Pseudomeriones hansi nov. sp. (Rodentia, Mammalia) from the Early Pliocene (Ruscinian) Fauna of Iğdeli (Turkey)

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Abstract: *Pseudomeriones hansi* nov. sp. is described from İğdeli locality (SW Sivas, Central Anatolia). The morphological description of the new species is given within its own systematic and stratigraphic relationships. The micromammalian fauna of İğdeli gives evidence for a new species which is characterized by its small size, its M2 with a deep lingual sinus curved backward and its m1 with a symmetric triangular anteroconid that bears a moderate labial arm reaching the base of the protoconid.

Keywords: Iğdeli, Early Pliocene/Ruscinian, Mammalia, *Pseudomeriones*, Taxonomy, Biocronology.

INTRODUCTION

İğdeli is situated in the southwestern of Sivas city (Central Anatolia, Turkey), (Fig. **1**). Small mammals from the İğdeli have been collected during the recent geological projects of the M.T.A. (General Directorate of Mineral Research and Exploration, Turkey). The material has been found in fine grain sediments below lacustrine limestones of the upper part of the Eğerci formation (Gemerek, Sivas) [1]. The assemblage of micromammals is quite varied, and consists of sixteen species of rodents *(Promimomys insuliferus*, *Apodemus dominans*, *Occitanomys (Rhodomys) vandami* n. sp., *Micromys bendai*, *Muridae* gen. et sp. indet., *Cricetus* cf. *lophidens*, *Mesocricetus* cf. *primitivus*, *Cricetulus migratorius*, *Allocricetus bursae*, *Kowalskia* sp., *Cricetidae* indet., *Myomimus igdeliensis* n. sp., *Tamias* sp., *Keramidomys* cf. *carpathicus, Pseudomeriones hansi* n. sp., *Spalacidae* gen. et sp. *indet.*) and two species of lagomorphs (*Ochotona mediterranensis* n. sp., *Prolagus* sp.). The occurrence of *Promimomys insuliferus* in İğdeli locality suggests an Early Pliocene/Early Ruscinian (MN 14) age.

MATERIAL AND METHODS

The rodent teeth described below have been collected by wet-screening material from İğdeli locality. The mesh of the finest sieve used is 0.5 mm. The approximate weight of the matrix washed from the locality was 3000 kg. The residues obtained after washing have been sorted by using a microscope. The maximum lengths of the murid cheek teeth have been measured from front to back whereas the maximum widths have been taken in the labial to lingual sense. The teeth were measured with a Nikon measuroscope. Measurements (length X width) are given in millimeters in the table. The teeth are all figured by magnified by 20.

The teeth terminology used here follows [2]. İğdeli material has been stored in the collections of the General Directorate of Mineral Research and Exploration (M.T.A.) in Ankara.

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SYSTEMATICS

Mc. Kenna & Bell 1997

Ordo Rodentia Bowdich, 1821

Family Muridae Gray, 1821

Sub-Family Gerbillinae, Gray, 1825

Genus *Pseudomeriones* Schaub, 1934

Pseudomeriones hansi n. sp.

(Plate I, Figs. **6-18**)

Type locality: İğdeli

Type Level: Early Pliocene/Early Ruscinian

Holotype: Left M2 (Plate I, Fig. **13**, İĞ. 72)

Derivatio nominis: The name is dedicated to Dr. Hans de Bruijn due to his cherished contributions to the works on small mammals in Turkey.

Diagnosis: *Pseudomeriones* of small size; M1 has three-four roots and M2 has two-three roots. The length/width ratio of M1 and of m1 is approximately 1.59 and 1.60 respectively (Table **1**). M2 has a deep lingual sinus. m1 has a symmetric triangular anteroconid which has a moderate labial arm reaching to the base of the protoconid.

Differential diagnosis: *P. hansi* n. sp. differs from *P. rhodius* and *P. tchaltaensis* in the smaller ratio of length to width for M1 and m1, wider M1 than m1 (Table **1**, Figs. **3-5**), and in the presence of a posterior lingual sinus (or syncline) on M2 that is curved backwards. It also differs from *P. tchaltaensis* in the lower crowned molars.

When it comes to compare *P. hansi* with *P. megistos*, the latter is significantly larger than the former, and lacks the posterolophid on its m1. *P. hansi* also differs from *P. complicidens* in being much higher and in terms of morphology, M2 with a deep lingual sinus curved backward and M1 and m2 with much less developed posterolophids than those of *P. complicidens*.

