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MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

(Plates XLIII-LI)

Contents

Abstract. — Eighteen species of rodents from the following Middle Oligocene localities of SW Mongolia: Loh, Tatal Gol, Buylsteen Khuduk, Ulan Ganga, Khatan Khayrkhan, Boongeen Gol, Nareen Bulak, Khaitch Bulak, Khalyun, and Begger Noor, are described and figured. New species *Tataromys gobiensis*, *Pseudocylindrodon mongolicus*, and *Cyclomylus minutus*, are defined.

INTRODUCTION

Rodents were first found in the Middle Oligocene of Mongolia by the Central Asiatic Expedition of the American Museum of Natural History in 1922, in a formation named Hsanda Gol occurring in the basin of Tsagan Noor Lake. The specimens derived partly from a locality called Loh and partly from outcrops of the same formation situated some 15 miles to the E and W from this locality. In most papers, the localization of the specimens was summarily given as "Hsanda Gol". The collection was described in preliminary papers by MATTHEW & GRANGER (1923*a*, *b*). However, no detailed description followed; particular species have been mentioned in some general papers, and some authors discussed their systematical position (e.g. STEHLIN & SCHAUB, 1951; SCHAUB, 1958; WOOD, 1962). MELLETT, in his hitherto unpublished thesis (1966) described in more detail some Hsanda Gol rodent species. However, in the published summaries of his work (MELLETT, 1967, 1968), only a revised list of the Hsanda Gol fauna, accompanied by remarks on stratigraphy and palaeoecology, was presented.

The Palaeontological Expeditions to Mongolia of the USSR Academy of Sciences in 1946—1949 made an abundant collection of rodents in a locality called Tatal Gol and situated several kilometers from Loh, where the Hsanda Gol Formation in also outcropped (ROZHDESTVENSKY, 1957). This was one of the localities previously explored by the American expedition and called then "Grand Canyon" (MELLETT, 1968). Also the Soviet collection was never entirely published. Particular species were described in papers by VINOGRADOV & GAMBARYAN (1952) and SHEVYREVA (1965, 1968, 1971*a*, *b*, 1972).

The Soviet geologists working in Western Mongolia found some Middle Oligocene rodents. No palaeontological studies were made; for some localities, *Tsaganomys altaicus* was considered to be a characteristic species (BELJAEVA, 1937; DEVYATKIN & LISKUN, 1966; DEVYATKIN, 1970).

The Mongolian palaeontologist DASHZEVEG published the results of this studies made in 1962—1965 in the region of Tsagan Noor Lake and in other Middle Oligocene localities in western and eastern Mongolia (1970, 1971). He described a new species, *Tachyoryctoides tatalgolicus*, occurring at Tatal Gol, and gave some new localities of *Tsaganomys altaicus* and other species.

During the Western Reconnaissance of the Mongolian-Polish Palaeontological Expedition in 1964, an abundant collection of rodent remains was made in the region of the Tsagan Noor Lake, namely at Loh, Tatal Gol and Buylsteen Khuduk, and also in the hitherto unexplored localities situated to the SW, namely Ulan Ganga, Khatan Khayrkhan, Boongeen Gol, Nareen Bulak, Khaitch Bulak, and Khalyun (GRADZIŃSKI *et al.*, 1969). During the 1965 expedition, remains of *Tsaganomys altaicus* were found in the Oligocene of Begger Noor. The collections made by these expeditions are the subject of the present paper.

In the regions adjoining the Mongolian People's Republic Middle Oligocene rodents have been also found. They occur in the Indricotherium fauna of Kazakhstan (ARGYROPULO, 1938, 1939*a*, *b*, *c*; BORISSIAK & BELJAEVA, 1948; FLEROV, 1961; FLEROV & IANOVSKAIA, 1971; SHEVYREVA, 1965, 1967, 1968, 1971, 1972; VORONTSOV, 1963; VINOGRADOV & GAMBARYAN, 1952). In China, BOHLIN (1937, 1946) found Middle Oligocene rodents in the Kansu province at Shargaltein

valley and Taben-buluk, YOUNG & CHOW (1955) in Lingwu, and TEILHARD DE CHARDIN (1926) in Ordos at the locality Saint-Jacques (San-Tan-Cho).

The main object of my study was to make accessible the collection by presenting descriptions, measurements and figures. In order to establish the systematical position of particular forms, further studies would be necessary, concerning all the available material of adequate rodent families, and not only the specimens from Mongolia.

The specimens described in the present paper are kept in the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw.

Abbreviations:

A. M. N. H. — American Museum of Natural History,
PIN — Palaeontological Institute USSR Academy of Sciences, Moscow,
Z. Pal. — Palaeozoological Institute of the Polish Academy of Sciences.

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The author is indebted to Miss M. DAWSON (Carnegie Museum, Pittsburgh) and Mrs N. S. SHEVYREVA (Palaeontological Institute USSR Academy of Sciences, Moscow) for valuable remarks and informations, and Mr. K. MALCZEWSKI for drawing the figures.

GENERAL REMARKS

In Table 1 the distribution of the rodent species described hitherto from the Middle Oligocene localities of Mongolia is presented. The most abundant fauna derived from Hsanda Gol Formation, represented in our collection by the specimens from Tatal Gol, Loh and Buylsteen Khuduk. It seems that the remains found in this formation may be referred to separate periods, but it is as yet impossible to make a complete division (see p. 169). In the richest locality, Tatal Gol, exclusively in the lower part of the profile were found: *Selenomys mimicus*, *Prosciurus lohiculus*, *P. arboraptus*, *Pseudocylindrodon mongolicus*, *Tataromys sigmodon*, *Karakoromys decessus*, *Parasminthus tangingoli*, *Cricetops* cf. *aeneus* and *Eumys asiaticus*; exclusively in the upper part of the profile: *Tataromys deflexus* and *Tachyoryctoides obrutchewi*. The remaining species were found throughout the profile. High number of rodent species and considerable variability of particular forms may also indicate that the collection from the Hsanda Gol Formation represents a long time.

The presence of two separate rodent faunas was also ascertained in the Middle Oligocene of Boongeen Gol. In the lower part of the profile *Prosciurus lohiculus*, *Karakoromys decessus*, *Cricetops dormitor*, *Tsaganomys altaicus* and *Eumys asiaticus* were found, while in the upper part, *Tataromys gobiensis* and *Cyclomylus lohensis*.

In the remaining localities stratigraphical division of the fauna was not possible. Usually, these localities were too poor to allow more general conclusions. Some differences in the composition of faunas may be also due to different ecological conditions at particular localities during deposition of the rodent remains.

Attempts to reconstruct the ecological conditions of the Mongolian Middle Oligocene should be based not only on rodents, but on the whole fauna preserved. Nevertheless, it may be suggested that the abundance of rodents, their general trend to hypsodontism, and lastly

Table 1

The occurrence of rodents in the Middle Oligocene localities of Mongolia

Species \ Localities	Hsanda Gol Formation (Mellett, 1968)	Tatal Gol, Lower part	Tatal Gol, Upper part	Loh	Buylsteen Khuduk	Nareen Bulak	Khatan Khayrkhan	Boongeen Gol, Lower part	Boongeen Gol, Upper part	Khalyun	Ulan Ganga	Khaitch Bulak	Begger Noor
Selenomys mimicus	+	+	—	—	—	—	—	—	—	—	—	—	—
Prosciurus lohiculus	+	+	—	—	—	—	+	+	—	—	+	—	—
Prosciurus arboraptus	+	+	—	—	—	+	+	—	—	—	—	—	—
Pseudocylindrodon mongolicus	+	+	—	—	—	—	—	—	—	—	—	—	—
Tsaganomys altaicus	+	+	+	+	+	+	+	+	—	+	+	—	+
Cyclomylus lohensis	+	+	+	+	+	—	—	—	+	—	—	—	—
Cyclomylus minutus	—	—	—	—	—	—	+	—	—	—	—	—	—
Tataromys deflexus	+	—	+	—	—	—	—	—	—	—	—	—	—
Tataromys gobiensis	—	—	—	—	—	—	+	—	+	—	—	+	—
Tataromys plicidens	+	—	—	—	—	—	+	—	—	—	—	—	—
Tataromys sigmodon	+	+	—	—	—	+	—	—	—	—	—	—	—
Tataromys cf. *grangeri*	+	—	—	—	—	—	+	—	—	—	—	—	—
Karakoromys decessus	+	+	—	—	—	—	+	+	—	—	+	—	—
Parasminthus tangingoli	—	+	—	—	—	—	—	—	—	—	—	—	—
Cricetops dormitor	+	+	+	+	+	—	—	+	—	—	—	—	—
Cricetops cf. *aeneus*	—	+	—	—	—	—	—	—	—	—	—	—	—
Eumys asiaticus	+	+	—	—	—	—	+	+	—	—	—	—	—
Tachyoryctoides obrutchewi	+	—	+	—	—	—	—	—	—	—	—	—	—

the presence of such undoubtedly burrowing forms as *Tsaganomys altaicus* and *Cyclomylus lohensis* clearly indicate that the predominating habitat were open areas devoid of forests.

Rodent faunas similar to that of Mongolia occurred in the Middle Oligocene in the adjoining regions, namely in the Chinese provinces of Ordos and Kansu, and in Kazakhstan.

In the latter area, some differences appear, namely some forms of open habitats seem to be absent, while aquatic forms are more common, e.g. Castoridae.

The Middle Oligocene rodent fauna of Central Asia evolved there from the Eocene and Lower Oligocene forms, still inadequately known. This may concern Ctenodactylidae and Cylindrodontidae. Some genera (*Prosciurus*, *Pseudocylindrodon*), seem to be clearly connected with North American faunas, thus indicating possibilities of migration between Asia and America. On the other hand, no connections with European faunas appear to have existed at that time.

SYSTEMATICS

Family ?APLODONTIDAE Trouessart, 1897

Genus **SELENOMYS** Matthew & Granger, 1923

Selenomys mimicus Matthew & Granger, 1923

(Pl. XLIII, Figs 1-3)

1923. *Selenomys mimicus* n.g., n.sp.; W. D. Matthew & W. Granger, Nine new rodents..., p. 5, Fig. 5.
1942. *Selenomys mimicus*; P. Teilhard de Chardin & P. Leroy, Chinese fossil mammals, p. 25.
1951. *Selenomys mimicus*; H. G. Stehlin & S. Schaub, Die Trigonodontie..., pp. 179, 334, 367, Figs. 266, 590.
1968. *Selenomys mimicus*; J. S. Mellett, The Oligocene..., pp. 6, 10.
1970. *Selenomys mimicus*; D. Dashzeveg, Novye dannye..., pp. 38, 40.
1971. *Selenomys mimicus*; K. K. Flerov & N. N. Ianovskaia, Ekologitscheskie kompleksy..., p. 20.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: 12 upper jaws with complete or fragmentary tooth-rows, 20 mandibles with complete and 26 with fragmentary tooth-rows, 1 isolated M_2 (all No. MgM-III/53).

Description. — All specimens are dark in colour, which confirms their provenance from below the lava bed. The better preserved upper jaws permit to state that the infraorbital foramen was very large. Teeth are hypsodont. Their individual variability is small. The length of upper

Table 2

Measurement of upper molars of *Selenomys mimicus* from Tatal Gol (Z. Pal. No. MgM-III/53)

Measurements	N	min.	max.	m
M^1 length	7	3.1	3.5	3.3
M^1 width	6	2.2	2.4	2.3
M^2 length	11	2.3	2.6	2.5
M^2 width	11	1.8	2.0	1.9
M^3 length	10	2.0	2.6	2.3
M^3 width	10	1.4	1.6	1.4
upper tooth row	5	7.0	8.5	7.6

Table 3

Measurements of lower molars of *Selenomys mimicus* from Tatal Gol (Z. Pal. No. MgM-III/53)

Measurements	N	min.	max.	m
M_1 length	20	2.1	2.5	2.3
M_1 width	20	1.5	1.9	1.7
M_2 length	20	2.3	2.7	2.6
M_2 width	20	1.4	1.8	1.6
M_3 length	20	2.4	2.8	2.7
M_3 width	20	1.3	1.5	1.4
lower tooth-row	20	6.6	7.7	7.2

molars is usually diminishing from M^1 to M^3. Angular process, never preserved completely, was strongly inflated. Lower incisor, not grooved, ends below M_2. The length of lower molars is augmenting from M_1 to M_3.

Dimensions: see Tables 2 and 3.

Discussion. — The original description made by MATTHEW & GRANGER (1923) was based on few upper and lower jaws. They were unable to establish the taxonomical position of the genus *Selenomys* and provisionally associated it with *Cricetops*. STEHLIN & SCHAUB (1951) place *Selenomys* among "Cricetidae of uncertain systematic position", they stress, however, the peculiarity of its tooth-pattern.

MELLETT (1966, 1968) studied a much greater material of *Selenomys* than that accessible to earlier students. He pointed to such characters as the inflated angular process, lower incisor terminating at the level of M_2, the enormous infraorbital foramen, and the zygomatic structure bearing no resemblance to *Cricetops*. As a result of his study, he tentatively placed *Selenomys* in the Aplodontidae. According to this author, the configuration of the zygomasseteric region is not protrogomorphous but dipodoid, and therefore the final decision concerning the systematic position of *Selenomys* will become possible only after better cranial material will have been studied. In my opinion, the evidence already collected does not agree with the inclusion of *Selenomys* in the Cricetidae and makes its connection with Aplodontidae most probable.

Selenomys mimicus was known until recently only from the Hsanda Gol Formation. DASHZEVEG (1970) cited this species in the list of fauna from a new Middle Oligocene fossil locality, Shukht, in SE Gobi.

Family PARAMYIDAE MILLER & GIDLEY, 1918

Genus ?PROSCIURUS MATTHEW, 1903

Prosciurus lohiculus MATTHEW & GRANGER, 1923

(Pl. XLIII, Figs. 4-7)

1923. *Prosciurus lohiculus* n. sp.; W. D. MATTHEW & W. GRANGER, Nine new rodents..., p. 7, Fig. 8.
1942. *Prosciurus lohiculus*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 25.
1951. *Prosciurus*? *lohiculus*; H. G. STEHLIN & S. SCHAUB, Die Trigonodontie..., p. 110, Fig. 159,

1962. *Plesispermophilus lohiculus* (partim); A. E. WOOD, The Early Tertiary..., p. 236, Fig. 87 *D*.
1968. ?*Plesispermophilus lohiculus*; J. S. MELLETT, The Oligocene..., pp. 6, 8, 10.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: fragmentary mandible with M_1 (No. MgM-III/71/1) and isolated lower molar, probably M_3 (No. MgM-III/71/2). Khatan Khayrkhan: mandible with emerging P_4 and M_1 (No. MgM-III/72). Boongeen Gol, lower part: maxilla with P^4-M^3 (No. MgM-III/73). Ulan Ganga: mandible with P_4 (No. MgM-III/74).

