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Cricetulus migratorius (PALLAS 1773) (Rodentia, Mammalia) population from the Toros Mountains (Turkey) (With a special reference to the relation of Cricetulus and Allocricetus genera)*

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ABSTRACT: The results of the metrical and morphological investigations are presented on a Holocene Turkish Cricetulus migratorius molar series with the comparision to a recent Syrian Cricetulus population and to Hungarian Plio-Pleistocene Allocricetus materials.

Introduction

This article is the 3rd one in the row of papers on a subfossil microvertebrate fauna collected by the author in the Bolkar Mountains in 1989. THe topography of the locality, the preliminary valuation of the fauna, and the detailed analysis of the Mesocricetus auratus (WATERHOUSE 1839) molar series was given by Hír, J. (1992 a, 1992 b).

The present article's aim in the first place is to publish the metrical and morophological description of the Cricetulus migratorius molar series. The other aim is to give new data for the taxonomic relation of the recent Cricitulus and fossil Allocricetus genera, because it is an unsolved probleme.

The material

13 maxillae with complette toothrowes, 19 maxillae fragments with incomplette toothrowes, 15 M1, 9 M2, 5 M3.

18 mandibulae with complette toothrowes, 17 mandibulae fragments with incomplette toothrowes, 22 m1, 17 m2, 10 m3.

We use the results of the elaboration of the folowing materials for comparision:

Cricetulus magratorius (PALLAS, 1773)

1. Krak des Chevaliers (Syria), recent (PRADEL, A. 1981). We have not studied this material directly. The data are after the original reference.

Allocricetus bursae SCHAUB, 1930

1. Pongor Hole (Hungary), Younger Middle Pleistocene. The material was collected and studied by HÍR, J. 1989a.
2. Tarkő Rockshelter (Hungary), Older Middle Pleistocene. The fauna was collected and published by JÁNOSSY, D. (1962, 1965, 1979, 1986). The detailed analysis of the Allocricetus material of the sequence was effected by Hír J. (1989b). 18 layers were distinguished during the excavation we grouped the Allocricetus material of the sequence into 5 part: 1. 1th layer, 2. 2nd-10th layers, 3. 11th-12th layers, 4. 13th-15th layers, 5. 16th-18th layers.

* A tanulmány, az OTKA T014412. számú pályázat támogatásával készült.

Alocricetus éhiki SCHAUB, 1930

1. Tarkő Rocksheter. The presence of this species was verified by HÍR, J. (1989b).
2. Osztramos 3. (Hungary), Uppermost Pliocene. The locality was excavated and elaborated by JÁNOSSY, D. (1970, 1979, 1986); JÁNOSSY, D-MEULEN VAN DER, A. 1975. The Allocricetus material was studied by HÍR, J. (1993).
3. Villány 3. (Hungary), Upper Pliocene. This classical locality has been studied for more than hundred years (KORMOS, T. 1937; KRETZOI, M. 1956; JÁNOSSY, D. 1979, 1986). The cricetid finds, elaborated by HÍR, J. (1993), had been collected by Jánossy D. in 1979

Deposition: the faunas from Meydan and from Pongor Hole are stored in the collection of the Municipial Museum of Pásztó. The materials of Tarkő, Osztramos, and Villány are placed in the Paleontological Department of the Hungarian Natural History Museum, Budapest.

Methods

The measurements were taken by the ocularmicrometer of a stereomicrioscope to an accuracy of 0,01 mm. The length of the upper toothrowes (L M1–3), the length of the lower toothrowes (L m1–3), and the length (L), anterior width (Wa), posterior width of the distinct teeth were measured. the measurements were worked aut by the basic statistic parameters. N: sample size, MIN–MAX: observation range, X: arithmetic mean, SD: standard deviation.

The morphological investigation based on the nomeclature of FAHLBUSH, V. (1964) and MEIN, P:-FREUDENTHAL, M. (1971). The separation of the different morphotypes is after the presence (+), or absence (–) of certain elements of the tooth crown.

The methods were stated in details by PRADEL, A. (1981, 1988) and HÍR, J. (1989b, 1992b, 1993). The complette repetition of the methodological description is not given here.

Description

The complette morphological diescription of the Cricetulus and Allocricetus molars was written by FAHLBUSCH, V. (1969) and PRADEL, A. (1981). The detailed reinterpretation has not primary importance from the standpoint of us. We can concentrate our attention to the investigated elements of the toothcrown.

