Studii şi Cercetări	Biologie	11	117 - 120	Universitatea din Bacău	Mai 2006

NEW BIOMETRICAL DATA FOR THE *MICROTUS ARVALIS* SPECIES PALL. 1779 (MAMMALIA: RODENTIA)

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Key words*: biometrical data, Rodentia, Microtus arvalis Pall., 1779*

INTRODUCTION

Microtus arvalis is one of the most well-known species of the fauna of small mammals from our country, present starting with the zone of the Danube delta up to the altitude of 1800 m (the Harghita mountains). Regarding the intraspecific taxonomy of this species, Ellerman and the collaborators (1966) recorded the existence of 28 subspecies.

In 1908 Miller described the *Microtus arvalis levis* subspecies after collecting 3 exemplars in Găgeni, Prahova, this subspecies including the populations of harvest mice from the plain and hill area in Romania. In 1963, Hamar considered on the basis of an exemplary collected in the Bucegi Mountains that the alpine populations belonged to the *Microtus arvalis heptneri* subspecies. Miller also recorded the subspecies *Microtus arvalis angularis*, after the material collected in Haţeg, Hunedoara. The latter was recognized by Ellerman and Morrison-Scott, but it wasn't confirmed by the subsequent researches. (Alexandrina Popescu and D. Murariu, 2001)

Taking into account these uncertain data referring to the intraspecific taxonomy of the *Microtus arvalis* species we consider necessary gathering as many data as possible that could help clarifying some problems of intraspecific taxonomy.

MATERIAL AND METHOD

Captures were made in the 2003-2004 period in the north-eastern region of Romania. Measurements were made, for 13 new cranial variables: the exterior length of the skull (L.ext.cr), the frontal (L.fr.) and parietal length (L.par.), the basal length of the skull (L.ba.), the rostrum width (l.r.) and height (h.r.), the incisive foramen length (L.inc.), the length and width of the cephalic capsule(L.cps.sk., l.cps.sk.), the auditory bulla width (l.a.b.), the length of the coronoid (L.coro.p.), condyloid (L.co.p) and anguloid processes (L.ang.p.).

Measurements were made using the digital callipers to 0-0,1 mm precision and the stereomicroscope MBS-1. The number of specimens analyzed was bigger but for the statistical analysis only the adult specimens were used, in which there is a complete suture closure.

Biometrical data were statistically analyzed calculating for each of the 13 cranial variables a series of indices: the minimal values (MIN), the maximal values (MAX), the mean values (M), the error mean (ES), the standard deviation (DS), the variation coefficient ($C= 100 \cdot \sigma / M$), the mean error of the average ($m\ \% = 100 \cdot m / M$) and the Confidence level.

All these variables were also correlated, thus determining the correlation coefficient. For a part of these biometrical data were established the equations of the regression lines and the determination factor (r^2). The determination coefficient shows how much per cent from the values of a variable depend on another variable.

RESULTS AND DISCUSSIONS

We present in Table 1 the values for the statistical indices used. The small values of the Confidence level and the superior and inferior limits indicate a small intraspecific variability for these variables. However, among all these the following have the smallest variability: the auditory bulla width, the length of the coronoid process and height of rostrum.

The same thing can be obvious analyzing the Figure 1, in which the mean, the error of the mean and the standard error of the mean are presented.

Table 1. Descriptive statistics of *Microtus arvalis*, Pall., 1779

Discriptors									
Variables	Minimum	Maximum	Mean	Standard Error	Standard Deviation	c%	Confidence Level(95,0%)	LI	LS
L.ext.cr	21.23	25.63	23.02	0.168	1.0550	4.569	0.3232	22.700	23.341
L.fr.	7.8	9.100	8.465	0.046	0.2920	3.499	0.0980	8.3748	8.5564
L.par.	4	4.800	4.320	0.048	0.2828	6.531	0.0873	4.2890	4.4597
L.ba.	21	23.23	22.46	0.082	0.5564	2.476	0.1715	22.319	22.654
l.caps.sk.	10	11.20	10.39	0.047	0.2961	2.858	0.0913	10.302	10.488
l.r.	3.9	4.80	4.300	0.043	0.2823	6.577	0.0876	4.2140	4.3860

