

## INTERDEPENDENCE BETWEEN DIFFERENT BODY SEGMENTS OF SCHNEIDER (*ALBURNOIDES BIPUNCTATUS*) POPULATION FROM NADRAG RIVER BASIN

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### Abstract

Carrying out a research on a topic of this kind completes the missing elements from the literature in Romania and also depicts the native Schneider population from the Nădrag River basin. The biological material aged 3-5 has been collected through an electric fishing device from the basin of the Nădrag River, a river from the Banat Hydrographical Space, Timiș Hydrographical Basin. The number of collected individuals from the aquatic environment for the investigation was 60. After the collection, the biological material has been anesthetized with MS-222 for reducing stress induced by actions undergone within the working protocol. Any characteristic that regards the body development at Schneider females in the Nădrag River is directly proportional to the development of another characteristic. Thus one of the characters change, entails the change of other in the same direction. The most connections of Schneider females are positively connected with thresholds between  $p < 0.05$  and  $p < 0.001$ . Insignificant correlations have been found between the length of the caudal peduncle and the length of the head ( $r = 0.808$ ;  $p = 0.808$ ) and between the body mass and the length of the mouth peak. ( $r = 0.276$ ;  $p = 0.077$ ). Regarding Schneider males it has been observed the fact that all connections between the analyzed characteristics are positively connected with thresholds between  $p < 0.05$  and  $p < 0.001$ . The exception to this is the positive connection between the length of the mouth peak and the length of the caudal peduncle that is insignificant since it represents a threshold of  $p = 0.129$  ( $p > 0.05$ ).

**Key words:** *Alburnoides bipunctatus*, theoretical prolificacy, Nădrag river basin

### INTRODUCTION

Through somatic measurements (body measurements) the fish condition can be established, their adaptability to the environment, as well as how the food is being used. The gross values obtained based on body measurements highlight, through mathematical calculations, the independence between the different body segments.

Carrying out a research on a topic of this kind completes the missing elements from the literature in Romania and also depicts the native Schneider population from the Nădrag River basin.

According to Bura et al. (2008) the Schneider females from the Nădrag River basin have an average body length of approximately  $9.99 \pm 0.20$  cm, and the males

have an average body length of approximately  $0.09 \pm 0.23$  cm [1].

The body mass of the Schneider population from the Nădrag River basin, related to values mentioned above is higher than  $9.77 \pm 0.71$  g at females and of  $6.67 \pm 0.49$  g at males. The length of the caudal peduncle is slightly bigger at females ( $1.65 \pm 0.04$  cm) as compared to males ( $1.58 \pm 0.07$  cm). In what regards the maximum body height, women have a maximum height of  $2.41 \pm 0.06$  cm as compared to males that have a maximum height of  $2.08 \pm 0.05$  cm.

### MATERIAL AND METHODS

The biological material aged 3-5 has been collected through an electric fishing device from the basin of the Nădrag River, a river from the Banat Hydrographical Space, Timiș Hydrographical Basin [2, 3].

Nădrag River, tributary of the Timis River, is formed in Nădrag locality, through

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the confluence of two water streams: Valea Cornetului and Valea Padetului.

The most recent data highlight the fact that Nădrag River is divided into two ecological areas, the trout area and the Mediterranean barbell area, that are not clearly separated one from another.

The trout area is set upstream from Jdioara locality and it is defined by clear water, well oxygenated, with low annual temperatures, high speed flow, a fairly steep riverbed and irregular riverbanks [2, 3].

The area of the Mediterranean barbell is set downstream where waters have a wider riverbed, without waterfalls, and the bottom is covered with gravel and sand. The superior limit reaches the height of 204m, and the inferior limit reaches the altitude of 117m [4].

The number of collected individuals from the aquatic environment for the investigation was 60. After the collection, the biological material has been anesthetized with MS-222 for reducing stress induced by actions undergone within the working protocol (carrying out somatic measurements, collecting scales for determining the age, releasing the captured/analyzed individuals).

In order to establish the interdependence of the main body parts, the following body measurements have been taken:

- The total body length: represents the distance between the mouth peak and the extremity of the caudal flipper.

- The standard body length: is being measured from the peak of the mouth to the last row of scales (the bottom of the caudal flipper).

- The length of the head: represents the distance between the peak of the mouth and the operculum posterior perpendicular.