M1, m1: PAC (pre-anterocon(-id) cingulum). It is a small enamel conelet on the mesial surface of the molar.

PAST: (parastyle). It is a cingular conulet on the posterolabial side of the anterocone on the M1 *(Fig. 9., 12.).*

M2: MTL Posterior metalophule. It is a crest between the metalophule and posteroloph trimming the metacone on the lingual side. ML (mesolophe) *(Fig. 10.)*

M3: in the studied materials the rare presence of accessoric enamel crests is visible in different location of the toothcrown *(Fig. 11.).*

m2-m3: ALC (antero-lingual cingulum). It is the continuation of the persistent anterolabial cingulum before the metaconid. ML (mesolophid) *(Fig. 7., 8.).*

The occurence of these elements is statistical.

The results of the metrical investigations are visible on the figures no. 1.–8., and on the *tables no. 1.–9.* The results of the statistical morphological investigations are presented on the *figures no. 9.–14.*

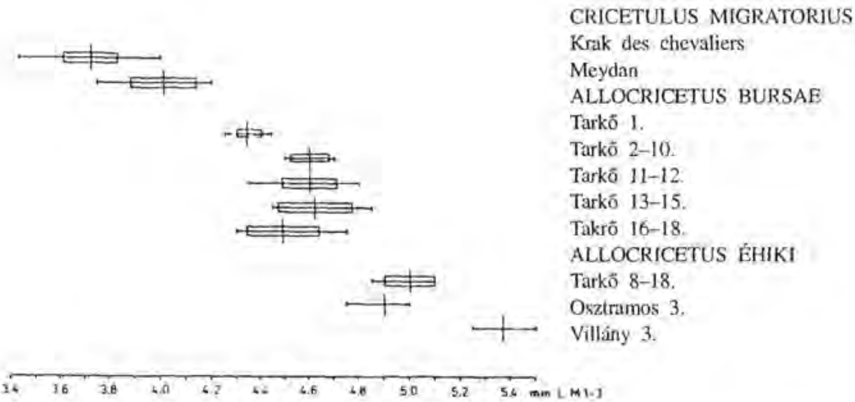


Fig. 1. The range, standard deviation and mean of the length of upper toothrowes (LM 1–3) in the investigated materials.

N	Min.-Max.	X	SD	Locality
		Cricetulus migratorius		
57	3.43–4.00	3.72	0.115	Krak des Chevaliers
13	3.75–4.20	4.01	0.129	Meydan
		Allocricetus bursae		
6	4.25–4.42	4.34	0.0631	Tarkő 1.
6.	4.50–4.70	4.60	0.0807	Tarkő 2.–10.
12	4.35–4.80	4.60	0.1136	Tarkő 11.–12.
11	4.35–4.85	4.62	0.1506	Tarkő 13.–15.
7.	4.30–4.75	4.49	0.1548	Tarkő 16.–18.
		Allocricetus éhiki		
4	4.85–5.10	5.00	0.1080	Tarkő 8.–18.
3	4.75–5.00	4.90	–	Osztramos 3.
2	5.25–5.50	5.37	–	Villány 3.

Table 1.
Comparision of the length of upper totthrowes (L M1–3) in the investigated materials

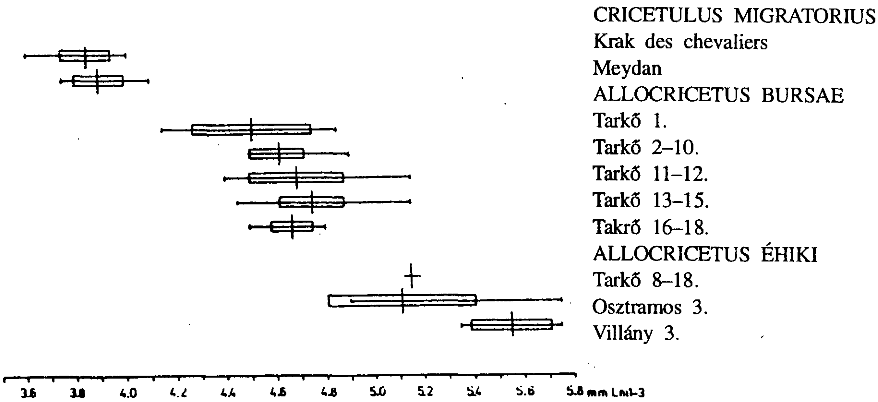


Fig. 2. The range, standard deviation and mean of the length of lower toothrowes (Lm 1–3) in the investigated materials.