h.r.	4	4.80	4.398	0.037	0.2351	5.376	0.0740	4.3183	4.4632
L.inc.	4.1	4.60	4.366	0.023	0.1671	3.832	0.0540	4.3132	4.4150
L.cps. sk.	9.4	10.50	10.11	0.047	0.2807	2.775	0.0867	10.033	10.203
l.a.b.	3.7	4.30	4.065	0.022	0.1416	3.486	0.0435	4.0170	4.1060
L.coro.p.	9.4	10.30	9.881	0.035	0.2368	2.385	0.0720	9.8111	9.9561
L.co. p.	11.7	13	12.28	0.061	0.4505	3.669	0.1384	12.145	12.429
L.ang.p.	11.5	12.05	12.10	0.037	0.2448	2.043	0.0766	12.022	12.178

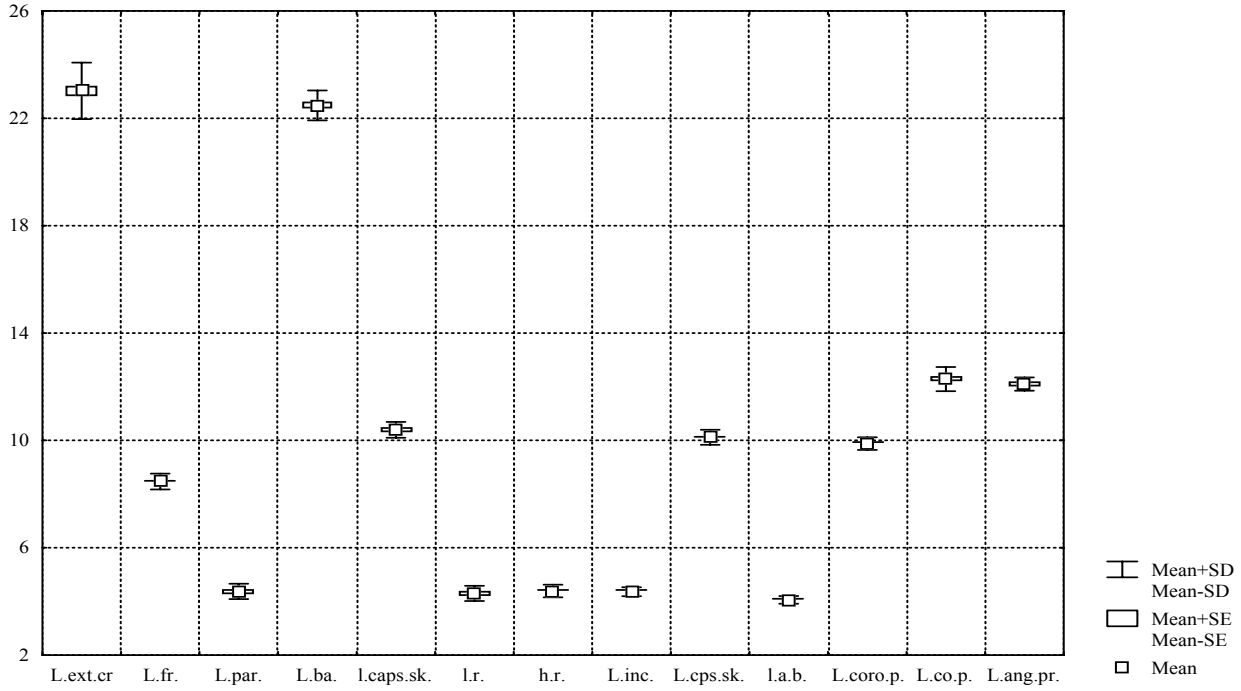

Fig. 1. Measures of central tendency for studied variables of *Microtus arvalis* Pall., 1779

According to these data we can say that variables such as: the auditory bulla width, the length of the coronoid process and height of rostrum could also have a taxonomical value.

