, and l in cm.

In Hungary — as I know — we have data of this character only on the pike-perch stock of the Balaton, published by BÍRÓ (1970). Accordiog to his investigations, to the individuals longer than 200 mm the following connection is valid:

$$\lg W = -5.2996 + 3.1634 \lg L$$

where, however, W is given in g, L in mm.

For comparability, I also reduced the connection concerning the stock in the Tisza to g and mm. The relation, shown in Fig. 1 and obtained in that way, is the following:
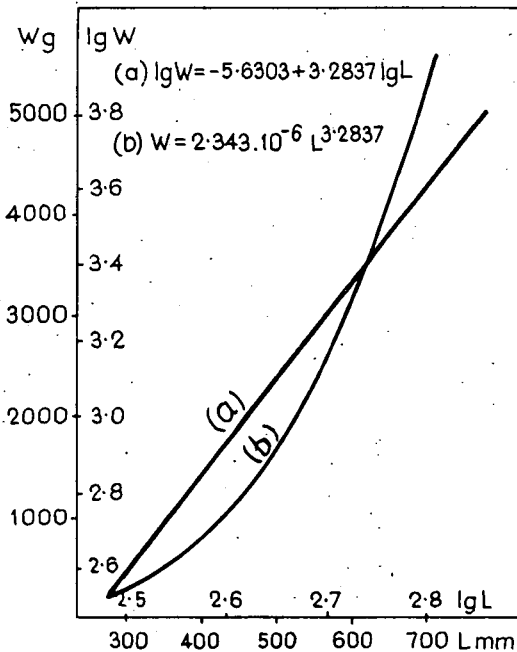
$$\lg W = -5.6303 + 3.2837 \lg L$$



Fig. 1.
Allometric relation of body weight and body length.
W: body weight (in g)
L: body length (in mm).

After comparing the parameters of both equations, there is no essential differ-ence to be seen. And that is natural, talking about groups within an identical spe-cies. Nonetheless, there is a little difference in case of both constants. For the sake of clearness, I expressed the average weights belonging to the single body measures out of both equations (Table 1).

It can be seen from the data, and the same is shown by constants "a" of the equations, that the pike-perches in the Tisza start with a smaller weight and are handicapped for a long time.

It appears from the comparison of constans "b", the so-called alometric expo-nents, that in the Tisza population the tempo of gaining weight is faster. Demonstrat-ing that on an example: while in case of the Balaton pike-perches at a double growth in length their gain in weight was 8.9-fold, the same of the Tisza individuals was 9.7-fold.

Table 1. *Body weight of pike-perches of the Balaton and of the Tisza*

| Body length (mm) | Body weight (g) | |
|---|---|---|
| | Balaton | Tisza |
| 300 | 344 | 319 |
| 400 | 855 | 821 |
| 500 | 1732 | 1708 |
| 600 | 3083 | 3109 |
| 700 | 5019 | 5154 |

From the point of view of production the condition of fish, that can be charac-terized by comparing the condition factors (CF), is important (Table 2). It is appar-ent from these data that the condition of the pike-perches in the Tisza, that are smaller than 561 mm, is poorer than of those in the Balaton. About 97 per cent of the individual caught were below the size limit mentioned above.

Table 2. *Condition of pike-perches of the Balaton and of the Tisza*

| Body length (mm) | $10^5 \cdot CF$ | |
|---|---|---|
| | Balaton | Tisza |
| 300 | 1.2740 | 1.1814 |
| 400 | 1.3359 | 1.2828 |
| 500 | 1.3856 | 1.3664 |
| 561 | 1.4153 | 1.4153 |
| 600 | 1.4273 | 1.4393 |
| 700 | 1.4632 | 1.5026 |

To sum up: The poupulation in the Tisza starts with smaller body weights and that handicap remains for long in spite of the faster tempo of growing. The condition of the large majority of the individuals caught is, therefore, poorer. Their body weight — in about 90 per cent of the cases — is by about 2.5 decagram smaller than the weight of the individuals of the same size caught from the Balaton.

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