N	Min.-Max.	X	SD	Locality
		Cricetulus migratorius		
98	3.61–4.01	3.85	0.097	Krak des Chevaliers
18	3.75–4.10	3.92	0.104	Meydan
		Allocricetus bursae		
11	4.15–4.85	4.51	0.2431	Tarkő 1.
9	4.45–4.90	4.62	0.1340	Tarkő 2.–10.
25	4.40–5.15	4.69	0.1900	Tarkő 11.–12.
22	4.45–5.15	4.75	0.1364	Tarkő 13.–15.
12	4.50–4.80	4.67	0.0814	Tarkő 16.–18
		Allocricetus éhiki		
1		5.15		Tarkő 14.
6	4.90–5.75	5.11	0.3277	Osztramos 3.
11	5.35–5.75	5.55	0.1665	Villány 3.

Table 2.
Comparision of the length of lower trotthrowes (L m1–3) in the investigeted materials

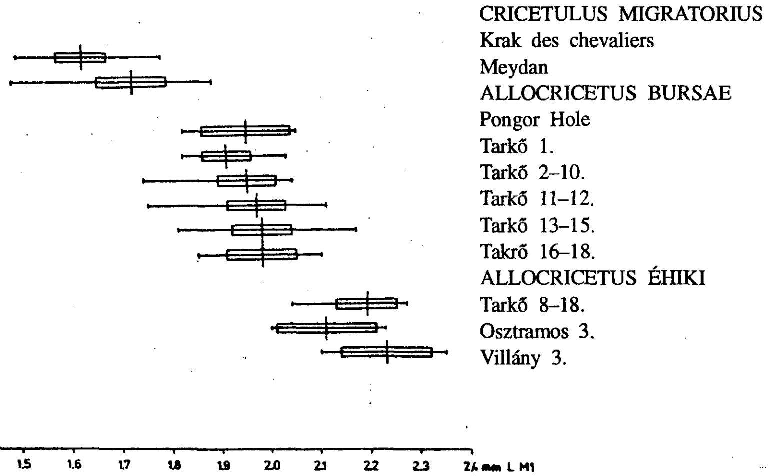


Fig. 3. The range, standard deviation and mean of the length of M1 molars in the investigated materials.

N	Min.–Max.	X	SD	Locality
		Cricetulus migratorius		
97	1.49–1.78	1.62	0.0550	Krak des Chevaliers
68	1.48–1.88	1.72	0.0730	Meydan
		Allocricetus bursae		
14	1.82–2.05	1.95	0.0864	Pongor.
46	1.74–2.03	1.91	0.0529	Tarkő 1.
52	1.74–2.04	1.95	0.0674	Tarkő 2.–10.
52	1.75–2.11	1.97	0.0651	Tarkő 11.–12.
49	1.81–2.17	1.98	0.0585	Tarkő 13.–15.
38	1.85–2.10	1.98	0.0663	Tarkő 16.–18.
		Allocricetus éhiki		
18	2.04–2.27	2.19	0.0558	Tarkő 8.–18.
17	2.00–2.23	2.11	0.1068	Osztramos 3.
11	2.10–2.35	2.23	0.0942	Villány 3.

Table 3.
Comparision of the length of M1 molars in the investigated materials

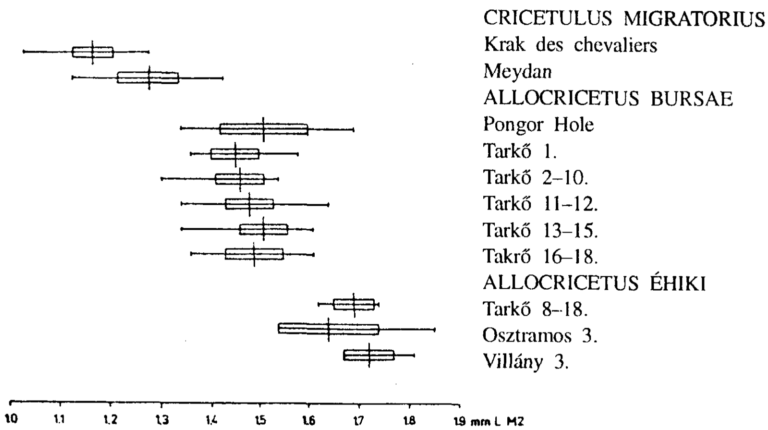


Fig. 4. The range, standard deviation and mean of the length of M2 molars in the investigated materials.