Description and dimensions. — The upper dentition from Boongeen Gol (No. MgM-III/73) is identical with the holotype of *Prosciurus lohiculus* from Hsanda Gol Formation described by MATTHEW & GRANGER (1923*b*). The dimensions of particular teeth are as follows: P^4 L: 2.6, W: 2.1, M^1 L: 1.9, W: 2.2, M^2 L: 2.1, W: 2.1, M^3 L: 2.2, W: 2.0 mm.

Among the remains of mandibles and lower dentition of Paramyidae from the Middle Oligocene of Mongolia 4 specimens possibly belong to *Prosciurus lohiculus*. In the mandibles from Tatal Gol and Khatan Khayrkhan the incisor is 1.5 mm broad, in the specimen from Ulan Ganga 1.8 mm. All are without any longitudinal rows. In one of the specimens, found in Khatan Khayrkhan (No. MgM-III/72), P_4 is emerging, M_1 slightly worn. The length of M_1 is 2.2, its width 2.2 mm, the length of the lower tooth-row (measured on alveoles) was about 8.4 mm. In M_1 there is a very pronounced ectolophid. This tooth is nearly rectangular, without protruding hypoconid. Trigonid basin is completely isolated from the talonid basin, which is small. There is an additional basin between the hypolophid and the posterior cingulum, where the hypoconulid is markedly developed. The external valley is oblique, undivided.

In the mandible from Tatal Gol (No. MgM-III/71/1) M_1 is slightly different. It is more elongated, its length being 2.3, width 1.8 mm. The external valley is nearly transversal and divided by a spur developed on the mesoconid. Metalophid is incomplete, therefore the trigonid basin is connected with the talonid basin. An isolated tooth from the same locality, probably M_3 (No. MgM-III/71/2) is 2.1 mm long, 2.1 mm broad and its structure agrees well with the above described specimen from the same locality. The lower mandible from Ulan Ganga (No. MgM-III/74) is more robust than those described above. Its P_4 is 2.3 mm long and 2.3 mm wide. The structure of its M_1, however, agrees well with the pattern of teeth in the remaining specimens.

Discussion. — *Prosciurus lohiculus* was described by MATTHEW & GRANGER (1923*b*) on the base of upper dentition only. MELLETT (1966) found in the collections made from the Hsanda Gol Formation by the American Museum of Natural History lower dentitions, which he tentatively connected with *Prosciurus lohiculus*, but these were never published. In his unpublished thesis there is no description of these specimens, but their dimensions are given as follows: P_4 is 2.1 mm long and 1.4 mm wide, the two specimens of M_1 are, respectively, 2.3 and 2.0 mm long and 1.8 and 1.6 mm wide, the length of the lower tooth-row in the more complete specimen was 8.0 mm.

ARGYROPULO (1939*c*) described and figured a lower dentition from the Oligocene of Kazakhstan, which he tentatively connected with the upper dentition from Hsanda Gol. STEHLIN & SCHAUB (1951) include (with question mark) the upper dentition from Hsanda Gol to *Prosciurus* and state that the lower dentition from Kazakhstan described by ARGYROPULO belongs to the genus *Plesispermophilus*. WOOD (1962) goes a step further and, on the assumption that the specimen from Kazakhstan belongs to the same form as the upper dentition from Hsanda Gol, includes *Prosciurus lohiculus* to the genus *Plesispermophilus*. In my opinion, the lower dentition from Kazakhstan cannot belong to the form described as *Prosciurus lohiculus* from Mongolia. Its dimensions are slightly larger (P_4-M_3 about 9.3 mm) and, what is more

important, there is no counterpart of the characteristic longitudinal crest developed so well on upper teeth of *Prosciurus lohiculus*.

In the material of mandibles described above one very variable species or two different species are represented. It seems highly probable that all or some mandibles belong to the same species as the upper dentition called *Prosciurus lohiculus*. They are therefore relevant to the generic position of *Prosciurus lohiculus*, which may be established by a detailed study of all materials available, including those from the American Museum of Natural History.

Prosciurus arboraptus SHEVYREVA, 1971

(Pl. XLIV, Figs. 1-3)

1968. *Prosciurus* sp.; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1971. *Prosciurus arboraptus* sp. nov.; N. S. SHEVYREVA, Novye gryzuny..., pp. 79-81, Fig. 6.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: fragment of upper jaw with P^4-M^2 (No. MgM-III/76/1), two fragmentary mandibles, both with P_4-M_2 (No. MgM-III/76/2 and 3). Khatan Khayrkhan. Upper jaw with P^3-M^3 (No. MgM-III/77). Nareen Bulak. Fragmentary mandible with P_4-M_3 (No. MgM-III/78).

Description. — P^3 is a simple cone with faint cingulum on its posterior ridge. P^4 is triangular with protruding anterointernal part. Anterior cingulum well developed in all three molars. Hypocone absent. Mesostyle present only in M^3. Posterior cingulum much weaker than the anterior one. Protoconule and metaconule distinct, connected by a crest.

The masseteric fossa ends below the posterior end of M_1. P_4 is short, narrow anteriorly, its protoconid and metaconid are divided by a deep basin. M_3 rather elongated, its basin divided into posterior and anterior part by a transversal ridge.

Dimensions: see Tables 4 and 5.

Table 4

Measurements of upper teeth of *Prosciurus arboraptus*

Z. Pal. cat. Nos.	P^3		P^4		M^1		M^2		M^3		Upper tooth-row
	length	width	length	width	length	width	length	width	length	width	
MgM-III/76/1	—	—	1.9	1.8	1.6	1.9	1.5	1.9	—	—	—
MgM-III/77	1.1	1.1	—	2.0	1.6	2.1	1.8	2.0	1.8	1.8	7.7

Discussion. — *Prosciurus arboraptus* was described by SHEVYREVA (1971 *a*) from the Middle Oligocene of Kazakhstan. The preserved material contained one maxillary fragment with P^4 and some isolated upper teeth. I was able to compare directly my material with the holotype and state the identity in upper dentition in the specimens from Mongolia and Kazakhstan.

The specimens from Tatal Gol (No. MgM-III/76) are smaller than those from Khatan Khayrkhan (No. MgM-III/77) and Nareen Bulak (No. MgM-III/78) and may represent another species, but more material is needed to solve this problem.

Table 5

Measurements of lower teeth of *Prosciurus arboraptus*

Z. Pal. cat. Nos.	P_4		M_1		M_2		M_3		Lower tooth row
	length	width	length	width	length	width	length	width	
MgM-III/76/2	1.8	1.4	1.8	1.4	1.9	1.5	—	—	—
MgM-III/76/3	1.6	1.5	1.6	1.6	1.7	1.6	—	—	—
MgM-III/78	1.7	1.6	1·6	1.7	1.8	1.8	2.0	1.6	6.9

MELLETT (1968) notes the presence of *Prosciurus* sp. in the fauna of Hsanda Gol Formation. In his unpublished thesis (1966) he gives the dimensions of some lower jaw fragments, which agree in this respect with our specimens, but their description is laconic. No upper jaws which correspond to the above mentioned mandibles were recognized by this author.

Family CYLINDRODONTIDAE MILLER & GIDLEY, 1918

Genus **PSEUDOCYLINDRODON** BURKE, 1935

Pseudocylindrodon mongolicus n.sp.

(Pl. XLIV, Figs. 4-5)

1952. *Pseudocylindrodon* sp.; B. S. VINOGRADOV & P. P. GAMBARYAN, Oligocenovye..., pp. 14-15, Fig. 1.
1968. cf. *Pseudocylindrodon* sp.; J. S. MELLETT, The Oligocene..., pp. 8, 10.
1971. *Pseudocylindrodon* sp.; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.

Holotype: mandible with P_4-M_2 (No. MgM-III/54/1).
Type horizon and locality: Tatal Gol, Hsanda Gol Formation, lower part, Gobi Desert, Mongolia.
Derivation of the name: mongolicus — occurring in Mongolia.

Material. — Besides the holotype, one mandible with M_1-M_3 (No. MgM-III/54/2) from the same locality.

Diagnosis. — Mandible is very robust. There is only one, large foramen mentale situated slightly anteriorly from the anterior border of P_4. Diastema short, forming a sharp crest. Anterior border of the incisor strongly convex, the tooth is about 2 mm long and 1.5 mm broad. Its pulp cavity is long and narrow. Posterior border of the incisor reaches below M_3. The masseteric fossa extends forwards to below the anterior end of M_2. The anterior part of P_4 is narrow, with the protoconid and metaconid separated by a shallow groove on the anterior face of the tooth. A longitudinal crest connects these two cusps with the endoconid. There is no mesostylid on P_4. This tooth is longer than M_1. The molars are not very hypsodont. Their talonid is broad. The valleys disappear without being transformed into fossetids. Metalophid is well developed on unworn molars.

Dimensions: see Table 6.

Discussion. — The presence of a small representative of Cylindrodontidae in Tatal Gol was first established by VINOGRADOV & GAMBARYAN (1952), who determined it as *Pseudocylindrodon* sp. They stressed the similarity with American species of this genus, but also characters peculiar to the Mongolian form. Their material contained two lower jaws, one with

Table 6

Measurements of lower molars of *Pseudocylindrodon mongolicus* from Tatal Gol

Specimen	P_4		M_1		M_2		M_3		Lower tooth-row
	length	width	length	width	length	width	length	width	
Z. Pal. No. MgM-III/54/1	1.7	1.5	1.5	1.5	1.4	1.6	—	—	±6.1
Z. Pal. No. MgM-III/54/2	—	—	1.6	1.6	1.5	1.6	1.4	1.4	—
A. M. N. H. No. 84205 (MELLETT 1966)	1.5	1.4	1.3	1.6	1.3	1.4	—	—	—
PIN No. 475-510b (VINOGRADOV & GAMBARYAN, 1952)	—	—	—	—	—	—	—	—	5.9

a complete tooth-row. MELLETT (1966) discovered one mandible of this form in the material from Tatal Gol collected by the American Museum of Natural History. *Pseudocylindrodon mongolicus* n. sp. is known only from Tatal Gol.

Pseudocylindrodon mongolicus n. sp. has many characters in common with two Early Oligocene American genera of Cylindrodontidae: *Cylindrodon* DOUGLASS, 1931 and *Pseudocylindrodon* BURKE, 1935. From *Cylindrodon fontis* DOUGLASS, 1931, the unique species of this genus, it differs in several characters. The internal valleys on the lower molars of *Pseudocylindrodon* (including *P. mongolicus* n.sp.) do not form closed fossetids with wear, as in *Cylindrodon*. Talonids of the molars are wider in the Mongolian form, and there is no reduction of the posterior part of M_3. *Pseudocylindrodon mongolicus* n. sp. has more characters in common with the American species of the genus *Pseudocylindrodon*. It differs, however, from known species of this genus, *P. medius* BURKE, 1938 and *P. neglectus* BURKE, 1935, in having one, instead of two, mental foramen, a relatively longer and differently shaped P_4, as well as a different molar-pattern. *Pseudocylindrodon tobeyi* BLACK, 1970, recently described by BLACK (1970) from Badwater Creek, is less hypsodont and of larger dimensions.

Pseudocylindrodon mongolicus n.sp. represents an immigrant from America in the Middle Oligocene of Central Asia.

Genus **TSAGANOMYS** MATTHEW & GRANGER, 1923

Tsaganomys altaicus MATTHEW & GRANGER, 1923

(Pl. XLV, Figs. 1-2)

1923. *Tsaganomys altaicus* n.g., n.sp.; W. D. MATTHEW & W. GRANGER, New Bathyergidae..., pp. 2-5, Figs. 1-4.
1926. *Tsaganomys altaicus*; P. TEILHARD DE CHARDIN, Description de mammifères..., pp. 28-30, Fig. 16, Pl. IV, Figs. 4-7.
1937. *Tsaganomys* sp.; E. J. BELJAEVA, Materialy..., pp. 12-13, Pl. I, Figs. 2-3.
1937. *Tsaganomys altaicus*; B. BOHLIN, Oberoligozäne..., pp. 46-48, Figs. 110-123.
1942. *Tsaganomys altaicus*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 30.
1948. *Tsaganomys* sp.; A. A. BORISSIAK & E. J. BELJAEVA, Mestonakhozdenia..., pp. 40, 41.
1951. *Tsaganomys altaicus*; H. G. STEHLIN & S. SCHAUB, Die Trigonodontie..., pp. 115, 281, Figs. 168, 480.
1952. *Tsaganomys altaicus*; B. S. VINORGADOV & P. P. GAMBARYAN, Oligocenovye..., pp. 23-41, Figs. 12*A*, 22 24.
1957. *Tsaganomys altaicus*; A. K. ROZHDESTVENSKY, Kratkie itogi..., p. 178.

1958. *Tsaganomys altaicus*; S. SCHAUB, Simplicidentata, p. 754, Fig. 156.
1962. *Tsaganomys altaicus*; I. M. GROMOV, Rodentia, p. 137, Fig. 93.
1964. ?*Tsaganomys* sp.; E. J. BELJAEVA, Nekotorye itogi..., p. 18.
1966. *Tsaganomys altaicus*; E. V. DEVYATKIN & I. G. LISKUN, K stratigrafii..., p. 138.
1968. *Tsaganomys altaicus*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Tsaganomys altaicus*; D. DASHZEVEG, Novye dannye..., pp. 38-41.
1970. *Tsaganomys altaicus*; E. V. DEVYATKIN, Geologia kainozoia..., pp. 51, 53, 57, 61.
1971. *Tsaganomys altaicus*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.
1971. *Tsaganomys altaicus*; N. S. SHEVYREVA, K voprosu..., p. 144.
1971. *Beatomys bisus (nomen nudum)*; N. S. SHEVYREVA, K voprosu..., p. 144.
1972. *Beatomys bisus* sp. nov.; N. S. SHEVYREVA, Novye gryzuny..., pp. 143-144, Fig. 6.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: 19 fragmentary mandibles with complete tooth-rows, 22 fragments of mandibles with incomplete tooth-rows, 15 fragments of skulls with complete or incomplete tooth-rows, numerous isolated incisors and molariforms (all No. MgM-III/55). Bones of postcranial skeleton have not been studied. Tatal Gol, Hsanda Gol Formation, upper part: 3 fragmentary mandibles with complete tooth-rows, 5 other mandibular fragments, 5 fragments of skulls, numerous isolated incisors and molariforms (all No. MgM-III/56). Loh, Hsanda Gol Formation: 3 fragmentary mandibles with complete tooth-rows, 7 fragments of mandibles with incomplete tooth-rows, 5 fragments of skulls, 3 isolated incisors (all No. MgM-III/57). Buylsteen Khuduk, Hsanda Gol Formation: 3 fragments of mandibles with incomplete tooth-rows, 2 fragments of skulls, numerous isolated incisors and molariforms (all No. MgM-III/58). Khatan Khayrkhan: 2 fragmentary mandibles with complete tooth-rows, 1 fragment of mandible with P_4-M_1, 1 fragment of skull with complete tooth-row, 11 fragments of skulls with parts of tooth-rows, numerous isolated incisors and molariforms (all No. MgM-III/59). Nareen Bulak: 3 fragmentary mandibles within complete tooth-rows, 3 fragments of skulls, isolated incisors and molariforms (all No. MgM-III/60). Boongeen, Gol, lower part: fragments of skull and postcranial skeleton of one specimen found together, 2 fragments of mandibles with incomplete tooth-rows, 8 isolated molariforms, 6 fragments of incisors (all No. MgM-III/61). Khalyun: fragments of skull of one specimen (No. MgM-III/63). Ulan Ganga: 4 isolated molariform teeth (all No. MgM-III/64). Begger Noor: fragmentary skull (No. MgM-III/65).

