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THE STUDY OF FLUCTUATING ASYMMETRY IN SOME POPULATIONS BELONGING TO *MUS SPICILEGUS* PETENYI, 1882 SPECIES FROM NORTH OF MOLDAVIA

BY

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In this paper we survey the fluctuating asymmetry at six cranium variables to demonstrate the influence of the stress about the population of the *Mus spicilegus.* For this study we have used 40 crania belonging to the individuals of *Mus spicilegus* species being collected from a corn field and 30 crania belonging to the individuals of the same species collected from an apple orchard.

Introduction

Random deviation from the perfect symmetry of normally symmetrical characters for an individual with a given genotype occurs during individual development due to the influence of multiple environmental factors.

Fluctuating asymmetry is often used as a measure of developmental instability and can be estimated as the variance of the distribution of differences between the left and right sides. (Taras K. Oleksyk, 2004).

We are pursuing in the present paper the fluctuant asymmetry is individuals of *Mus spicilegus*; this is also a comparative study which tries to follow in stress factor is a determinant factor for the deviation from the perfect bilateral symmetry.

Materials and Methods

For this study we have used 40 crania belonging to the individuals of *Mus spicilegus* species being collected from a corn field (May 2004) and 30 crania belonging to the individuals of the same species collected from an apple orchard (May 2004). For the fluctuant-asymmetry study, 6 cranium variables were taken into study: the length of nasal bones, the length of the diastema, the length of incisors foramina, the rostral length, the length of the cranium capsule and the length of the auditive bubble. The measurements were made for each of the variables (on the right and the left side of the cranium) under stereomicroscope MBS 10.

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The analysis of the fluctuant asymetry consisted of the submission of the statistical analysis of the values obtaind with the help of SPSS 10,0 program. The tests used were Kolmogorov-Smirnov, for testing the normality of the variables, the t test for pair samplings, for testing the significance of the difference between parts, and Skewness and Kurtosis, for establishing of the asymmetry direction and for the analysis of the degree of excess of the frequencies distribution of one variable.

Results and discussions

The Kolmogorov-Smirnov test showed that values are normally distributed around the mean for every variable; consequently, the testing of the significance of the differences between parts was accomplished based on the t test for pairs of values for each of the 6 variables. The acknowledgement of the opportunity of using this test was made also by the variables bigger than 0,8 obtined following to the correlation of the measurements between parts.

A significant differences was obtained for the length of the nasal bones (t=7.663872 and sig.=0.000), the length of the diastema (t=3.029269 and sig.=0.004335) and the length of the cranium capsule (t=2.259069 and sig.=0.029545).

An insignificant difference could be noticed for the length of the incisors foramina (t=1.864202 and sig.=0.069833); the rostral length (t=0.60611 and sig=0.547954), the length of the auditive bubble (t=1.403459 and sig.=0.168392).

According to the Skewness index, we have a directional asymetry to the left, for the nasal bones length and the length of the auditive bubble and a directional asymmetry to the right, for the diastema, the rostral length, the length of the cranium capsule and the length of the incisors foramina (Table No 1)

Table no. 1. The values of the Skewness and Kurtosis index for the differences between the left and right side fort the six cranium variables (for crania of *Mus spicilegus* from the population with high density)

Variables	L-R nasal bones	L-R diastema	L-R incisors foramina	L-R rostrum	L-R cranium capsule	L-R auditive bubble
N	**40**	**40**	**40**	**40**	**40**	**40**
Skewness	-1.272	1.779	0.059	0.460	1.172	-1.031
Std. Error of Skewness	0.374	0.374	0.374	0.374	0.374	0.374
Kurtosis	3.623	7.940	3.997	7.943	3.367	1.371
Std. Error of Kurtosis	0.733	0.733	0.733	0.733	0.733	0.733

The same tests were applied for the remaining 30 crania belonging to the *Mus spicilegus* species (from the population with low density- apple orchard).

The results of these tests are entirely different from the results obtained early. Consequently, only one of the variables shows significant differences for the two parts (the length of the nasal bones).

The results of the t test for pairs of values are as follows: the length of the nasal bones t=2.804 abd sig.=0.009; the diastema length t=1.975 and sig.=0.058; the length of the incisors foramina t=0.626 and sig.=0.536; the length of the cranium capsule t=1.140 and sig.=0.264; the rostral length t=0.441 and sig.=0.662 and the length of the auditive bubble t=-0.924 abd sig.=0.363.

The values for the Skewness and Kurtosis index show that the asymmetry is oriented to the left for the length of the auditive bubble and to the right for the remaining variables, and the Kurtosis index shows the existence of the existence of the types of curves, platykurtic and leptokurtic (Table No. 2)

Table No. 2. The values of the Skewness and Kurtosis index for the differences between the left and the right sides for the six cranial variables (for the crania of *Mus spicilegus* from the low density population)

Variables	L-R nasal bones	L-R diastema	L-R incisors foramina	L-R rostrum	L-R cranium capsule	L-R auditive bubble
N	**30**	**30**	**30**	**30**	**30**	**30**
Skewness	0.298	0.067	0.003	0.494	2.316	-4.102
Std. Error of Skewness	0.427	0.427	0.427	0.427	0.427	0.427
Kurtosis	0.295	0.178	0.229	0.682	9.228	21.435
Std. Error of Kurtosis	0.833	0.833	0.833	0.833	0.833	0.833

Conclusions

1. In the individuals belonging to the population from the wheat field. the deviations from the bilateral symmetry are the length of the nasal bones, the diastema length and the length of the cranial capsule.
2. In the individuals collected from the apple orchard, the deviations from the bilateral symmetry are a little less obvious, only for the length of the nasal bones, the difference between parts is significant.
3. The obvious deviations from the bilateral symmetry noticed in the individuals from the population for the wheat filed can be explained based on the high density of the individuals from this population ($0,01/m^2$) in comparasion with the lower density registered in the apple orchard ($0,007/m^2$)
4. The high density of the individuals from a population constitutes a stress factor, which seams to be at the origin of the fluctuating asymmetry.

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