N	Min.–Max.	X	SD	Locality
		Cricetulus migratorius		
87	1.03–1.28	1.168	0.044	Krak des Chevaliers
37	1.13–1.43	1.28	0.064	Meydan
		Allocricetus bursae		
6	1.29–1.69	1.51	0.1319	Pongor
32	1.36–1.58	1.45	0.0531	Tarkő 1.
37	1.30–1.54	1.46	0.0536	Tarkő 2.–10.
52	1.34–1.64	1.48	0.0524	Tarkő 11.–12.
41	1.34–1.61	1.51	0.0567	Takrő 13.–15.
19	1.36–1.61	1.49	0.0608	Tarkő 16.–18.
		Allocricetus éhiki		
10	1.62–1.74	1.69	0.0367	Tarkő 8.–18.
11	1.54–1.85	1.64	0.1051	Osztramos 3.
7.	1.67–1.81	1.72	0.0534	Villány 3

Table 4.
Comparision of the length of M2 molars in the investigated materials

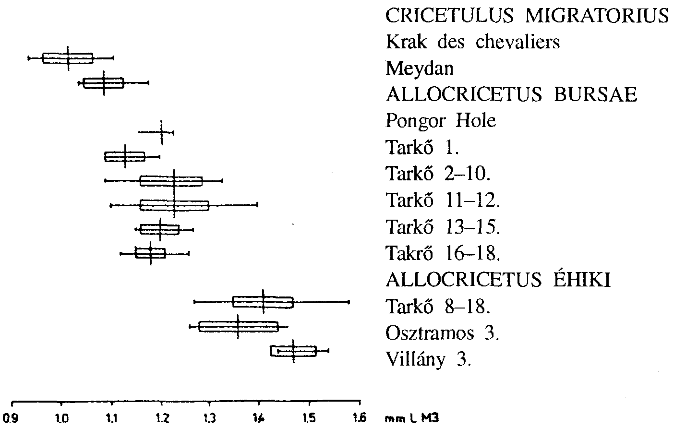


Fig. 5. The range, standard deviation and mean of the length of M3 molars in the investigated materials.

N	**Min.–Max.**	**X**	**SD**	**Locality**
		Cricetulus migratorius		
66	0.94–1.11	1.02	0.046	Krak des Chevaliers
24	1.04–1.18	1.09	0.0407	Meydan
		Allocricetus bursae		
2	1.16–1.26	1.21		Pongor
9	1.09–1.20	1.13	0.0466	Tarkő 1.
19	1.09–1.33	1.23	0.0653	Tarkő 2.–10.
30	1.10–1.40	1.23	0.0745	Tarkő 11.–12.
22	1.15–1.27	1.20	0.0376	Tarkő 13.–15.
18	1.12–1.26	1.18	0.0365	Tarkő 16.–18.
		Allocricetus éhiki		
8.	1.39–1.58	1.43	0.0695	Tarkő 8.–18.
4	1.26–1.46	1.36	0.0896	Osztramos 3.
4	1.44–1.58	1.47	0.0486	Villány 3.

Table 5.
Comparision of the length of M3 molars in the investigated materials

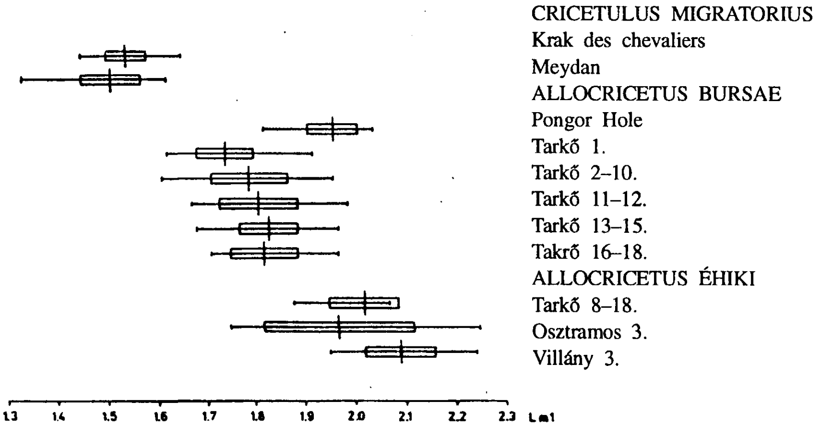


Fig. 6. The range, standard deviation and mean of the length of m1 molars in the investigated materials.