Description and dimensions. — Incisor bulge ends above M^2. P^3 is lacking. Upper row of molariform teeth is 18.0 to 21.0 mm long (N = 6, m = 19.0 mm). Lower incisor 5.2—7.8 mm wide. Lower row of molariform teeth 15.7—23.8 mm long (Table 7). All molariform teeth are rootless, and form cylinders usually without traces of original structure of the crown.

Discussion. — The skull and teeth of *Tsaganomys altaicus* were described in detail by MATTHEW & GRANGER (1923*a*). VINOGRADOV & GAMBARYAN (1952) gave a description of the postcranial skeleton. According to MATTHEW & GRANGER (1923*a*) in some specimens from Hsanda Gol Formation the milk teeth (dp^3 and dp^4) could be seen, as well as traces of the crown pattern still existing on the surface of the permanent teeth. These characters are not visible in our specimen with exception of small traces of original structure on lower molars. It seems that the existence of milk teeth was observed in the specimens of *Cyclomylus lohensis*, which are sometimes similar in size to the smaller specimens of *Tsaganomys altaicus*.

SHEVYREVA (1971*b*, 1972) stated that the material hitherto described as *Tsaganomys altaicus* contains two forms, differing by the histological structure of molariform teeth. The more evolved form is named *Beatomys bisus* SHEVYREVA, 1972. I was able to look through the material of SHEVYREVA and I am not convinced that the differences should be expressed by the creation of a new genus and species. It is, however, possible, that in the case of *Tsaganomys*, as in that

Table 7

Length of P_4-M_3 in *Tsaganomys altaicus*

Locality	Z. Pal. cat. Nos.	N	min.	max.	m
Tatal Gol, lower part MgM-III/55	dark specimens	15	18.2	21.3	20.1
	white specimens	4	19.1	19.7	19.4
Tatal Gol, upper part	MgM-III/56	3	16.6	21.5	18.4
Loh	MgM-III/57	3	17.6	22.5	20.3
Khatan Khayrkhan	MgM-III/59	2	15.7	18.2	16.8
Nareen Bulak	MgM-III/60	1	—	—	18.7
Boongeen Gol, lower part	MgM-III/6	2	20.0	23.8	21.9

of other forms from the Hsanda Gol Formation, different evolutionary stages are represented in different layers.

Tsaganomys altaicus is known from numerous localities in Mongolia and in China (Ordos, Kansu), but is absent from the beds of the same age in Kazakhstan. Its presence in Georgia is doubtful (GROMOV, 1962), the only specimen from this country was lost (L. K. GABUNIA, personal communication).

Genus **CYCLOMYLUS** MATTHEW & GRANGER, 1923

Cyclomylus lohensis MATTHEW & GRANGER, 1923

(Pl. XLV, Figs. 3-4 and XLVI, Figs. 1-3)

1923. *Cyclomylus lohensis* n. g., n. sp.; W. D. MATTHEW & W. GRANGER, New Bathyergidae..., p. 5.
1926. *Tsaganomys* (small specimens); P. TEILHARD DE CHARDIN, Description de mammifères..., p. 30, Fig. 16.
1942. *Cyclomylus lohensis*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 30.
1952. *Cyclomylus lohensis*; B. S. VINOGRADOV & P. P. GAMBARYAN, Oligocenovye..., pp. 17-18.
1952. *Pseudotsaganomys mongolicus* sp. nov.; B. S. VINOGRADOV & P. P. GAMBARYAN, Oligocenovye..., pp. 22-23, Fig. 11.
1956. *Cyclomylus lohensis*; C. C. YOUNG & M. M. CHOW, Some Oligocene..., pp. 448-449, 456, Fig. 1.
1957. *Pseudotsaganomys mongolicus*; A. K. ROZHDESTVENSKY, Kratkie itogi..., p. 178.
1957. *Cyclomylus lohensis*; A. K. ROZDESTVENSKY, Kratkie itogi..., p. 178.
1968. *Cyclomylus* (= „*Pseudotsaganomys*") *lohensis*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Cyclomylus lohensis*; D. DASHZEVEG, Novye dannye..., pp. 38, 39, 40, 42.
1971. *Cyclomylus lohensis*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.
1971. *Pseudotsaganomys mongolicus*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitscheskie kompleksy..., p. 20.
1972. *Sepulkomys eboretus* sp. nov.; N. S. SHEVYREVA, Novye gryzuny..., pp. 140-141, Fig. 4.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: 27 fragmentary mandibles with complete tooth-rows, 41 fragments of mandibles with incomplete tooth-rows, 1 fragmentary skull with complete tooth-row, 4 other fragments of skulls, 8 isolated molariforms (all No.

MgM-III/66). Tatal Gol, Hsanda Gol Formation, upper part: 2 fragmentary mandibles with complete tooth-rows, 1 fragment of mandible with incomplete tooth-row, 3 fragments of skulls with incomplete tooth-rows, 1 fragment of skull without teeth, 7 isolated molariforms (all No. MgM-III/67). Loh, Hsanda Gol Formation: 9 fragmentary mandibles with complete tooth-rows, 8 fragments of mandibles with incomplete tooth-rows, 1 fragment of skull with complete tooth-row, 3 other skull fragments, 1 isolated molariform (all No. MgM-III/68). Buylsteen Khuduk, Hsanda Gol Formation: 1 fragment of mandible with M_1-M_3 (No. MgM-III/69). Boongeen Gol, upper part: 1 isolated molariform tooth (No. MgM-III/62).

Description and dimensions. — Incisor bulge ends above M^2. P^3 is present in the form of a tiny, simple rod. Molariform teeth hypsodont, with closed roots. Upper row of molariform teeth, preserved completely only in two specimens, is respectively 12.6 and 13.6 mm long.

Table 8

Length of P_4-M_3 in *Cyclomylus lohensis*

Locality	Z. Pal. cat. Nos.	N	min.	max.	m
Tatal Gol, lower part MgM-III/66	dark specimens	23	13.5	17.5	14.9
	white specimens	3	14.7	17.3	15.8
Tatal Gol, upper part	MgM-III/67	2	14.3	14.5	14.4
Loh	MgM-III/68	8	13.1	16.5	15.1

The original structure of the crown is visible in our specimens only in P^4, which emerges when the molars are already deeply worn. All other upper teeth, as well as P^4 in older specimens, are simple cylinders.

Lower incisor 3.9—5.0 mm wide. Lower row of molariform teeth (P_4-M_3) 13.1—17.5 mm long (Table 8). The original tooth-pattern is more durable than in *Tsaganomys altaicus*. In two specimens from Loh (No. MgM-III/68/1 and 2) dp_4 is present, in the first one the crown-structure is still preserved. This tooth differs from all other molariform teeth in being elongated, not circular. P_4 emerges when the molars are already deeply worn. M_3 loses its structure much later than other molars. In ontogenetically older specimens all molariform teeth are simple cylinders.

Discussion. — *Cyclomylus lohensis* was described (without figures and measurements) from the Hsanda Gol Formation by MATTHEW & GRANGER (1923*a*). VINOGRADOV & GAMBARYAN (1952), who studied the material collected by the Soviet Palaeontological Expedition in Tatal Gol, described, besides *Cyclomylus lohensis*, a new species, *Pseudotsaganomys mongolicus*. The material from the Hsanda Gol Formation dealt with here gives no evidence for the existence of two different species of similar size, as it is clearly uniform. The differences between *Cyclomylus* and *Pseudotsaganomys mongolicus* indicated by VINOGRADOV & GAMBARYAN (1952) are not convincing. Thus it seems that one can follow MELLETT (1968) in thinking that *Pseudotsaganomys mongolicus* is junior synonym of *Cyclomylus lohensis*.

In the above mentioned paper by VINOGRADOV & GAMBARYAN (1952), a second species

of *Pseudotsaganomys, P. turgaicus*, is described from the Oligocene of Kazakhstan. The figures seem to imply that it does not differ generically from *Cyclomylus*, but without seeing the original specimens I am unable to decide whether it differs specifically from *C. lohensis*. Besides the Hsanda Gol Formation *Cyclomylus lohensis* has recently been noted by DASHZEVEG (1970) from some other Mongolian localities. It is also known from Kansu in China (TEILHARD DE CHARDIN, 1926: "*Tsaganomys* sp. small specimens"; YOUNG & CHOW, 1956). SHEVYREVA (1972) described a new genus and species *Sepulkomys eboretus*, differing from *Cyclomylus lohensis*, by the presence of P^3 (which, according to her, is lacking in the holotype of the last mentioned species) and by some other minor characters. Further studies are needed to elucidate the problem of systematics of this group of Cylindrodontidae.

Cyclomylus minutus n.sp.

(Pl. XLVI, Figs. 4, 5)

Holotype: rostral part of skull with incisors and complete rows of molariform teeth (No. MgM-III/70/1).
Type horizon and locality: Khatan Khayrkhan, Middle Oligocene, Gobi Desert, Mongolia.
Derivation of the name: minutus — of small dimensions.

Material. — Besides the holotype 1 fragmentary mandible with broken incisor and complete row of molariform teeth (No. MgM-III/70/2) from the same locality and belonging probably to the same individual.

Diagnosis. — Incisor bulge ends above M^1. Interorbital space wide, nasalia long and narrow, rostrum relatively long. Mandible robust, foramen mentale below the posterior part of the diastema. Incisors without longitudinal ridges, upper ones projecting strongly at the points. 4 molariform teeth in a row, no trace of upper or lower P^3. Cheek-teeth very hypsodont, probably without closed roots. In our specimen M^3 did not yet emerge, nevertheless the structure of its crown is only slightly marked in its surface in form of two ridges. All other, upper as well as lower, teeth, without traces of original structures on their crowns, form cylinders encircled by a band of enamel.

Dimensions: Upper and lower incisors 2.6 mm broad, upper tooth-row 10.3 mm, lower 13.0 mm long.

Discussion. — *Cyclomylus minutus* n. sp. is much smaller than *C. lohensis*. It differs from it in having no P^3, incisors without longitudinal ridges, teeth more hypsodont, structure of M^3 more ephemeric and otherwise distinctive. Among the Mongolian species of Cylindrodontidae it seems to be the most advanced in the direction of hypsodoncy.

Family CTENODACTYLIDAE ZITTEL, 1893

Genus **TATAROMYS** MATTHEW & GRANGER, 1923

Tataromys deflexus TEILHARD DE CHARDIN, 1926

(Pl. XLVII, Fig. 1)

1926. *Tataromys deflexus* sp. nov.; P. TEILHARD DE CHARDIN, Description de mammifères..., p. 28, Fig. 15B.
1942. *Tataromys deflexus*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 25.
1951. *Tataromys deflexus*; H. G. STEHLIN & S. SCHAUB, Die Trigonodontie..., pp. 125, 289, Figs. 181, 496.
1958. *Tataromys* sp.; S. SCHAUB, Simplicidentata, p. 781, Fig. 211.
1968. *Tataromys deflexus*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1971. *Tataromys deflexus*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.

Material. — Tatal Gol, Hsanda Gol Formation, upper part: 4 fragments of mandibles with P_4-M_3, 1 fragment of skull with strongly damaged teeth (all Z. Pal. No. MgM-III/40).

Description. — This is the largest form of Ctenodactylidae in the collection dealt with here. Foramen mentale situated below the anterior edge of M_1. The protruding masseteric crest begins below the central part of M_1. The incisor of the mandible is ca. 2.7 mm long and 2.3 mm wide. Molars slightly hypsodont. In P_4, protoconid and metaconid join by a longitudinal ridge with the entoconid and weakly developed hypoconid.

Dimensions: see Table 9.

Discussion. — *Tataromys deflexus* was described by TEILHARD DE CHARDIN (1926) from St. Jacques in Ordos basing on a fragment of upper jaw with M^2-M^3. He considered the characteristic feature to be, besides size exceeding other species of the genus: „le paralophe et le métalophe, en lieu d'être transverse, sont fortement infléchis en avant; et le métacône émet

Table 9

Measurements of lower molars of *Tataromys deflexus*

Z. Pal. cat. Nos.	P_4		M_1		M_2		M_3		Lower tooth-row
	length	width	length	width	length	width	length	width	
MgM-III/40/2 *	3.0	—	3.9	3.0	5.5	3.8	7.3	4.4	±21
MgM-III/40/3	—	—	—	—	5.5	3.0	—	—	—
MgM-III/40/5	2.6	2.5	4.3	2.6	5.0	3.5	—	—	—

* teeth strongly worn

un crochet qui, rejoignant un anté-crochet issu du paracône, détermine un puits d'émail sur les dents moyennement usées". The length of M^2-M^3 in the holotype was 10.5 mm.

STEHLIN & SCHAUB (1951) found *T. deflexus* in the material from the Hsanda Gol Formation collected by the American Museum of Natural History and obtained by the Naturhistorisches Museum in Basle, represented by a mandible (P_4-M_3 18.5 mm long) and a maxilla with strongly abraded teeth (P^4-M^3 16.8 mm long). The teeth figured in their work correspond by their structure to those from Tatal Gol described above.