Variables with an increased distribution around the mean should be regarded with a certain restraint from the point of view of their taxonomical value, because it involves an increased degree of intraspecific variability (the exterior and basal lengths of the skull).

Analyzing the correlation and the regression we had in view: identifying the existence of a connection among variables, determining the degree of intensity of this connection and establishing its meaning and form. As a result of the Kolmogorov-Smornov normality test, the Pearson correlation and the significance test for alfa = 0.05, the existence of positive and negative correlations among these variables were established. (Table 2).

The most powerful correlations, that is with a correlation indice value close to the maximal value (r=1) could be found in the following pairs of variables: the width of the cephalic capsule – the rostrum width, the rostrum width – the rostrum height, the length of the parietal bones – the length of the condyloid processes, the rostrum width – the length of the condyloid processes, the rostrum height – the length of the condyloid processes. For these pairs of variables we have calculated the determination coefficient (r^2) as well as the equation of the regression line, represented in the Figures 2, 3, 4, 5 and 6.

The presence of some negative correlations can also be noticed, that is the value of the correlation index (r<0), stressing the fact that the increase of an independent variable determines the diminution of another variable considered independent. Such a relation can be noticed among the pairs formed by the length of the cephalic capsule with the other variables studied.

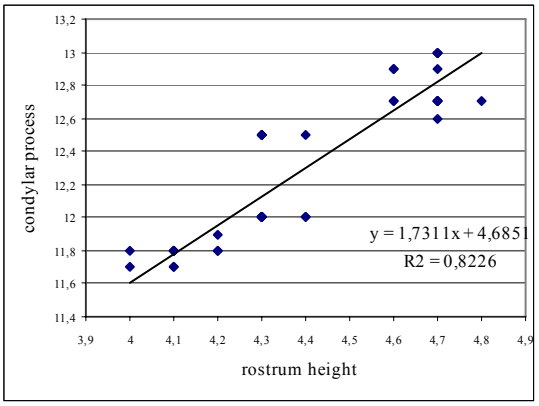

Fig. 2. The correlation between the length condylar process and rostrum height

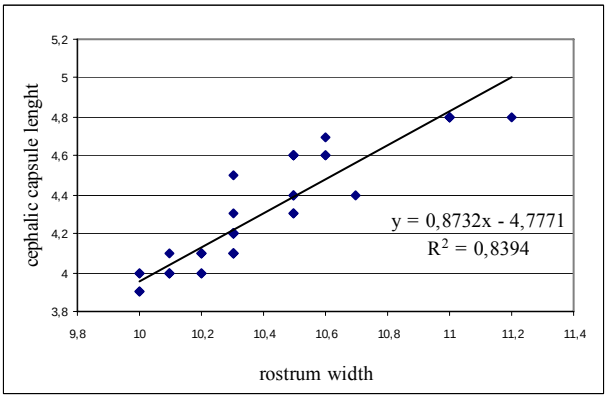

Fig. 3. The correlation between the cephalic capsule length and rostrum width

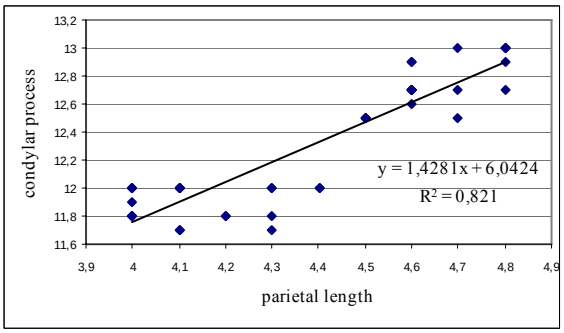

Fig. 4. The correlation between the condylar process length and parietal length

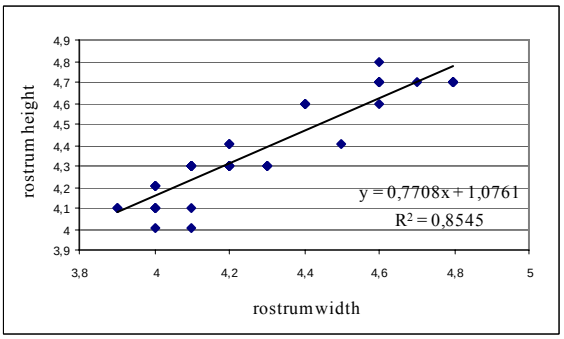

Fig. 5. The correlation between the rostrum height and rostrum width

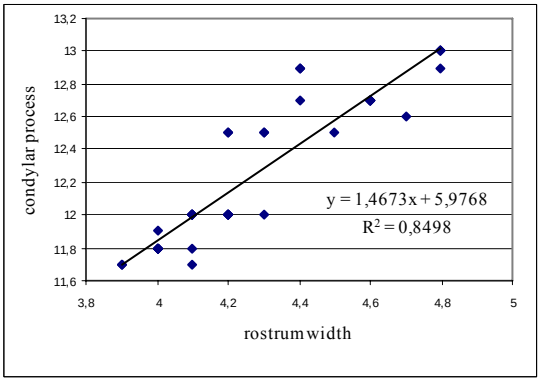

Fig. 6. The correlation between the condylar process length and rostrum width

Table 2. The correlations between studied variables of *Microtus arvalis* Pall., 1779