N	Min.–Max.	X	SD	Locality
		Cricetulus migratorius		
150	1.45–1.65	1.537	0.046	Krak des Chevaliers
48	1.33–1.62	1.516	0.0639	Meydan
		Allocricetus bursae		
13	1.71–1.85	1.78	0.0529	Pongor
51	1.62–1.92	1.74	0.0628	Tarkő 1.
54	1.61–1.96	1.79	0.0795	Tarkő 2.–10.
71	1.67–1.99	1.81	0.0773	Tarkő 11.–12.
43	1.68–1.97	1.83	0.0638	Tarkő 13.–15.
37	1.71–1.97	1.82	0.0726	Tarkő 16.–18.
		Allocricetus éhiki		
5	1.88–2.07	2.02	0.0779	Tarkő 8.–18.
19	1.75–2.25	1.97	0.1577	Osztramos 3.
23	1.95–2.24	2.09	0.0717	Villány 3.

Table 6.
Comparision of the length of m1 molars in the investigated materials

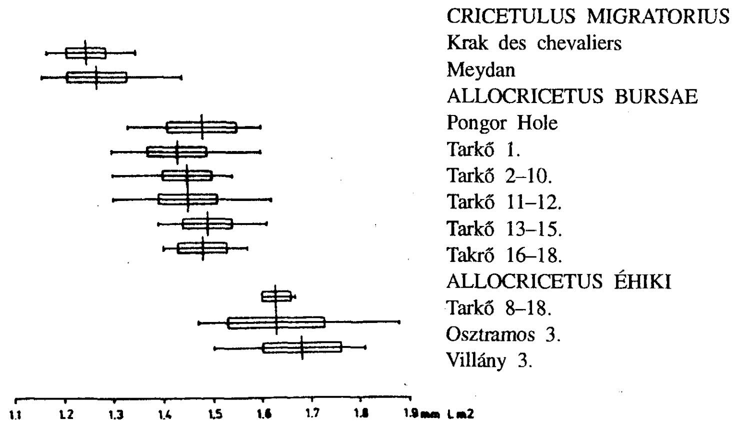


Fig. 7. The range, standard deviation and mean of the length of m2 molars in the investigated materials.

N	Min.–Max.	X	SD	Locality
		Cricetulus migratorius		
138	1.17–1.35	1.254	0.040	Krak des Chevaliers
39	1.16–1.44	1.27	0.0547	Meydan
		Allocricetus bursae		
9	1.33–1.60	1.48	0.0730	Pongor
30	1.30–1.60	1.43	0.0609	Tarkő 1.
58	1.30–1.54	1.45	0.0536	Tarkő 2.–10.
78	1.30–1.62	1.45	0.0660	Tarkő 11.–12.
45	1.39–1.61	1.49	0.0465	Tarkő 13.–15.
41	1.40–1.57	1.48	0.0555	Tarkő 16.–18.
		Allocricetus éhiki		
11.	1.60–1.67	1.63	0.0259	Tarkő 8.–18.
23	1.47–1.88	1.63	0.1145	Osztramos 3.
31	1.50–1.81	1.68	0.0789	Villány 3.

Table 7.
Comparision of the lengthe of m2 molars in the investigted materials

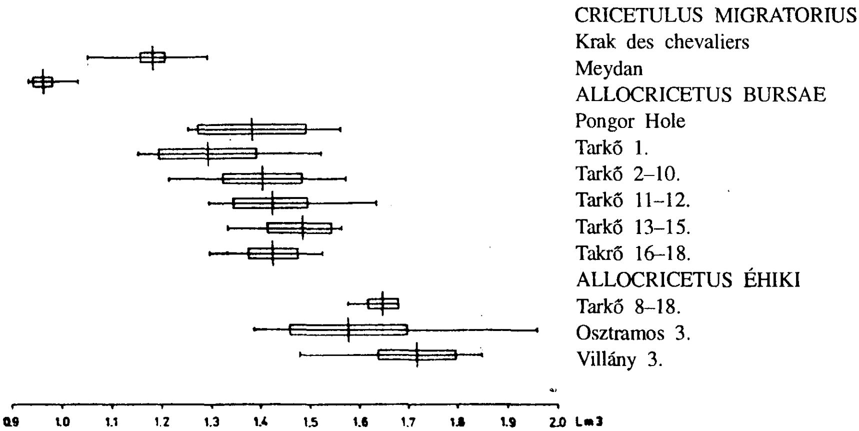


Fig. 8. The range, standard deviation and mean of the length of m3 molars in the investigated materials.