MELLETT (1968) mentions *T. deflexus* from Tatal Gol. In his unpublished thesis (1966) he stated that "with one exception all specimens came from the same locality (f. n. 536) that yielded Tachyoryctoides". In his specimen protoloph and metaloph of M^2-M^3 were connected by a cross crest isolating a fossette in the center of the tooth. He gives the following measurements for selected two specimens of *T. deflexus:* P^4 L: 3.0, W: 3.7, M^1 L: 4.1, W: 3.8, M^2 L: 4.8, W: 4.2, M^3 L: 5.3, W: 4.5, P^4-M^3: 17.5 (spec. A. M. N. H. No. 21688) and P_4 L: 3.1, W: 2.5, M_1 L: 4.0, M_2 L: 5.5, W: 3.8, M_3 L: 6.5, W: 3.9, P_4-M_3: 18,7 (spec. A. M. N. H. No. 85123). In the two other specimens he studied P_4-M_3 measured 23.3 and 23.9 mm.

State of preservation of our specimens does not allow to see the characteristic structure of upper molars; however, the structure of teeth of the mandible, and still more so their dimensions, imply that the specimens dealt with here belonged to *T. deflexus.*

Tataromys gobiensis n.sp.

(Pl. XLVII, Figs. 2-5; Pl. XLVIII, Fig. 1-2)

Holotype: Fragment of skull with left M^2-M^3 and right M^3, slightly worn (No. MgM-III/41/1).
Type horizon and locality: Khatan Khayrkhan, Middle Oligocene, Gobi Desert, Mongolia.
Derivation of the name: gobiensis — occurring in the Gobi Desert.

Material. — Khatan Khayrkhan: besides the holotype (No. MgM-III/41/1) 2 fragments of skulls, one with right M^1-M^2 and left M^1 (No. MgM-III/41/2), another, larger, with strongtly worn M^2-M^3 (No. MgM-lII/41/3), 1 fragment of mandible with M_2-M_3 (No. MgM-III/41/4). Boongeen Gol, upper part: 3 fragments of mandibles, isolated M_2 and isolated M^2 (all No. MgM-III/42). Khaitch Bulak: 8 fragments of mandibles (all No. MgM-III/43).

Diagnosis. — Large form of the genus *Tataromys* (M^2-M^3 in the holotype 8.5 mm). The valleys of upper molars transversal. There is no trace of a crest connecting proto- and metaloph and of a formation of fossette in the center of the teeth. The deep posteroexternal valley in M^1-M^3 is divided by a longitudinal crest descending from the metacone and isolating its medial part into a fossette. In M^1 a small fossette develops from the medial part of the anteroexternal valley.

Lower jaw as in *T. deflexus:* foramen mentale below P_4 or the anterior border of M_1, masseteric crest begins below the middle of M_1. Lower incisor about 2.5 mm long, 2.1 mm broad. In P_4 hypoconid is very weak. The pattern of lower molars very similar to that in other large species of *Tataromys*. The dimensions of lower molars are augmenting from M_1 to M_3.

Dimensions: Tables 10 and 11.

Discussion. — Distinction of species in the large forms of *Tataromys* is very difficult. The structure of upper molars clearly differing in the present species from *T. deflexus* indicates

Table 10

Measurements of upper molars of *Tataromys gobiensis*

Z. Pal. cat. Nos.	M^1		M^2		M^3	
	length	width	length	width	length	width
MgM-III/41/1	—	—	4.2	3.6	4.3	3.6
MgM-III/41/2	3.4	2.9	4.4	3.6	—	—
MgM-III/41/3	5.4	±4.6	6.3	4.4	—	—
MgM-III/42/1	—	—	4.9	4.2	—	—

that in the Mongolian Middle Oligocene there were two distinct large forms of this genus. However, the similarity of the structure of teeth of lower jaws does not allow to determine to which one the mandibles belonged. Pronounced variability of size of large representatives of *Tataromys* may imply that some specimens included here to *T. gobiensis* belonged to some other species, possibly *T. deflexus*. BOHLIN (1946), describing the material from Taben Buluk in

Table 11

Measurements of lower molars of *Tataromys gobiensis*

Z. Pal. cat. Nos.	P_4		M_1		M_2		M_3		Lower tooth-row
	length	width	length	width	length	width	length	width	
MgM-III/41/4	—	—	—	—	5.1	3.5	6.5	3.9	—
MgM-III/42/2	—	—	3.6	2.6	4.7	3.3	5.2	3.6	±16
MgM-III/42/3	2.3	2.3	3.7	2.6	4.6	3.3	—	—	—
MgM-III/42/4	—	—	—	—	4.8	3.3	—	3.7	—
MgM-III/42/5	—	—	—	—	5.2	3.3	—	—	—
MgM-III/43/1	—	—	4.8	3.5	5.7	4.8	6.1	4.2	—
MgM-III/43/2	—	—	3.7	2.6	4.2	3.1	5.5	3.5	—
MgM-III/43/3	—	—	4.8	2.8	5.0	3.8	—	—	—
MgM-III/43/4	—	—	—	—	4.6	3.3	—	—	—
MgM-III/43/5	—	—	—	—	3.9	2.7	—	—	—
MgM-III/43/6	—	—	—	—	—	—	7.0	4.4	—

Kansu, had similar doubts, and ultimately determined his specimens as "*Tataromys* — large species" not attempting further subdivision. MELLETT (1966) admits that the material from Hsanda Gol Formation described by him as *T. deflexus* may represent two different forms.

Tataromys plicidens MATTHEW & GRANGER, 1923

(Pl. XLVIII, Fig. 3)

1923. *Tataromys plicidens* n.g., n.sp.; W. D. MATTHEW & W. GRANGER, Nine new rodents..., pp. 5-6, Fig. 6.
1926. *Tataromys cf. plicidens*; P. TEILHARD DE CHARDIN, Description de mammifères..., pp. 27-28, Fig. 15A.
1937. *Tataromys cf. plicidens* B. BOHLIN, Oberoligozäne Säugetiere..., pp. 40-41, Figs. 87-99; Pl. 1, Figs. 29-33.
1942. *Tataromys plicidens*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 25.
1951. *Tataromys plicidens*; H. G. STEHLIN & S. SCHAUB, Die Trigonodontie..., pp. 125, 289, Figs. 179, 495.
1958. *Tataromys plicidens*; S. SCHAUB, Simplicidentata, p. 780, Figs. 208, 209.
1968. *Tataromys plicidens*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Tataromys plicidens*; D. DASHZEVEG, Novye dannye..., p. 38.
1971. *Tataromys plicidens*; K. K. FLEROW & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.

Material. — Khatan Khayrkhan: skull fragment with both rows of upper molars (No. MgM-III/44).

Description. — Upper molar pattern is nearly identical to that figured by MATTHEW & GRANGER (1923*b*) for the specimen from Hsanda Gol. The presence of a small singular cusp on the buccal margin of M^3 is to be noted.

Dimensions: P^4 L: 2.2, W: 2.6, M^1 L: 2.5, W: 2.5, M^2 L: 3.0, W: 2.9/3.0, M^3 L: 3.6/3.7, W: 3.2/3.3, length of upper tooth-row 11.3 mm.

Discussion. — *Tataromys plicidens* was described from Hsanda Gol by MATTHEW & GRANGER (1923*b*). MELLETT (1966) mentions additional material (5 upper and lower jaws) from the same locality. According to the figure in the original description, P^4-M^3 in the holotype are about 14 mm long, another specimen (A. M. N. H. No. 19084), according to MELLETT (1966) has an upper tooth-row 12.2 mm long. Our specimen is slightly smaller. The material described from Kansu by BOHLIN (1937, 1946) and from Ordos by TEILHARD DE CHARDIN (1926) differs from the holotype of *T. plicidens* in size and was only tentatively placed in this species.

Tataromys sigmodon MATTHEW & GRANGER, 1923

(Pl. XLVIII, Fig. 4)

1923. *Tataromys sigmodon* n.sp.; W. D. MATTHEW & W. GRANGER, Nine new rodents...,, p. 6.
1942. *Tataromys sigmodon*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 26.
1946. *Tataromys cf. sigmodon*; B. BOHLIN, The fossil mammals..., pp. 94-95, Figs. 16f, 19: 33, Pl. II, Fig. 29.
1968. *Tataromys sigmodon*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Tataromys sigmodon*; D. DASHZEVEG, Novye dannye..., p. 38.
1971. *Tataromys sigmodon*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: mandible with P_4-M_3 (No. MgM-III/45). Nareen Bulak: fragment of mandible belonging to Ctenodactylidae, with a fragment of a molar. The specimen is of the size of *T. sigmodon* (No. MgM-III/46).

Description. — Foramen mentale situated below the anterior border of M_1. Masseteric crest begins below the posterior border of M_1. Teeth in the specimen from Tatal Gol strongly worn. The hypoconid in P_4 lacking. M_2 and M_3 are of similar size. External valleys of the molars are directed rather obliquely backwards.

Dimensions: Specimen No. MgM-III/45:P_4 L: 1.5, W: 1.5, M_1 L: 2.4, W: 1.8, M_2 L: 2.8, W: 2.2, M_3 L: 2.8, W: 2.2, length of lower tooth-row 9.3 mm.

Discussion. — *Tataromys sigmodon* was described from Hsanda Gol by MATTHEW & GRANGER (1923*b*) on the basis of a palate with upper molars. The description is limited to the statement that: "Dentition and details of construction of teeth very close to *T. plicidens* but of smaller size, length of P^4-M^3 = 8.8 mm". MELLETT (1966) mentions, besides the holotype, two upper and lower jaw fragments from the same locality. He gives the following dimensions of lower molars: M_1 L: 2.5 and 2.2, W: 1.4 and 1.3, M_2 L: 2.7 and 2.3, W: 1.8 and 1.7, M_3 L: 2.5, W: 1.8 mm. The material from Hsanda Gol was never figured. BOHLIN (1946) referred a partial lower jaw from Taben-Buluk to this species ("*Tataromys* cf. *sigmodon*"). The details differ here slightly from our specimen: teeth are relatively broader and hypoconid of P_4 is better developed. I am inclined to think that the specimen from Kansu represents a form different from this found in Hsanda Gol.

Tataromys cf. grangeri BOHLIN, 1946

(Pl. XLVIII, Fig. 5)

Material. — Khatan Khayrkhan: 5 mandibles, one with M_1-M_2 (No. MgM-III/47/1), another with M_1-M_3 (No. MgM-III/47/2), 3 others without molars (No. MgM-III/47/3—5).

Description. — Foramen mentale situated below P_4 or below the anterior border of M_1. Masseteric crest begins below the posterior border of M_1. Molars brachyodont. On M_2-M_3 the ridge connecting metaconid and entoconid is not oblique, as in *Karakoromys*, but parallel to the long axis of the tooth, situated buccally and devoid of mesostylid.

Dimensions: see Table 12.

Discussion. — The specimens described above are the smallest representatives of Ctenodactylidae in the material studied. They differ from *Karakoromys decessus* by smaller size, more posteriorly situated foramen mentale, and a simpler structure of molars. The size of our specimens agrees with that given by BOHLIN (1946) for *Tataromys grangeri* from Taben-Buluk (M_1 L: 1.5, W: 1.3, M_2 L: 1.5, W: 1.4). The molar-pattern is also similar. In BOHLIN's specimens foramen mentale is situated still further back (below M_1). MELLETT (1966) found in the collection

Table 12

Measurements of lower molars of *Tataromys* cf. *grangeri*

Z. Pal. cat. Nos.	M_1		M_2	
	length	width	length	width
MgM-III/47/1	1.5	1.2	1.6	1.3
MgM-III/47/2	1.4	1.1	1.6	—

from Hsanda Gol specimen of Ctenodactylidae smaller than *Karakoromys decessus* (M_1 L: 1.5—1.7, W: 1.0, M_2 L: 1.8, W: 1.2—1.3, M_3 L: 1.7, W: 1.2), which he listed under the name "*Leptotataromys*". The genus *Leptotataromys*, comprising a single species *L. gracilidens*, was created by BOHLIN (1946) for one specimen of lower jaw from Shargaltein-Valley, with M_3 and a part of M_2 of much larger dimensions than in our specimens and in those described by MELLETT (1966) from Hsanda Gol. Whatever the position of *Leptotataromys gracilidens*, it is surely specifically different from the Mongolian specimens.

SHEVYREVA (1971*a*) described from the Oligocene of Kazakhstan a new genus and species, *Woodomys chelkaris*. According to this author, the species is present also in Tatal Gol. No comparison with *Tataromys grangeri* is given in her paper. Her form seems to agree perfectly with *T. grangeri* in the structure of mandible, in the form of the molars and in the dimensions, the only difference being in the structure of P_4. In *Woodomys*, the hypoconid is well developed and the posterior pair of the cusps in P_4 is isolated from the anterior one. In my opinion, this may be explained by the variability of the tooth, but our material does not contribute to the solution of this problem.

Genus **KARAKOROMYS** MATTHEW & GRANGER, 1923

Karakoromys decessus MATTHEW & GRANGER, 1923

(Pl. XLIX, Figs. 1-8)

1923. *Karakoromys decessus* n. g., n. sp.; W. D. MATTHEW & W. GRANGER, Nine new rodents..., pp. 6-7, Fig. 7.
1937. *Karakoromys* cfr. *decessus*; B. BOHLIN, Oberoligozäne Säugetiere..., p. 42, Fig. 100, Pl. 1, Fig. 34.
1942. *Karakoromys decessus*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil. mammals, p. 25.
1951. *Karakoromys decessus*; G. STEHLIN & S. SCHAUB, Die Trigonodontie..., pp. 288-289, Fig. 494.
1958. *Karakoromys decessus*; S. SCHAUB, Simplicidentata, p. 780, Fig. 207.
1968. *Karakoromys decessus*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Karakoromys decessus*; D. DASHZEVEG, Novye dannye..., pp. 38, 40.
1971. *Karakoromys decessus*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 17.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: mandible with M_1-M_2 (No. MgM-III/48). Boongeen Gol, lower part: 2 maxillae with complete tooth-rows (No. MgM-III/49/1—2), 9 mandibles with complete or fragmentary tooth-rows (No. MgM-III/49/3—11). Ulan Ganga: 2 mandibular rami found together, both with complete tooth-rows (No. MgM-III/50/1—2). Khatan Khayrkhan: maxilla with complete tooth-row (No. MgM-III/51/1), 12 mandibles with incomplete tooth-rows (No. MgM-III/51/2—13).

Description. — M^2 is the largest of upper molars. The tooth-pattern is similar to that in the smaller species of *Tataromys* (see e.g. Fig. 6 in MATTHEW & GRANGER, 1923*b*). The lophs are transversal. Anterior and posterior cingula well developed but less so than in *Tataromys*. All the upper molars have three roots, of which the buccal is the largest. The posterior part of M^3 is rather different in two specimens from Boongeen Gol: in specimen No. MgM-III/49/1 it is more reduced than in No. MgM-III/49/2.