P. hansi differs from *P. abbreviatus*, *P. latidens* and *P. pythagorasi* in the larger width/length ratio of both M1 and

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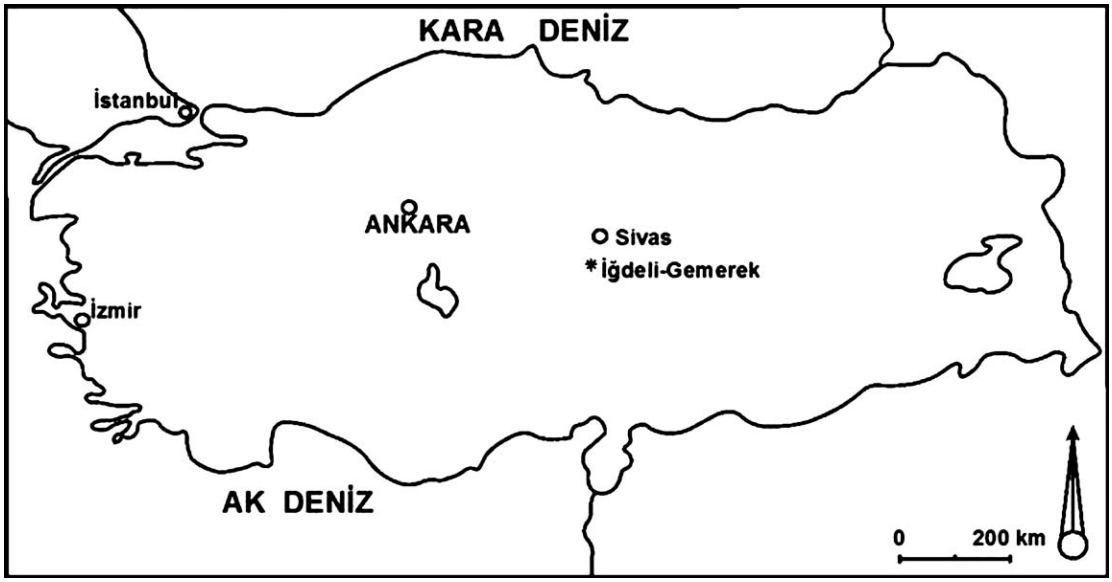


Fig. (1). Sketch map showing the approximate positions of the Early Pliocene locality of İğdeli, Eastern Mediterrenean. * İğdeli (Gemerek, Sivas)

m1 and the more elongated, symmetric and triangular shaped anteroconid. *P. hansi* further differs from *P. latidens* in the shallower protosinusid on m2, the weaker anterolabial cusp on m3, in M2 the lower occurrence frequency of the anteroloph which if present is more weakly developed. Moreover, *P. hansi* doesn't have the labial anterolophid on m3 unlike *P. latidens*.

MATERIAL AND MEASUREMENTS

	Length			Width	
	Range	Mean	N	Range	Mean
m1	19.75-23.90	21.57	16	11.00-15.30	13.34
m2	13.25-16.25	14.40	13	12.50-14.00	13.10
m3	8.10-10.25	8.82	5	9.40-10.90	10.32
M1	21.50-25.00	23.90	6	11.00-14.50	13.84
M2	11.00-16.00	12.59	15	11.50-15.00	13.36
M3	7.50-9.00	8.25	2	10.00-11.00	10.50

Description: m1-3 is mandibular teeth and M1-3 is maxillary teeth.

The cricetid form on M1, M2, m1 and m2 is clearly seen.

m1. Lower m1 is narrow and long. The main cuspids are alternated with one another. Anteroconid is triangle, quite symmetrical, wide and anteriorly elongated in shape. It has a moderate labial cingulum reaching to the base of the protoconid. Metalophid and hypolophid are paralell to each other, slightly curv backwards and attach to the labial cuspids at the front. The posterolophid is seperated from the entoconid through with a relatively deep posterior lingual sinusid in eleven out of fifteen samples, it is very short in other two samples, while in the rest two it looks like a projection (crest-like) in the posterior side. Generally, the samples with less developed or non-developed posterolophids belong to the old individuals. The m1 is two rooted, having one anterior and one posterior roots.

m2. m2 is square in shape. The main cuspids are alternated with one another. Twelve out of thirteen samples have two labial sinusids; the anterior one is shallow and the other one forms a deep lingual sinusid curved forward. In the other tooth which is less worn out, there is a clear additional, shallow postero-lingual sinusid. So, the posterolophid in the mentioned tooth has been significantly developed whereas in most of the teeth, it forms just a projection in the posterior loph. The depth of the anterior labial sinusid is variable. In four samples, the anterior labial sinusid is quite deep, suggesting that it is not related with corrosion and it is similar to the cricetid pattern in shape. m2 has one anterior and one posterior root.

m3. It is asymmetric V shaped and consists of one lingual sinusid. m3 is two rooted with one anterior and one posterior roots.

M1. The occlusal surface is quite narrow and long. The main cusps are alternated with one another. The anterocone is quite developed though narrower than the posterior lophs. In nine samples out of seventeen, M1 has three roots but in the rest eight samples a very little fourth root occurs in the labial side below the paracone.