N	Min.–Max.	X	SD	Locality
		Cricetulus nigratorius		
110	1.06–1.30	1.186	0.054	Krak des Chevaliers
30	1.12–1.36	1.24	0.0593	Meydan
		Allocricetus bursae		
5	1.26–1.57	1.39	0.1154	Pongor
26	1.16–1.53	1.30	0.1072	Tarkő 1.
29	1.22–1.58	1.41	0.0849	Tarkő 2.–10.
57	1.30–1.64	1.43	0.0752	Tarkő 11.–12.
36	1.34–1.57	1.49	0661	Tarkő 13.–15.
27	1.30–1.53	1.43	0.0520	Tarkő 16.–18.
		Allocrcetus éhiki		
4	1.58–1.61	1.65	0.0337	Tarkő 8.–18.
20	1.39–1.96	1.58	0.1269	Osztramos 3.
28	1.48–1.85	1.72	0.0790	Villány 3.

Table 8.
Comparision of the length of m3 molars in the investigated materials.

N	Min.–Max.	X	SD	
39	0.78–1.05	0.92	0.0547	Wa M1
39	0.99–1.25	1.12	0.0617	Wp M1
38	0.91–1.16	1.07	0.0667	Wa M2
38	0.83–1.12	1.00	0.0645	Wp M2
24	0.88–1.04	0.97	0.0442	Wa M3
48	0.49–0.70	0.59	0.0541	Wa m1
48	0.91–1.06	0.97	0.0315	Wp m1
46	0.94–1.09	1.02	0.0344	Wa m2
46	0.94–1.06	1.02	0.0350	Wp m2
35	0.88–1.04	0.97	0.0413	Wa m3

Table 9.
Basic statistical parameters of the transversal measurements (anterior and posterior width) of the Cricetulus migratorius molars from Meydan.

sympl.	compl.	Locality
	Cricetulus migratorius	
72	28%	Meydan
	Allocricetus bursae	
59	41%	Tarkő 1.
64	36%	Tarkő 2.–10.
62	38%	Tarkő 11.–18.
	Allocricetus éhiki	
41	60%	Tarkő 8.–18.
22	78%	Villány 3.–Osztramos 3.

Table 10.
Distribution of the complex and symple type molars in the investigated materials.

Discussion

In the recent fauna of Hungary small sized hamster does not exist. But in the fossil materials it is frequent and had been represented by numerous taxa from hte Middle Miocene up to the Pleistocene–Holocene border (JÁNOSSY, D 1979, 1986; KORDOS, L. 1987). The Allocricetus éhiki and Allocricetus bursae are common in the Upper Pliocene and Pleistocene faunas all over in Europe MAUL, L. (1990).

SCHAUB, S. (1930) based the diagnosis of the two species on the build of the skull. He remarked the lack of differences in the toothmorphology from the living genus Cricetulus. KURTÉN, B: (1968) used the name Cricetulus bursae for Allocricetus bursae. MAYHEW, D. (1977) disputed the validity of the Allocricetus genus as well and underlined the morphological identity of hte Allocricetus and Cricetulus genera.

After the investigations of us we can state: the recent Cricetulus migratorius from the Near East and the fossil Allocricetus from Hungary are distinguishable on the basis of the longitudinal measurements of the teeth and toothrowes, and on the basis of the statistic morphological differences as well. The disparities are significant only in the case of the toothrowes. *(Fig. 2., 2., Tab. 1., 2.).* Among the lenghts of the teeth the differences are considerable, and related to the averages *(Fig. 3–8., Tab. 3.–8.).*

After the investigation of us we can see a process of simplification of the toothcrowns from the Pliocene up to the recent species on the whole. But the trends are very different of the different kind ot teeth. It is most unambiguous at the M1, M2 molars *(Fig. 3., 4.,; Tab. 3., 4.).*