Foramen mentale situated below P_4 or below the anterior border of M_1, masseteric crest begins below the posterior border of M_1. Molars are brachyodont. M_2 and M_3 are of about the same size, larger than M_1. Dp_4 is a relatively long-lasting tooth. It is much more elongated than P_4 and has an additional posterior cusp. P_4 emerges when the molars, especially M_1, are already deeply worn. None of my specimens have the hypoconid so well developed as in the specimen figured by MATTHEW & GRANGER (1923*b*); usually this cusp is small or nearly obsolete. The development of mesolophids in M_1-M_3 is fairly variable. Usually, the crest between the anterior and posterior cusp in the molars is weak.

Dimensions: see Tables 13 and 14.

Discussion. — *Karakoromys decessus* was described from the Hsanda Gol Formation by MATTHEW & GRANGER (1923*b*). Besides a short diagnosis, a figure of the holotype (mandible)

Table 13

Measurements of upper molars of *Karakoromys decessus*

Z. Pal. cat. Nos.	P^4		M^1		M^2		M^3		Upper tooth-row
	length	width	length	width	length	width	length	width	
MgM-III/49/1	1.0	1.3	1.5	1.5	1.6	1.7	1.5	1.7	5.7
MgM-III/49/2	1.1	1.5	1.6	1.7	1.9	1.8	1.8	1.8	6.3
MgM-III/51/1	1.2	1.2	1.6	1.6	1.9	1.8	1.8	1.8	6.3

Table 14

Measurements of lower molars of *Karakoromys decessus*

Z. Pal. cat. Nos.	P_4		M_1		M_2		M_3		Lower tooth-row
	length	width	length	width	length	width	length	width	
MgM-III/48	—	—	1.8	1.3	1.9	1.5	—	—	—
MgM-III/49/3	1.4	1.1	1.8	1.5	1.9	1.7	2.1	1.6	7.0
MgM-III/49/4	—	—	1.8	1.3	2.0	1.5	1.9	1.4	—
MgM-III/49/5	1.3	1.1	1.9	1.5	2.1	1.8	2.0	1.6	7.1
MgM-III/49/6	—	—	—	—	2.1	1.6	2.0	1.4	—
MgM-III/49/7	—	—	—	—	1.9	1.5	1.9	1.3	—
MgM-III/49/8	—	—	1.8	1.4	1.8	1.8	1.9	1.6	—
MgM-III/49/9	1.3 *	0.9 *	1.6	1.3	1.9	1.5	—	—	—
MgM-III/49/10	1.1 *	0.9 *	—	—	—	—	—	—	—
MgM-III/50	1.2	1.1	2.1	1.4	2.2	1.7	2.3	1.6	7.7
MgM-III/51/2	—	—	1.9	1.5	2.2	—	2.1	1.6	±7.3
MgM-III/51/3	—	—	1.7	1.2	2.0	1.5	2.0	1.5	±6.5
MgM-III/51/4	—	—	—	—	2.0	1.7	2.1	—	—
MgM-III/51/5	—	—	1.8	1.3	2.0	1.5	1.9	1.4	—
MgM-III/51/6	1.3	1.1	1.9	1.5	2.1	1.7	2.1	1.6	±6.9
MgM-III/51/7	—	—	1.9	1.5	2.1	1.7	—	—	—
MgM-III/51/8	—	—	1.9	1.3	—	—	—	—	—
MgM-III/51/9	—	—	—	—	2.1	1.6	2.1	1.6	—
MgM-III/51/10	1.1	1.0	2.0	1.4	2.0	1.7	—	—	—
MgM-III/51/11	—	—	—	—	2.1	1-8	—	—	±7.7

* dp_4

was given. The presence of this species was established later by BOHLIN (1937) in Shargaltein--Valley in Kansu and by DASHZEVEG (1970) in Shukht in SE Gobi. "*Karakoromys* sp." described by TEILHARD DE CHARDIN from St. Jacques (1926) does not belong to this species. *Karakoromys*, being contemporaneous with larger representatives of Ctenodactylidae described as belonging to the genus *Tataromys*, is a more primitive, smaller and more brachyodont form. Now, when small forms of *Tataromys* have been discovered, it is doubtful whether it merits generic designation.

Family ZAPODIDAE COUES, 1875

Genus **PLESIOSMINTHUS** VIRET, 1926

Plesiosminthus tangingoli (BOHLIN, 1946)

(Pl. L, Fig. 1)

1946. *Parasminthus tangingoli* n.sp.; B. BOHLIN, The fossil mammals..., pp. 23-30, Figs. 2: 7-10, 3: 1-6, 28, 31-45, 5*B*, 6*B*; Pl. 1, Figs. 3, 5-9, 11.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: fragment of left maxilla with P^4-M^1 (No. MgM-III/52).

Description. — P^4 reduced, composed of central cone and semilunar, cingular crest on the posterior border, with single rooth. M^1 rectangular, with weak anterior and posterior cingulum. Mesostyle well developed, reaching the border of the tooth. The specimen is whitish, without dark coloration typical for most bones and teeth from lower beds of Tatal Gol, thus it possibly derives from the upper part of the formation.

Dimensions: P^4 L: 0.6, W: 0.6, M^1 L: 1.1, W: 1.0 mm.

Discussion. — BOHLIN (1946) described from Taben-Buluk in Kansu a new genus, *Parasminthus*, comprising 3 species: *P. asiaecentralis*, *P. tangingoli* and *P. parvulus*. He stressed the similarity between his genus and *Plesiosminthus* from the Oligocene of Europe, but decided to create a new genus on the base of supposed differences in the structure of incisor. According to STEHLIN & SCHAUB (1951), there is no reason to separate generically the Kansu species from the European ones. Forms similar to *Plesiosminthus* are known also from the Palaeogene of North America. The three species from Taben-Buluk differ mostly in size, *P. asiaecentralis* being the largest (P^4 L: 0.7, W: 0.8; M^1 L: 1.7, W: 1.7 mm), *P. parvulus* the smallest (P^4 L: 0.4, W: 0.5, M^1 L: 1.0, W: 1.0 mm). The specimen from Tatal Gol described above is about the size of the intermediate species, *P. tangingoli* (P^4 L: 0.5, W: 0.6, M^1 L: 1.3, W: 1.2 mm), with which it almost perfectly agrees in the pattern of the preserved teeth.

Fossil Zapodidae were hitherto unknown from the Oligocene of Mongolia.

Family CRICETIDAE ROCHEBRUNE, 1883

Genus **CRICETOPS** MATTHEW & GRANGER, 1923

Cricetops dormitor MATTHEW & GRANGER 1923

(Pl. L, Figs. 2-6, Text-figs. 1-2)

1923. *Cricetops dormitor* n.g., n.sp.; W. D. MATTHEW & W. GRANGER, Nine new rodents..., pp. 1-4, Figs. 1-4.
1925. *Cricetops dormitor*; S. SCHAUB, Die hamsterartigen..., pp. 84-88, Fig. 15.
1938. *Cricetops affinis* sp. n.; A. I. ARGYROPULO, On the fauna..., p. 225.
1942. *Cricetops dormitor*; P. TEILHARD DE CHARDIN & LEROY, Chinese fossil mammals, p. 25.
1948. *Cricetops affinis*; A. A. BORISSIAK & E. I. BELJAEVA, Mestonakhozdenia..., p. 40.
1951. *Cricetops dormitor*; H. G. STEHLIN & S. SCHAUB, Die Trigonodontie..., pp. 178, 331, Figs. 265, 281.
1957. *Cricetops affinis*; E. I. BELJAEVA, Aperçu sommaire..., p. 144.
1958. *Cricetops dormitor*; S. SCHAUB, Simplicidentata, pp. 800-801, Fig. 250.
1964. *Cricetops affinis*; E. I. BELJAEVA, Nekotorye itogi..., p. 18.
1965. *Cricetops dormitor*; N. S. SHEVYREVA, Novye oligocenovye..., pp. 107-108.
1965. *Cricetops elephantus* sp. nov.; N. S. SHEVYREVA, Novye oligocenovye..., p. 111, Fig. 3 w, g.
1968. *Cricetops dormitor*; C. A. REPENNING, Mandibular musculature..., pp. 7, 53, 54, Fig. 4.
1968. *Cricetops dormitor dormitor*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1968. *Cricetops dormitor elephantus*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Cricetops dormitor*; D. DASHZEVEG, Novye dannye..., pp. 38, 39, 40, 42.
1970. *Cricetops elephantus*; D. DASHZEVEG, Novye dannye..., pp. 39, 40.
1970. *Cricetops dormitor*; E. V. DEVYATKIN, Geologia kainozoia..., p. 57.
1971. *Cricetops dormitor*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 17.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: 97 mandibles with complete molar tooth-rows, 137 mandibles with incomplete tooth-rows, 40 skull fragments with molars, 16 skull fragments without teeth or teeth damaged, 42 isolated molars (all No. MgM-III/29). Tatal Gol, Hsanda Gol Formation, upper part: mandible with M_2-M_3 (all No. MgM-III/30). Loh, Hsanda Gol Formation: 2 mandibles with complete tooth-rows, 6 mandibles with incomplete tooth-rows, 2 skull fragments with molars, 2 skull fragments without molars (all

No. MgM-III/31). Buylsteen Khuduk, Hsanda Gol Formation: 2 fragments of mandibles with M_1-M_2 and M_1 respectively, 5 isolated molars (all No. MgM-III/32). Khatan Khayrkhan: 1 mandible with M_1-M_2 (No. MgM-III/33).

Description. — The present material agrees in skull structure with that presented by MATTHEW & GRANGER (1923*b*), and in teeth structure with that described by SCHAUB (1925) and SHEVYREVA (1965).

Two groups of specimens may be distinguished in the material from the lower part of the section in Tatal Gol, light and dark coloured. From the upper part of the profile at this locality, above the lava bed, there derives a single specimen, light coloured. All specimens from Loh are dark, those from Buylsteen Khuduk are light.

It may be seen in Tables 15 and 16 that the dimensions of the material studied are very variable. This is presented in Text-figs. 1 and 2, which refer to M_2, the most common tooth in our material. Thus it may be supposed that two different populations may be distinguished

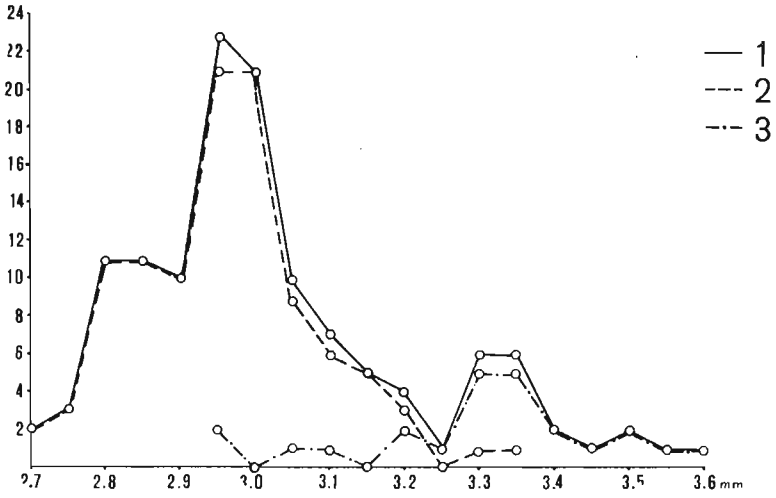

Fig. 1
Length of M_2 of *Cricetops dormitor* from the Hsanda Gol Formation. *1* — total sample, *2* — dark specimens, *3* — white specimens.

in *Cricetops dormitor* from the Hsanda Gol Formation. These are probably two different chronosubspecies: the older population was anterior, and the younger one posterior, to the formation of the lava bed. However, as the lava bed is not developed throughout the outcrops studied, and as the material was collected on the surface, it is not always possible to localize exactly the specimens in the profile. It may be supposed that all the light specimens from Tatal Gol derive from the post-lava bed part of the profile.

The teeth structure is fairly variable, but there are in this respect no constant differences between the molars of the smaller and greater specimens. Light coloured specimens of upper molars are scarce. As a rule M^1 lack additional styles behind anterocone; if present they are feebly marked.

Dimensions: see Tables 15 and 16.

Discussion. — MATTHEW & GRANGER (1923*b*) described *Cricetops dormitor* as a new species from the Hsanda Gol Formation. No dimensions were given, the length of M_1-M_3 of the holotype as measured in the figured was 10.0 mm. They placed this species in a separate

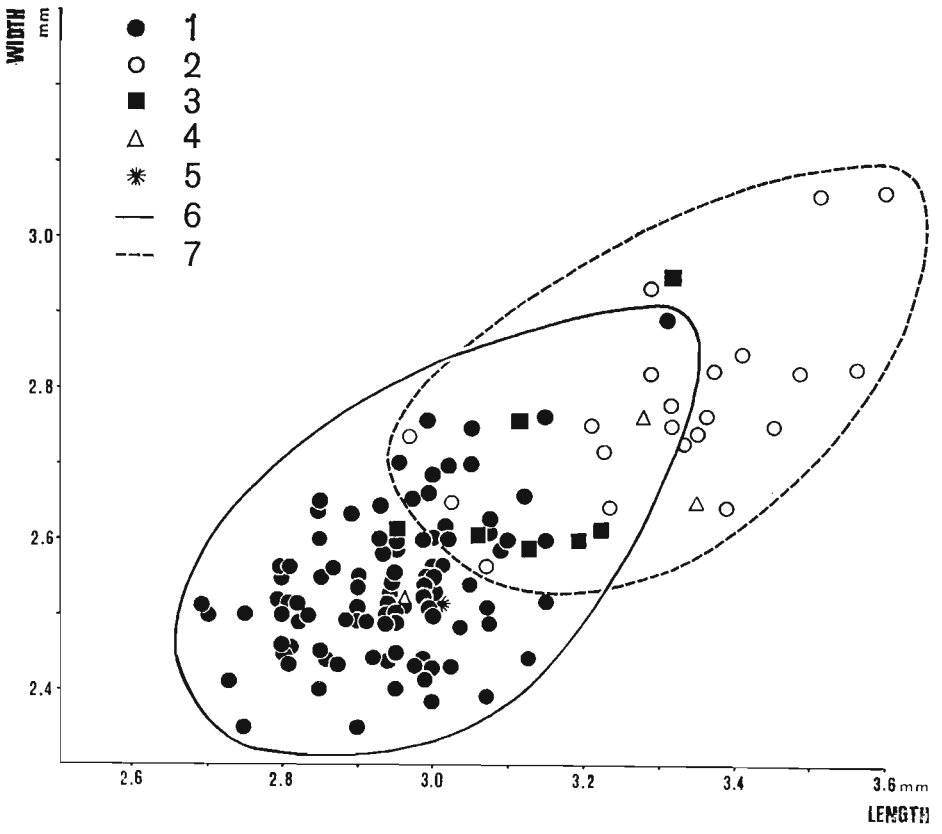

Fig. 2
Dimensions of M_2 of *Cricetops dormitor* from the Middle Oligocene of Mongolia. *1* — Tatal Gol, dark specimens, *2* — Tatal Gol, white specimens, *3* — Loh, *4* — Buylsteen Khuduk. *5* — Khatan Khayrkhan, *6* — *Cricetops dormitor dormitor*, *7* — *C. d. elephantus.*

family, Cricetopidae. SCHAUB (1925) described one of the specimens from Loh obtained by the Basle collections (length of M_1-M_3 9.0 mm), and established that it belonged to the family Cricetidae, an opinion hitherto generally accepted.