Variables	L.ext.cr	L.fr.	L.par.	L.ba.	l.cps.skr.	l.r.	h.r..	L.inc.	L.cps.sk.	l.a.b.	L.coro.p	L.co.p.	Lang.p.
L.ext.cr	1												
L.o.fr.	0,83398	1											
L.par.	0,61274	0,80232	1										
L.ba.	0,64795	0,52216	0,52920	1									
l.cps.sk.	0,52801	0,71116	0,83546	0,47679	1								
l.r.	0,63385	0,82782	0,85762	0,49281	**0,91619**	1							
h.r..	0,62571	0,80377	0,80895	0,56448	0,82937	**0,92441**	1						
L.inc.	0,51304	0,64759	0,78560	0,54407	0,67700	0,67869	0,66077	1					
L.cps.sk.	-0,2304	-0,4868	-0,4849	-0,10303	-0,4599	-0,6398	-0,6460	-0,2311	1				
l.a.b.	0,56064	0,68200	0,60173	0,43137	0,69214	0,72498	0,70850	0,65314	-0,4692	1			
L.coro.p.	0,32280	0,38039	0,35695	0,38057	0,59388	0,53154	0,54482	0,58785	-0,1039	0,7424	1		
L.co.p.	0,63475	0,79341	**0,90607**	0,58707	0,88345	**0,92187**	**0,90695**	0,82407	-0,5983	0,6818	0,4976	1	
Lang.p.	0,51811	0,69473	0,79037	0,51547	0,88046	0,87627	0,85942	0,68269	-0,4661	0,6849	0,7205	0,8407	1

CONCLUSIONS

The paper intends bringing new data regarding the biometry of the *Microtus arvalis* species;

13 new cranial variables belonging to the *Microtus arvalis* species Pall., 1779 have been studied from the statistical point of view;

The confidence means and intervals established allow the appreciation of the intraspecifical variability degree;

The interdependence among the cranial variables analyzed has stressed upon the presence of the positive correlations for the following pairs: the width of the cephalic capsule – the rostrum width, the rostrum width – the rostrum height, the length of the parietal bones – the length of the condyloid processes, the rostrum width – the length of the condyloid processes, and a negative correlation among the length of the cephalic capsule and the other variables studied.

REZUMAT

Lucrarea noastră îşi propune sa aducă noi date cu privire la biometria speciei *Microtus arvalis* Pall., 1779. Pentru acest studiu s-au utilizat cranii aparţinând indivizilor adulti ai speciei menţionate.

S-au analizat din punct de vedere statistic 13 noi variabile craniene: lungimea exterioară a craniului, lungimea oaselor frontale şi parietale, lungimea bazală a craniului, lăţimea şi înălţimea rostrală, lungimea foramenelor incisivilor, lungimea şi lăţimea capsulei craniene, lăţimea bulei auditive, lungimea proceselor coronoide, condiloide şi anguloide.

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