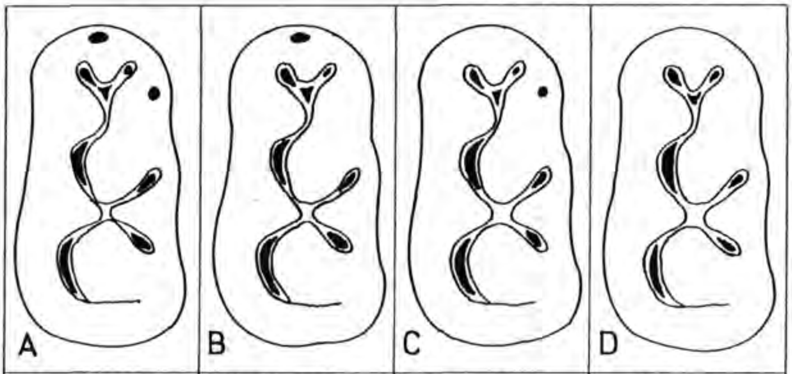
The process of simplification is clear if we merge the teeth into two groups:

1. teeth with simple morphlolgy;
   those are the M1:d, M2:d, M3:a, m1:b, m2:d, m3:a, g-types. The teeth of this group had not any accessory elements.

2. teeth with complex morphology:
   M1: a, b, c, M2: a, b, c, M3: a, m1: a, m2: a, b, c, m3: a, g-types Those are the teeth bearing accessory elements.

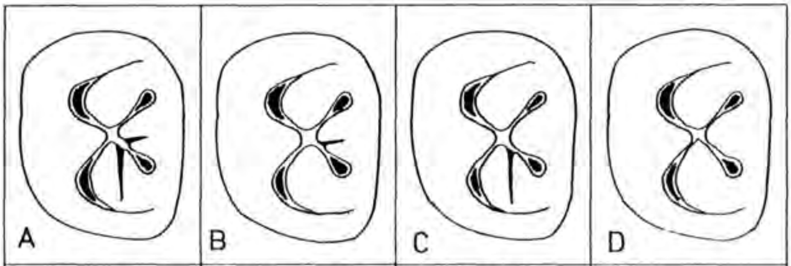
Among the teeth of the Aloocricetus éhiki the complex molars are more typical. The frequency of the simple molars is slightly higher in Allocricetus bursae materials. In the Cricetulus migratorius sample the simple group is in absolute majority *(Tab. 10.).*

We can draw a distinction between the Cricetulus and Allocricetus genera with the above presented methods only of we have a large noumber of teeth.



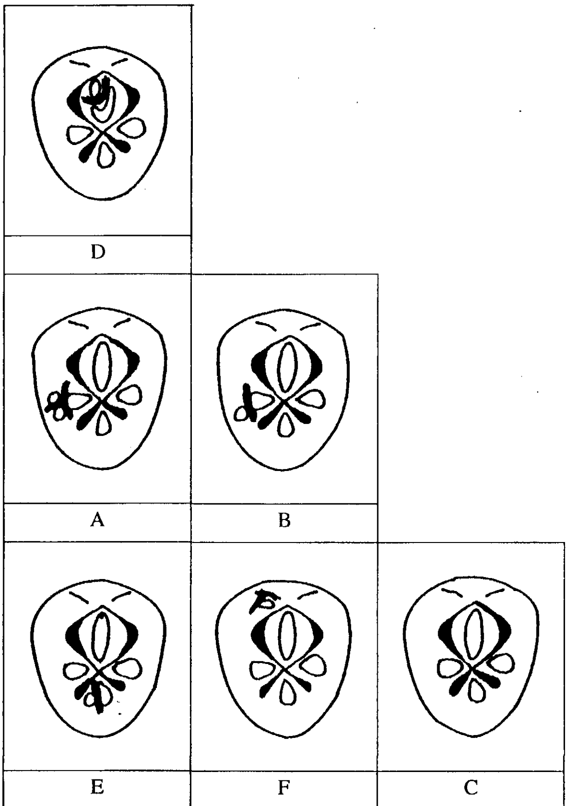
PAC +, PAST+	PAC +, PAST –	PAC –, PAST +	PAC +, PAST –	
Cricetulus migratorius				
22	8	30	40	Meydan
Allocricetus bursae				
15	0	65	20	Tarkő 1.
52	6	36	6	Tarkő 2–10.
33	4	54	9	Tarkő 11–12.
23	2	75	0	Tarkő 13–15.
30	2	52	16	Tarkő 16–18.
Allocricetus éhiki				
54	4	32	10	Osztramos 3 – – Villány 3

Fig 9. The distribution of the morphotypes on M1 molars (%)