In 1938 ARGYROPULO described (but not figured) a second species of this genus, from Myn-Say in Central Kazakhstan, called *Cricetops affinis*. The length of the tooth-rows of the two specimens studied was, respectively, 9.0 and 9.1 mm. He thought that his species was very similar to *C. dormitor*, but there were differences in molar structure. SHEVYREVA (1965), who studied the specimens from Kazakhstan together with a more abundant material from the Hsanda Gol Formation of Mongolia, believed that the differences pointed out by ARGYROPULO (1938) are unimportant and that *C. affinis* should be considered a synonym of *C. dormitor*. Further on in the text of her paper, however, she described other differences between the Mongolian and Kazakhstan specimens, and supposed that it will be possible to separate the latter in a subspecies when more extensive collections will have been made.

Besides, SHEVYREVA (1965) described from Tatal Gol a new species, *Cricetops elephantus* and stated that it is present also in Kazakhstan (Turgay Basin). She believed that this species differs from *C. dormitor* by greater dimensions (length of M_1-M_3 10.2—10.9 mm), and by the characters of M^1, which does not narrow behind the anterocones and possesses there additional

Table 15

Measurements of upper molars of *Cricetops dormitor*

Locality		Tatal Gol, lower part		Loh
Z. Pal. cat. Nos.		MgM-III/29		MgM-III/31
		dark specimens	white specimens	
M^1 length	N	41	3	1
	min.	3.7	4.4	—
	max.	4.5	4.8	—
	m	4.1	4.6	4.0
M^1 width	N	40	3	1
	min.	2.4	2.8	—
	max.	2.9	3.2	—
	m	2.7	3.0	2.4
M^2 length	N	31	1	1
	min.	2.6	—	—
	max.	3.2	—	—
	m	2.8	3.2	2.7
M^2 width	N	43	1	1
	min.	2.4	—	—
	max.	2.9	—	—
	m	2.7	2.6	2.4
M^3 length	N	13	—	1
	min.	2.3	—	—
	max.	2.6	—	—
	m	2.4	—	2.4
M^3 width	N	13	—	1
	min.	2.3	—	—
	max.	2.5	—	—
	m	2.4	—	2.2
M^1-M^3 length	N	11	—	1
	min.	9.0	—	—
	max.	9.8	—	—
	m	9.1	—	9.1

styles. However, MELLETT (1966, 1968) argues convincingly, that *C. dormitor* and *C. elephantus* should be considered subspecies of the same species.

Cricetops dormitor occurs in the outcrops of the Hsanda Gol Formation in the valley of the Tsagan Noor Lake. DASHZEVEG (1970) mentioned *C. dormitor* (as well as *C. elephantus*) from some new outcrops in this region, and also from the locality Shukht in SE Mongolia. Both forms are also known from the Indricotherium fauna of Kazakhstan. It is significant that this species, so abundant in the Middle Oligocene of the Tsagan Noor basin, was found only in a single locality in SW Gobi (Khatan Khayrkhan).

Table 16

Measurements of lower molars of *Cricetops dormitor*

Locality		Tatal Gol, lower part		Tatal Gol upper part	Loh	Buylsteen Khuduk	Khatan Khayrkhan
Z. Pal. cat. Nos.		MgM-III/29		MgM-III/30	MgM-III/31	MgM-III/32	MgM-III/33
		dark specimens	white specimens				
M_1 length	N	95	9	—	3	2	1
	min.	3.0	3.5	—	3.5	3.5	—
	max.	3.6	3.9	—	3.8	3.8	—
	m	3.3	3.6	—	3.6	3.7	3.3
M_1 width	N	95	9	—	3	2	1
	min.	2.1	2.4	—	2.6	2.5	—
	max.	2.5	2.8	—	2.6	2.5	—
	m	2.3	2.6	—	2.6	2.5	2.2
M_2 length	N	96	20	1	7	3	1
	min.	2.7	2.9	—	2.9	3.0	—
	max.	3.3	3.6	—	3.3	3.3	—
	m	2.9	3.3	3.6	3.1	3.2	3.0
M_2 width	N	95	20	1	7	3	1
	min.	2.3	2.6	—	2.6	2.5	—
	max.	2.9	3.1	—	2.9	2.8	—
	m	2.5	2.8	3.1	2.7	2.6	2.5
M_3 length	N	96	15	1	7	1	—
	min.	2.7	3.0	—	2.8	—	—
	max.	3.3	3.6	—	3.5	—	—
	m	2.9	3·3	3.5	3.2	3.0	—
M_3 width	N	92	15	1	7	1	—
	min.	2.1	2.5	—	2.4	—	—
	max.	2.8	2.9	—	2.8	—	—
	m	2.5	2.7	3.1	2.7	2.6	—
M_1-M_3 length	N	96	1	—	2	—	—
	min.	8.1	—	—	9.9	—	—
	max.	10.2	—	—	10.4	—	—
	m	9.2	9.6	—	10.2	—	—

Cricetops cf. **aeneus** SHEVYREVA, 1965

(Pl. L, Fig. 7)

Material. — Tatal Gol, Hsanda Gol Formation, lower part: 1 damaged right half of mandible with M_1-M_3 (No. MgM-III/34).

Description. — The teeth of the unique specimen are slightly worn, black. Their pattern is similar to that of molars of *C. dormitor*. In M_1, ectostylid and mesostylid are well developed, both extending to the margin of the tooth. Posterior arm of the hypoconid distinct. Posterior border of protoconid adjoins the paraconid process thus forming a closed anterofossetid. In

M_2, mesostylid and ectostylid distinctly developed, but shorter than in M_1. In M_3, antero-fossetid distinctly limited. Posterior part of M_3 narrower than in *C. dormitor*, hypoconid displaced in a median direction and situated at the tooth axis. Ectostylid and mesostylid absent in this tooth.

Dimensions: M_1 L: 2.5, W: 1.6, M_2 L: 2.0, W: 1.7, M_3 L: 1.9, W: 1.6, length of M_1-M_3 6.4 mm.

Discussion. — The teeth structure allows to include the present specimen to the genus *Cricetops*. Besides *C. dormitor*, which differs from this specimen by a much larger size and the structure of teeth described above, the only other species of this genus is *C. aeneus* SHEVYREVA from the Oligocene of Tselkar-Teniz in Kazakhstan, where it is represented only by the holotype consisting of skull and mandible. Slight differences of structure between the present specimen and that of Kazakhstan may be referred to intraspecific variability, whose extent it is impossible to establish because of inadequate material. The same may pertain to size: in the holotype M_1-M_3 length is 7.9 mm, and thus the Mongolian specimen is clearly smaller.

Genus **EUMYS** LEIDY, 1856

Eumys asiaticus MATTHEW & GRANGER 1923

(Pl. LI, Figs. 1-5)

1923. *Eumys asiaticus* n.sp.; W. D. MATTHEW & W. GRANGER, Nine new rodents..., pp. 7-8, Fig. 9.
1925. *Eumys asiaticus*; S. SCHAUB, Die hamsterartigen..., p. 84.
1942. *Eumys asiaticus*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 35.
1968. *Eumys asiaticus*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1970. *Eumys asiaticus*; D. DASHZEVEG, Novye dannye..., p. 38.
1971. *Eumys asiaticus*; K. K. FLEROV & N. M. IANOVSKAIA, Ekologitcheskie kompleksy..., p. 20.
1972. *Eumys asiaticus*; M. VIANEY-LIAUD, Contribution à l'étude..., p. 40.

Material. — Tatal Gol, Hsanda Gol Formation, lower part: maxilla with M^1-M^3 (No. MgM-III/35/1), 2 mandibles with M_1-M_3 (No. MgM-III/35/2 and 3), mandible with M_2-M_3 (No. MgM-III/35/4) and mandible with M_1 (No. MgM-III/35/5). Nareen Bulak: fragment of maxilla with M^1-M^2 (No. MgM-III/36/1) and fragment of mandible with M_1 (No. MgM-III/36/2). Khatan Khayrkhan: mandible with M_2-M_3, strongly worn (No. MgM-III/37).

Description. — Upper dentition. Specimen No. MgM-III/35/1 from Tatal Gol: In M^1 anterocone undivided, paracone and protocone divided by a deep fossetus. Mesostyle well developed, but does not reach the border of the tooth. In M^2 mesoloph is present. In M^3 metacone reduced, internal valley rudimentary. External valley closed by the cingulum and divided by a ridge descending from the posterior branch of the protocone.

In the specimen No. MgM-III/36/1 from Nareen Bulak anterocone of M^1 is broader and shows the beginning of division in two cusps. The external valley behind the protocone open. Metacone completely isolated from the hypocone. In M^2 metacone and hypocone connected by a transversal ridge.

Lower dentition. Specimen No. MgM-III/35/2 from Tatal Gol: In M_1 the posterior ridge of the protoconid has a short mesostylid. Ectostylid lacking, the external valley open, not blocked by cingular ridge. In M_2 a fossetid limited by the anterior connection between para- and protoconid and by the posterointernal ridge of the protoconid is present. The posterior ridge of the protoconid forms a small cusp with a short mesostylid. The valleys are nearly transversal, they are not closed by the cingulum. In M_3 paraflexids form two closed

fossetids. Internal arm of the protoconid bends anteriorly forming a closed fossetid dividing para- and protoconid. The internal valley transversal, open. In the specimens No. MgM-III/35/3 and 5 from the same locality ectostylid in M_1 is present. In No. MgM-III/35/3 it reaches the external border of the tooth. M_2 in this specimen does not differ from this tooth in No. MgM-III/35/2. In the specimens No. MgM-III/35/3 and 4 M_3 differs markedly from this tooth in specimen No. MgM-III/35/2: internal arm of the posterior border of the protoconid does not bend anteriorly and instead of reaching the posterior border of the paraconid as in No. MgM-III/35/2 it extends to the inner border of the tooth. Metaconid in these two specimens is stronger and its anterior arm bridges the internal valley, which is open in No. MgM-III/35/2. In the specimen No. MgM-III/36/2 from Nareen Bulak M_1 is long but slender, there is a short ectostylid and mesostylid is rudimentary. Specimen No. MgM-III/37 from Khatan Khayrkhan is strongly worn, but the structure of M_3 seems to be of the type represented by specimens No. MgM-III/35/3 and 4.

Dimensions: see Tables 17 and 18.

Table 17

Measurements of upper molars of *Eumys asiaticus*

Z. Pal. cat. Nos.	M^1		M^2		M^3		Upper tooth-row
	length	width	length	width	length	width	
MgM-III/35/1	2.1	1.3	1.6	1.4	1.2	1.2	4.9
MgM-III/36/1	2.2	1.4	1.8	1.4	—	—	—

Table 18

Measurements of lower molars of *Eumys asiaticus*

Z. Pal. cat. Nos.	M_1		M_2		M_3		Lower tooth-row
	length	width	length	width	length	width	
MgM-III/35/2	1.8	1.4	1.7	1.5	1.7	1.4	5.2
MgM-III/35/3	1.6	1.2	1.4	1.3	1.5	1 2	4.5
MgM-III/35/4	—	—	1.4	1.1	1.3	1.0	—
MgM-III/35/5	1.7	1.1	—	—	—	—	—
MgM-III/36/2	2.0	1.3	—	—	—	—	—
MgM-III/37	—	—	1.6	1.2	1.3	1.0	±4.4

Discussion. — In the material from Tatal Gol two different forms are present, one larger, represented by mandible No. MgM-III/35/2 and another slightly smaller, represented by the remaining lower jaws. Besides the differences in size, there are differences in the structure of molars, described above. In the smaller form left and right rows of cusps are more isolated, there is also a marked difference in M_3 pattern: metaconid is better developed. Upper dentition (No. MgM-III/35/1) may belong to the larger form. The specimens from Nareen Bulak are of rather large dimensions, but the structure of upper molars shows some differences from the larger form from Tatal Gol. It is difficult to decide which of these two forms from Tatal Gol is conspecific with the holotype of *Eumys asiaticus*, as its dimensions were not published, description is lacking and the figure in the paper by MATTHEW & GRANGER (1923*b*) does not permit to study the tooth-pattern in detail. I am unable to decide whether the above differences are referable to individual variability or point to the existence of more than one population.

Another problem is the systematic position of *Eumys asiaticus*. In the earlier papers, no doubts about its membership in the genus *Eumys* were expressed. However, according to M. VIANEY-LIAUD (1972) "*Eumys asiaticus* (MATTHEW & GRANGER, 1923)... semble présenter des affinités plus grandes avec les genres *Leidymys* ou *Eucricetodon* qu'avec *Eumys*". The structure of M^3 in *E. asiaticus* seems to be rather different from the pattern of this tooth in American representatives of the genus. I was able to compare my Mongolian material with the dentition of *Eumys sp.* form Harding Co., South Dakota. In the American specimens the internal valley in M^3 is deep, oblique, the external valley open, undivided. No cingulum is present between meta- and hypocone. In the Mongolian specimens, the internal valley is rudimentary, transverse, barred by cingulum and divided by a ridge descending from the protocone. A ridge between meta- and hypocone together with the posterior cingulum form a fossette.

Family RHIZOMYIDAE MILLER & GIDLEY, 1918

Genus **TACHYORYCTOIDES** BOHLIN, 1937

Tachyoryctoides obrutschewi BOHLIN, 1937

(Pl. LI, Figs. 6, 7)

1937. *Tachyoryctoides obrutschewi* n. sp.; B. BOHLIN, Oberoligozäne..., pp. 43-45, Text-figs. 103, 104, 105b; Pl. 1, Figs. 36, 37.
1942. *Tachyoryctoides obrutschewi*; P. TEILHARD DE CHARDIN & P. LEROY, Chinese fossil mammals, p. 37.
1946. *Tachyoryctoides obrutschewi*; B. BOHLIN, The fossil mammals..., pp. 67-74, Fig. 14C.
1951. *Tachyoryctoides obrutschewi*; H. G. STEHLIN & S. SCHAUB, Die Trigonodontie..., p. 333, Figs. 586, 587.
1968. *Tachyoryctoides* (= „*Aralomys*") *obrutschewi*; J. S. MELLETT, The Oligocene..., pp. 6, 10.
1971. *Tachyoryctoides tatalgolicus* sp. nov., D. DASHZEVEG, Novyj Tachyoryctoides..., pp. 68-69.