- The length of the mouth: is being established from the peak of the mouth to the anterior perpendicular of the eye.

- The length of the caudal peduncle: represents the distance between the posterior

perpendicular of the anal flipper bottom and the body posterior limit (up to the last scales row).

- The body maximum height: is being measured in the most developed part.

- The minimum body height: is being determined in the tightest part of the caudal peduncle.

- The body weight: is being established with the help of the balance.

The interpretation of the interdependence has been made in all the above enumerated segments.

## RESULTS AND DISCUSSIONS

From the data presented in table 1 it can be inferred that any characteristic regarding the body development at Schneider females from the Nădrag River is directly proportional with the development of another characteristic. Therefore, modifying one of the characteristics entails the change in the others, in the same regard.

By analyzing the connections between the studied characteristics it has been observed that most connections are positively connected with thresholds between  $p < 0.05$  and  $p < 0.001$ .

Insignificant correlations have been found between the length of the caudal peduncle and the length of the head ( $r = 0.808$ ;  $p = 0.808$ ) and between the body mass and the length of the mouth peak ( $r = 0.276$ ;  $p = 0.077$ ).

By analyzing the interdependence between the different body segments at Schneider males (table 2), it has been observed the fact that all connections between the analyzed characteristics are positively connected with thresholds between  $p < 0.05$  and  $p < 0.001$ . The exception to this is the positive connection between the length of the mouth peak and the length of the caudal peduncle that is insignificant since it represents a threshold of  $p = 0.129$  ( $p > 0.05$ ).

Table 1 Interdependence between different body segments of *Schneider* females (*Alburnoides bipunctatus*) aged 4-5

	Body total length	Body standard length	Length of the head	Length of the mouth peak	Length of caudal peduncle	Maximum height of the body	Minimum height of the body
Standard length of the body	0.991 0.000						
Length of the head	0.917 0.000	0.904 0.000					
Length of the mouth peak	0.462 0.002	0.443 0.003	0.488 0.001				
Length of caudal peduncle	0.805 0.000	0.777 0.000	0.750 0.000	0.313 0.043			
Maximum height of the body	0.889 0.000	0.881 0.000	0.808 0.808	0.591 0.000	0.705 0.000		
Minimum height of the body	0.859 0.000	0.839 0.000	0.757 0.000	0.418 0.006	0.578 0.000	0.787 0.000	
Body weight	0.637 0.000	0.618 0.000	0.547 0.000	0.276 0.077	0.363 0.018	0.516 0.000	0.693 0.000

ns  $p > 0,05$ ; \* $p < 0,05$ ; \*\* $p < 0,01$ ; \*\*\* $p < 0,001$ .

Table 2 Interdependence between different body segments of *Schneider* males (*Alburnoides bipunctatus*) aged 3-4

	Body total length	Body standard length	Length of the head	Length of the mouth peak	Length of caudal peduncle	Maximum height of the body	Minimum height of the body
Standard length of the body	0.982 0.000						
Length of the head	0.868 0.000	0.849 0.000					
Length of the mouth peak	0.754 0.000	0.759 0.000	0.923 0.000				
Length of caudal peduncle	0.558 0.000	0.579 0.000	0.466 0.004	0.258 0.129			
Maximum height of the body	0.916 0.005	0.918 0.000	0.932 0.000	0.855 0.000	0.509 0.002		
Minimum height of the body	0.780 0.000	0.802 0.000	0.584 0.000	0.457 0.005	0.598 0.000	0.695 0.000	
Body weight	0.957 0.000	0.989 0.000	0.799 0.000	0.736 0.000	0.543 0.001	0.893 0.000	0.798 0.000

## CONCLUSIONS

1. Most of the obtained correlations through mathematical calculations are positively or intensely correlated.

2. Insignificant correlations have been recorded between the length of the caudal peduncle and the length of the head ( $r = 0.808$ ;  $p = 0.808$ ) and the body mass and the length of the mouth peak ( $r = 0.276$ ;  $p = 0.077$ ).

3. The positive correlation between the length of the mouth peak and the length of the caudal peduncle is insignificant since it presents a threshold of  $p=0.129$  ( $p>0.05$ ).

4. Any characteristic that regards the body development at Schneider males and females in the Nădrag River is directly proportional to the development of another characteristic.

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