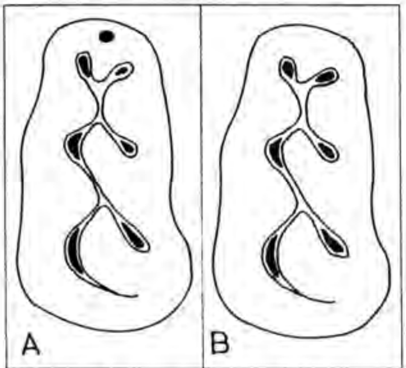
MTL +, ML +	MTL –, ML +	MTL +, ML –	MTL –, ML –	
Cricetulus migratorius				
0	0	0	100	Meydan
Allocricetus bursae				
7	16	9	68	Tarkő 1.
2.5	2.5	11	84	Tarkő 2–10.
5	3	20	72	Tarkő 11–12.
5	8	8	79	Tarkő 13–15.
14	7	9	70	Tarkő 16–18.
Allocricetus éhiki				
5	0	28	67	Osztramos 3 – – Villány 3

Fig 10. The distribution of the morphotypes on M2 molars (%)



A, B, D, E, F	Cricetulus migratorius	
0	100	Meydan
	Allocricetus bursae	
12	88	Tarkő 1.
11	89	Tarkő 2–10.
36	64	Tarkő 11–12.
24	76	Tarkő 13–15.
28	72	Tarkő 16–18.
	Allocricetus éhiki	
12	88	Osztramos 3 – – Villány 3

Fig 11. The distribution of the morphotypes on M3 molars (%)



PAC +	PAC –	
Cricetulus migratorius		
7	93	Meydan
Allocricetus bursae		
20	80	Tarkő 1.
19	81	Tarkő 2–10.
14	86	Tarkő 11–12.
11	89	Tarkő 13–15.
3	97	Tarkő 16–18.
Allocricetus éhiki		
0	100	Osztramos 3 – – Villány 3

Fig 12. The distribution of the morphotypes on m1 molars (%)

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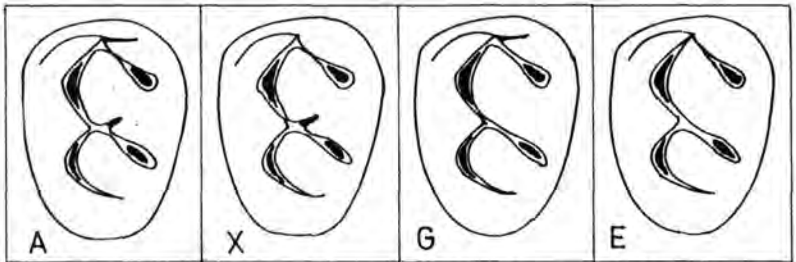
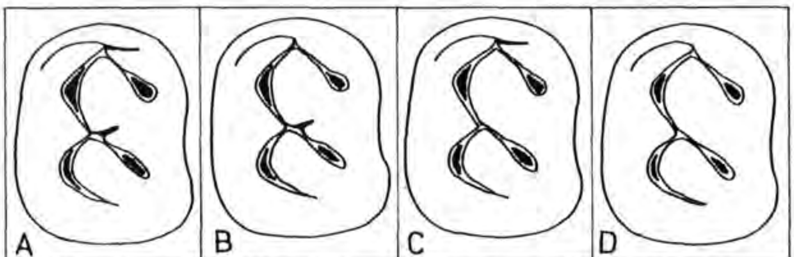


ALC +, ML +	ALC –, ML +	ALC +, ML –	ALC –, ML –	
		Cricetulus migratorius		
0	10	30	60	Meydan
		Allocricetus bursae		
5	5	25	65	Tarkő 1.
0	2	26	72	Tarkő 2–10.
5	11	15	69	Tarkő 11–12.
19	9	16	54	Tarkő 13–15.
22	11	29	38	Tarkő 16–18.
		Allocricetus éhiki		
22	30	35	13	Osztramos 3 – – Villány 3

Fig 13. The distribution of the morphotypes on M2 molars (%



ALC +, ML +	ALC –, ML +	ALC +, ML –	ALC –, ML –	
		Cricetulus migratorius		
63	18	4	15	Meydan
		Allocricetus bursae		
23	62	0	15	Tarkő 1.
7	53	3	37	Tarkő 2–10.
18	66	4	12	Tarkő 11–12.
38	62	0	0	Tarkő 13–15.
38	55	0	7	Tarkő 16–18.
		Allocricetus éhiki		
60	31	2	7	Osztramos 3 – – Villány 3

Fig 14. The distribution of the morphotypes on M3 molars (%

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