Material. — Tatal Gol, Hsanda Gol Formation, upper part: damaged mandible with incisor and M_1-M_3 (No. MgM-III/38). A part of mandible with M_1-M_2 (No. MgM-III/39) from the same locality belongs probably to the same species.

Description. — In the specimen No. MgM-III/38 mandible is massive, anterior border of processus coronoideus reaches the branch of mandible at half the length of M_2. Lower masseteric crest strongly developed, upper almost vertical. The incisor reached far behind M_3; it is triangular in cross-section, its height almost equal width. M_1 strongly worn, surface structure poorly visible. Nothing is left from the paraflexid, remains of protoflexid are however visible. Mesostyle preserved. Surface of M_2 S-shaped, only remains of lobes situated behind the anterior cingulum preserved. In M_3, anterior cingulum somewhat more clearly differentiated.

From the specimen No. MgM-III/39 only a small fragment of mandible with M_1-M_2 in very early stages of wear is preserved. In M_1, not even a trace of protoflexid can be seen, but paraflexid is deep. Posterior border of protoconid smooth. Mesostylid distinctly developed, straight. Anterior cingulum in M_2 well differentiated, posterior surface of paraconid smooth.

Dimensions: see Table 19.

Discussion. — Specimens of *Tachyoryctoides obrutschewi* were collected by the Central Asiatic Expedition of the American Museum of Natural History in Hsanda Gol, but for a long

Table 19

Measurements of lower molars of *Tachyoryctoides obrutschewi*

Z. Pal. cat. Nos.	M_1		M_2		M_3		Lower tooth-row
	length	width	length	width	length	width	
MgM-III/38	3.8	3.4	4.0	4.1	4.2	3.8	13.0
MgM-III/39	3.9	3.1	3.5	3.7	—	—	—

time this material was left unpublished. One specimen of mandible with M_2, obtained by the Naturhistorisches Museum in Basle, was figured by STEHLIN & SCHAUB (1951, Fig. 587). According to MELLETT (1966), two species of Rhizomyidae occur in the Hsanda Gol Formation, namely *Tachyorystoides obrutschewi* and *T. pachygnathus*, the latter much exceeding our specimens in size (M_1 L: 4.6—4.7, length of M_1-M_3 15.0 mm). DASHZEVEG (1971) apparently omitted these data in writing that he was the first to find *Tachyoryctoides* in the Hsanda Gol Formation (at Tatal Gol), and he determined the specimen found as belonging to the new species, *T. tatalgolicus*.

The genus *Tachyoryctoides* was erected by BOHLIN (1937) for the specimens from the Shargaltein Valley in Kansu. He distinguished three species, *T. obrutschewi*, *T. intermedius* and *T. pachygnathus*, differing slightly by size. Some traces of the presence of this genus were found by BOHLIN (1946) also in Taben Buluk. TEILHARD DE CHARDIN & LEROY (1942) doubt the validity of BOHLIN's distinction between particular species.

The structure of teeth of the specimen No. MgM-III/38 agrees with that described by BOHLIN (1937) as *T. obrutschewi*; the lack of the characteristic islet of enamel in M_1 of our specimen may be due to a more advanced wear. The dimensions of the holotype (length of M_1-M_3 13.0 mm) agree with those of the present specimen. Also *T. tatalgolicus*, described by DASHZEVEG (1971), agrees in dimensions and structure with *T. obrutschewi*, the only important difference being the presence of a slight mesostylid in M_1 of the former.

The specimen No. MgM-III/39, though approaching the above described specimen in size, seems to differ by the structure of the anterior part of M_1. However, the specimens of *Tachyoryctoides* are too scarce to establish the scale of the individual variability. Generally, variability of molar structure in Rhizomyidae is important.

The genus *Aralomys* ARGYROPULO, 1939 from the Upper Oligocene of Kazakhstan (ARGYROPULO, 1939*a*, VORONTSOV, 1963), is believed by MELLETT (1968) and DASVZEVEG (1971), to be a synonym of *Tachyoryctoides*, probably rightly. As to the systematical position of these rodents, opinions are divided. Thus, BOHLIN (1937, 1946) considered that they belonged to

Rhizomyidae, STEHLIN & SCHAUB (1951) included them to Cricetidae and SCHAUB (1958) created for them a separate subfamily, Tachyoryctoidinae. Possibly, these opinions are not completely contradictory, as it seems that the Rhizomyidae developed from Cricetidae in the Palaeogene of Asia and that *Tachyoryctoides* was an early stage in this process.

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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLIII

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 1. Right M^1-M^3, L: 7.7 mm (Z. Pal. MgM-III/53/1).
Fig. 2. Right M_1-M_3, L: 6.9 mm (Z. Pal. MgM-III/53/2).
Fig. 3. Right M_1-M_3, L: 7.3 mm (Z. Pal. MgM-III/53/3).

Middle Oligocene, Boongeen Gol, Gobi Desert, Mongolia

Fig. 4. Right P^4-M^3, L: 8.8 mm (Z. Pal. MgM-III/73).

Middle Oligocene, Khatan Khayrkhan, Gobi Desert, Mongolia

Fig. 5. Right M_1, L: 2.2 mm (Z. Pal. MgM-III/72).

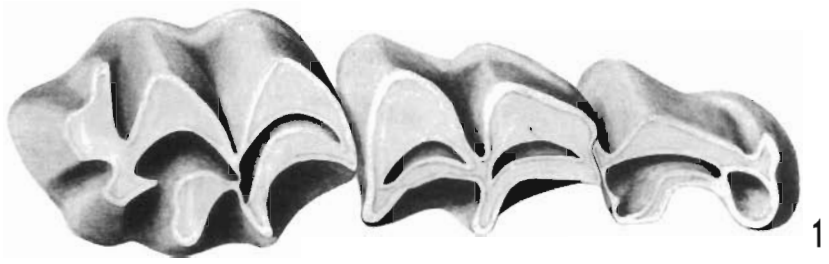
Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 6. Left M_1, L: 2.3 mm (Z. Pal. MgM-III/71/1).

Middle Oligocene, Ulan Ganga, Gobi Desert, Mongolia

Fig. 7. Left P_4, L: 2.3 mm (Z. Pal. MgM-III/74).

Drawn by K. Malczewski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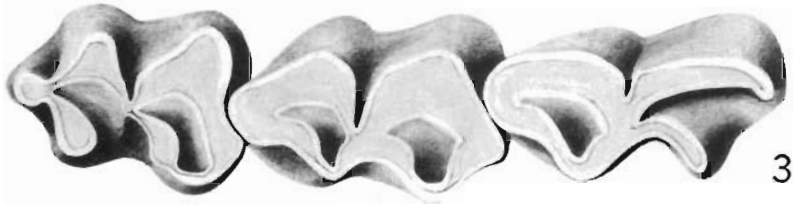
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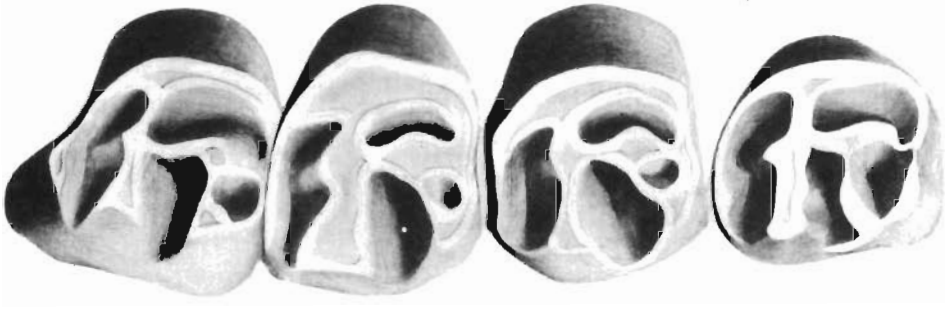
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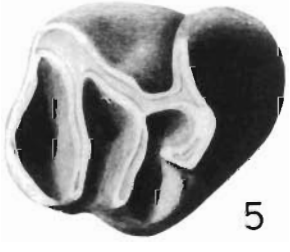
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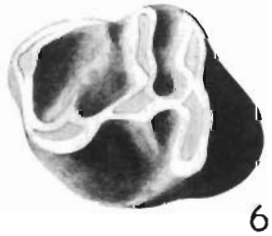
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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLIV

Middle Oligocene, Khatan Khayrkhan, Gobi Desert, Mongolia

Fig. 1. Left P^3-M^3, holotype, L: 7.7 mm (Z. Pal. MgM-III/77).

Middle Oligocene, Nareen Bulak, Gobi Desert, Mongolia

Fig. 2. Left P_4-M_3, L: 6.9 mm (Z. Pal. MgM-III/78).

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 3. Left P_4-M_2, L: 5.5 mm (Z. Pal. MgM-III(76/2).

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 4. Right P_4-M_2, holotype, L: 4.6 mm (Z. Pal. MgM-III/54/1).
Fig. 5. Left M_1-M_3, L: 4.5 mm (Z. Pal. MgM-III/54/2).

Drawn by K. Malczewski


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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLV

Page

Tsaganomys altaicus MATTHEW & GRANGER 156

Middle Oligocene, Boongeen Gol, lower part, Gobi Desert, Mongolia

Fig. 1. Right P^4-M^3, L: 18 mm (Z. Pal. MgM-III/61/1).

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 2. Right P_4-M_3, L: 20 mm (Z. Pal. MgM-III/55/7).

Cyclomylus lohensis MATTHEW & GRANGER 158
(see also Pl. XLVI)

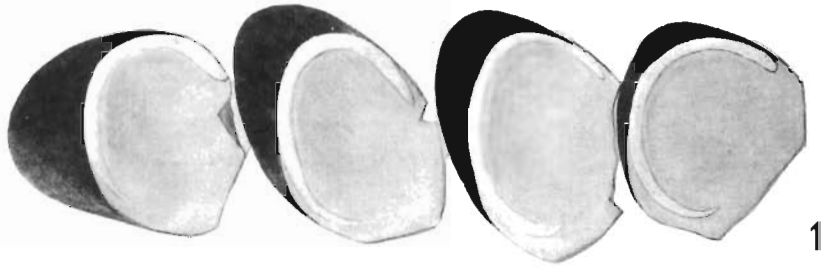
Middle Oligocene, Hsanda Gol Formation, Loh, Gobi Desert, Mongolia

Fig. 3. Right M_1-M_3 of a young specimen, L: 12 mm (Z. Pal. MgM-III/68/4).

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 4. Left P_4-M_3, L: 16 mm (Z. Pal. MgM-III/60/4).

Drawn by K. Malczewski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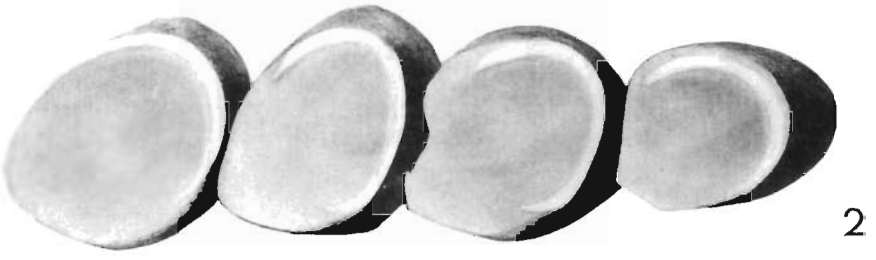
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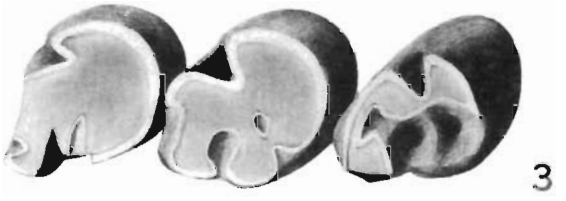
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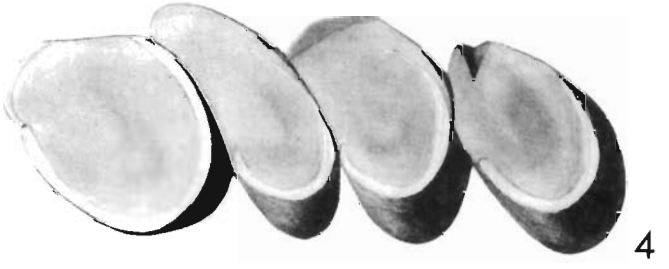
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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLVI

Page

Cyclomylus lohensis MATTHEW & GRANGER 158
(see also Pl. XLV)

Middle Oligocene, Hsanda Gol Formation, Loh, Gobi Desert, Mongolia

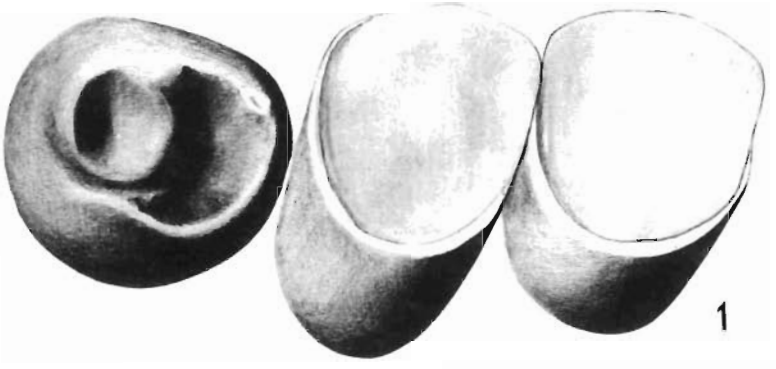
Fig. 1. Left P^4-M^2, L: 11 mm (Z. Pal. MgM-III/68/2).
Fig. 2. Left dp_4-M_3, L: 13.1 mm (Z. Pal. MgM-III/68/1).
Fig. 3. Right P_4-M_3, L: 14.5 mm (Z. Pal. MgM-III/68/3).

Cyclomylus minutus n.sp. 160

Middle Oligocene, Khatan Khayrkhan, Gobi Desert, Mongolia

Fig. 4. Left P^4-M^3, holotype, L: 10.3 mm (Z. Pal. MgM-III/70/1).
Fig. 5. Right P_4-M_3, L: 13.0 mm (Z. Pal. MgM-III/70/2).

Drawn by K. Malczewski



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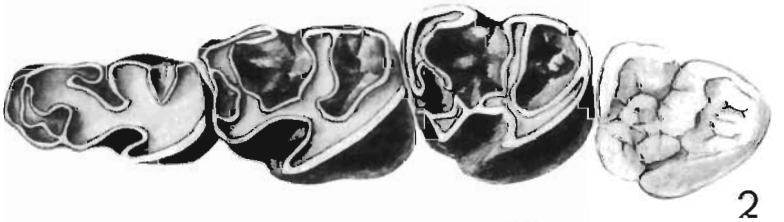

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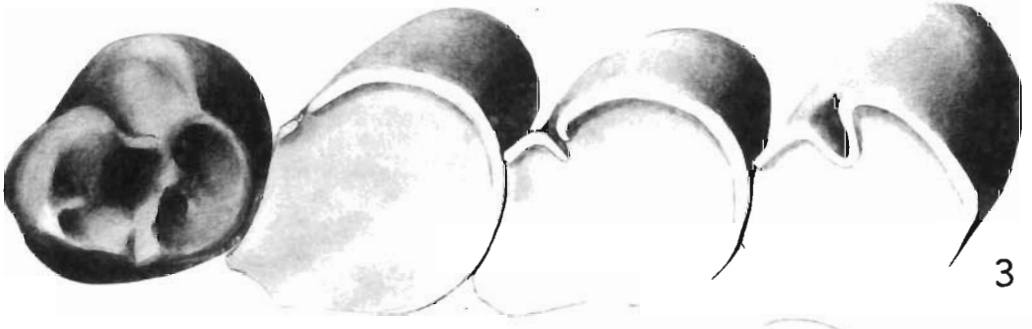

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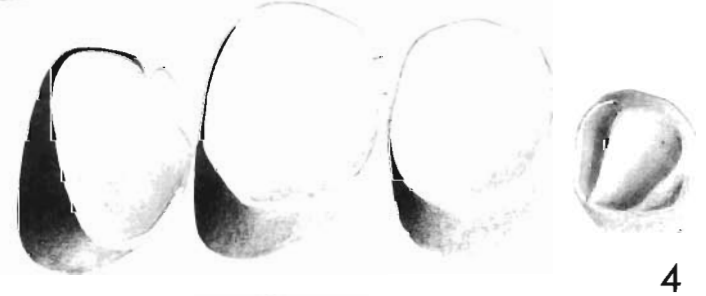

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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLVII

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, upper part, Gobi Desert, Mongolia

Fig. 1. Left M_2, L: 5.5 mm (Z. Pal. MgM-III/40/3).

Middle Oligocene, Khatan Khayrkhan, Gobi Desert, Mongolia

Fig. 2. Left M^2-M^3, holotype, L: 8.5 mm (Z. Pal. MgM-III/41/1).
Fig. 3. Right M_1-M^2, L: 7.8 mm (Z. Pal. MgM-III/41/2).
Fig. 4. Right M^3-M_3, L: 11.6 mm (Z. Pal. MgM-III/41/4).

Middle Oligocene, Khaitch Bulak, Gobi Desert, Mongolia

Fig. 5. Right M_1-M_3, L: 16.6 mm (Z. Pal. MgM-III/43/1).

Drawn by K. Malczewski

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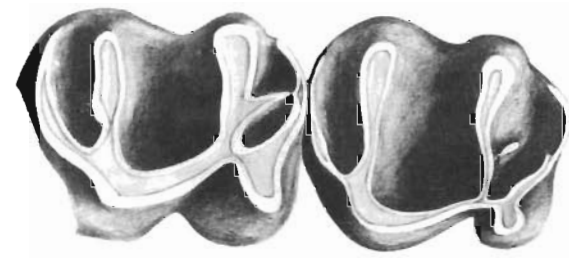

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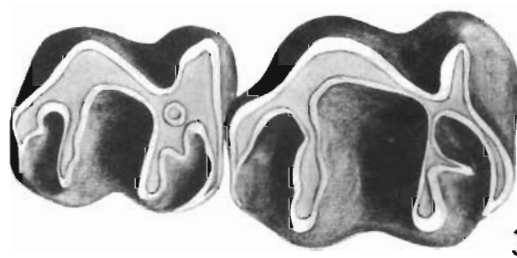

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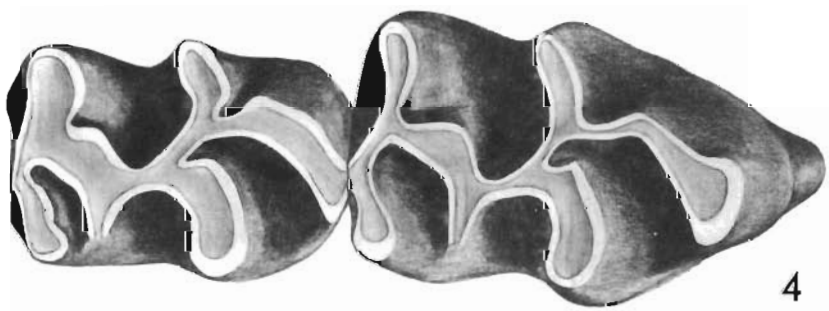

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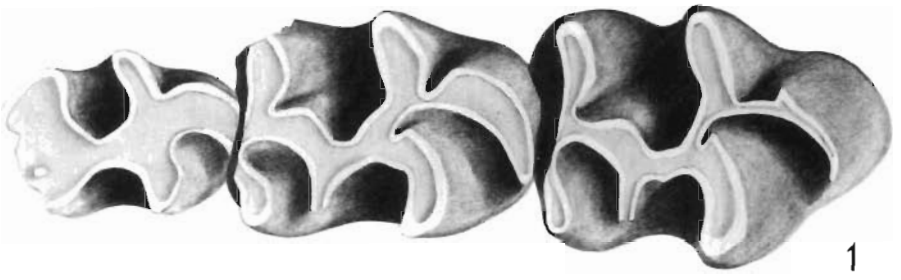
K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLVIII

Drawn by K. Malczewski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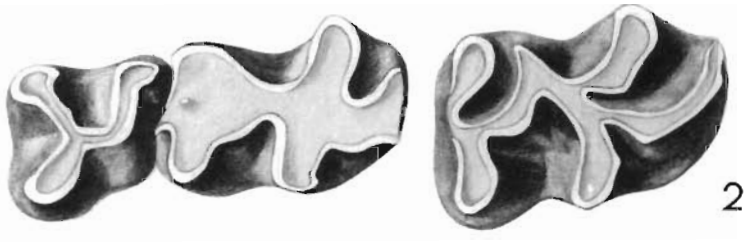
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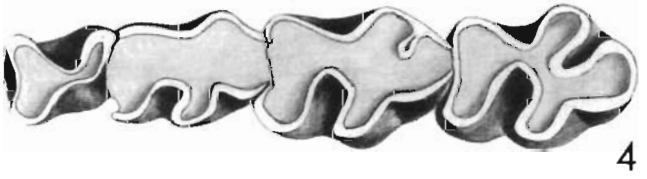
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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE XLIX

Middle Oligocene, Boongeen Gol, lower part, Gobi Desert, Mongolia

Fig. 1. Left P^4-M^3, L: 5.7 mm (Z. Pal. MgM-III/49/1).
Fig. 2. Right P^4-M^3, L: 6.3 mm (Z. Pal. MgM-III/49/2).
Fig. 3. Left P_4-M_3, L: 7.0 mm (Z. Pal. MgM-III/49/3).
Fig. 4. Right P_4-M_3, L: 7.1 mm (Z. Pal. MgM-III/49/5).
Fig. 5. Left Dp_4-M_2, L: 4.8 mm (Z. Pal. MgM-III/49/9).

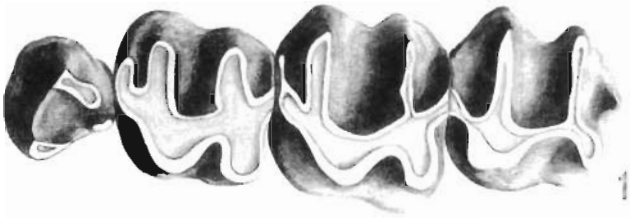
Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 6. Right M_2-M_3, L: 3.7 mm (Z. Pal. MgM-III/48).

Middle Oligocene, Khatan Khayrkhan, Gobi Desert, Mongolia

Fig. 7. Left P_4-M_3, L: 6.9 mm (Z. Pal. MgM-III/51/6).
Fig. 8. Left P_4-M_2, L: 5.1 mm (Z. Pal. MgM-III/51/10).

Drawn by K. Malczewski



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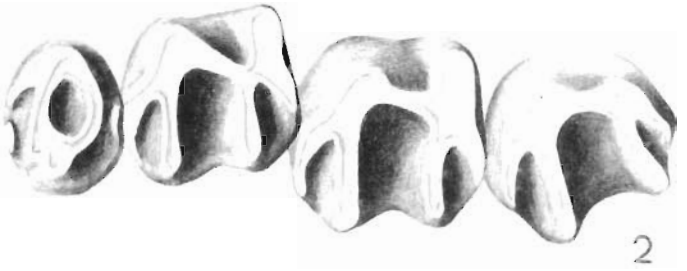

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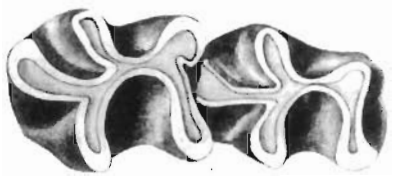

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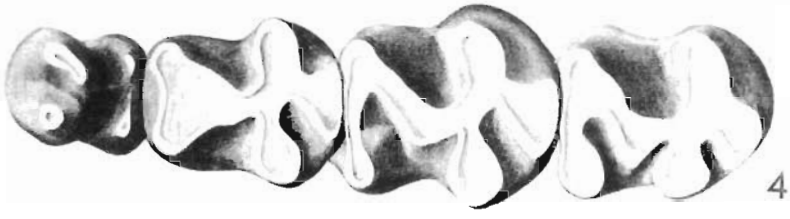

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PLATE L

Page

Plesiosminthus tangingoli (BOHLIN) 167

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 1. Left P^4-M^1, L: 1.7 mm (Z. Pal. MgM-III/52).

Cricetops dormitor MATTHEW & GRANGER 168

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 2. Left M_1-M^3, L: 9.3 mm (Z. Pal. MgM-III/29/1).
Fig. 3. Right M_1-M_3, slighty worn, L: 9.2 mm (Z. Pal. MgM-III/29/7).
Fig. 4. Right M_1-M_3, deeply worn, L: 9.5 mm (Z. Pal. MgM-III/29/5).
Fig. 5. Left M_1-M_3, deeply worn, L: 9.6 mm (Z. Pal. MgM-III/29/6).

Middle Oligocene, Hsanda Gol Formation, Loh, Gobi Desert, Mongolia

Fig. 6. Left M^1-M^3, L: 9.1 mm (Z. Pal. MgM-III/31/1).

Cricetops cf. *aeneus* SHEVYREVA 172

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 7. Right M_1-M_3, L: 6.4 mm (Z. Pal. MgM-III/34).

Drawn by K. Malczewski

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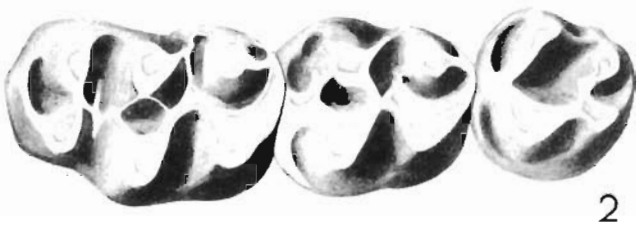

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K. KOWALSKI: MIDDLE OLIGOCENE RODENTS FROM MONGOLIA

PLATE LI

Page

Eumys asiaticus MATTHEW & GRANGER 173

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, lower part, Gobi Desert, Mongolia

Fig. 1. Right M^1-M^3, L: 4.9 mm (Z. Pal. MgM-III/35/1).
Fig. 2. Left M_1-M_3, L: 5.2 mm (Z. Pal. MgM-III/35/2).
Fig. 3. Left M_1-M_3, L: 4.5 mm (Z. Pal. MgM-III/35/3).

Middle Oligocene, Nareen Bulak, Gobi Desert, Mongolia

Fig. 4. Right M^1-M^2, L: 4.0 mm (Z. Pal. MgM-III/36/1).
Fig. 5. Left M_1, L: 2.0 mm (Z. Pal. MgM-III/36/2).

Tachyoryctoides obrutschewi BOHLIN 175

Middle Oligocene, Hsanda Gol Formation, Tatal Gol, Upper part, Gobi Desert, Mongolia

Fig. 6. Left M_1-M_3, L: 13.0 mm (Z. Pal. MgM-III/38).
Fig. 7. Right M_1-M_3, L: 7.4 mm (Z. Pal. MgM-III/39).

Drawn by K. Malczewski


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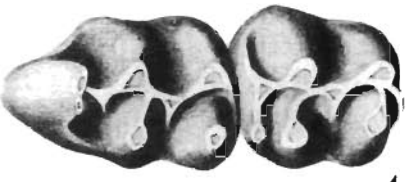
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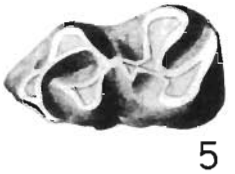
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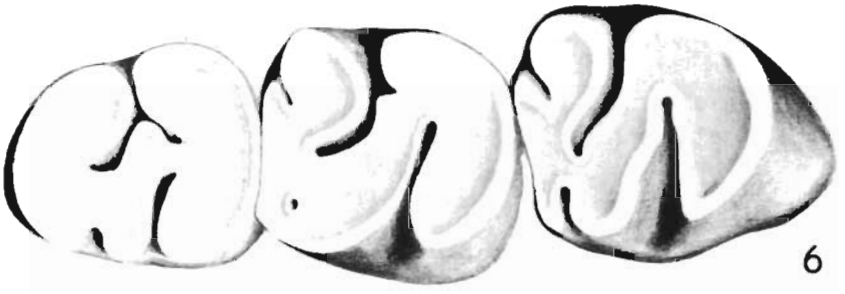
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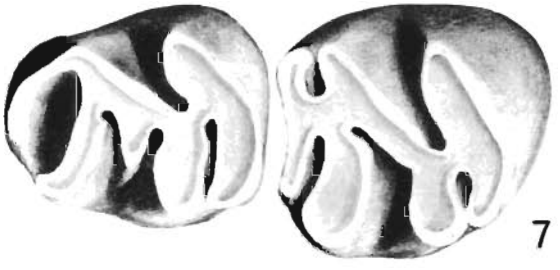
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