M2. It consists of two lophs almost equal in mass. There is a lingual and a labial sinus. The lingual sinus is curved backwards and it is deeper than the labial. The anteroloph is apparent in one of fourteen samples and in the others, it is either quite weak or absent. M2 has three roots in ten samples and four in fourteen samples.

M3. The occlusal surface is a symmetrical and closed V-shaped. The posterior loph is smaller than the anterior. The lingual sinus is quite deep. M3 has three roots.

Table 1. The Length/Width Ratios of the Molars of *Pseudomeriones* Species

Species	Locality	m1	m2	m3	M1	M2	M3
P. tchaltaensis	Çalta	1.74	1.09	1.10	1.79	0.93	0.84
P. megistos	Paliambela-B and Monasteri	1.52	1.09	-	1.70	0.86	-
P. complicidens	Ningxian	2.00	1.16	-	-	-	-
P. rhodius	Maritsa	1.71	0.97	1.01	1.81	0.88	0.88
	Develi	1.79	---	0.89	---	0.93	---
P. hansi	İğdeli	1.60	1.09	0.85	1.59	0.94	0.83
P. abbreviatus	King-Yan-fou (Kansu)	1.52	1.07	1.12	1.76	1.04	0.89
	Pul-e Charkii	1.41	1.00	0.88	1.51	0.92	0.77
P. pythagorasi	Samos	1.54	---	---	1.43	---	---
P. latidens	Molayan	1.52	1.02	0.95	1.48	0.95	0.79
	Karaözü	1.54	1.03	---	1.47	0.95	0.78
	Dendil	1.50	1.07	0.97	1.44	0.98	0.91
	Kaleköy	0.97	---	---	---	0.91	---

REMARKS

İğdeli gerbil with its "cricetid" structure of cusp/cuspid alternation on m1/M1 and the presence of two labial and one lingual sinusids on m2 clearly shows the characteristic features of *Pseudomeriones*. Historical overviews of the genus are given by [2-10].

The most primitive type of *Pseudomeriones* is *P. latidens*, firstly described from Molayan, Afghanistan (MN13) [11, 12]. Older representatives of *P. latidens* have been found in Karaözü, Kaleköy and Dendil (Turkey) which are placed in the MN 9-11 zones in Anatolia [8, 12, 13, 21]. If Karaözü, Kaleköy and Dendil are older than Molayan, then *P. latidens* must have been migrated to Afghanistan and

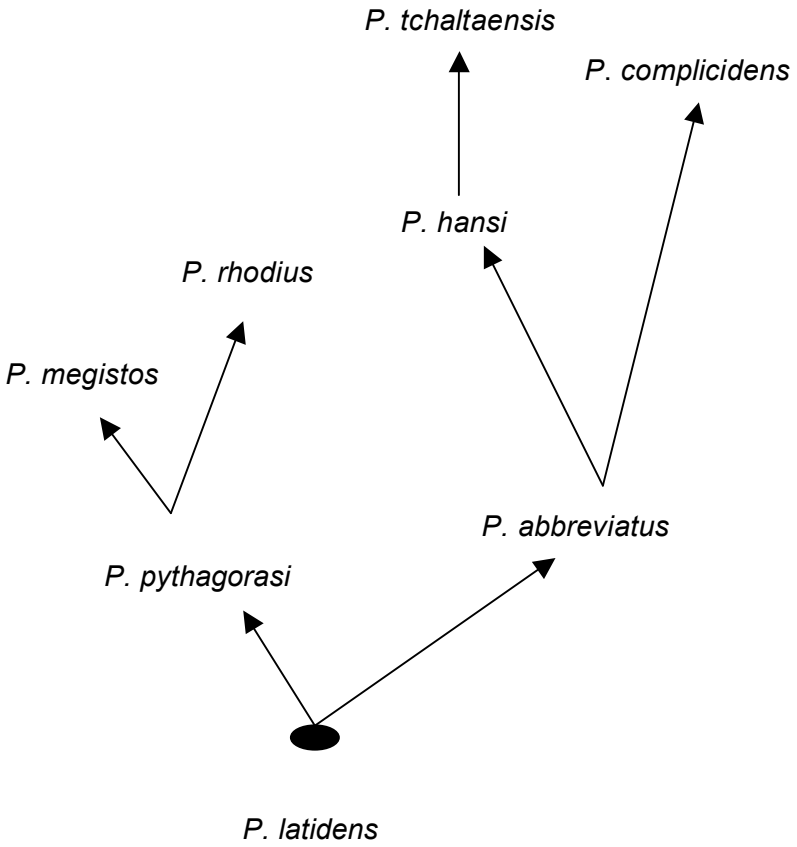
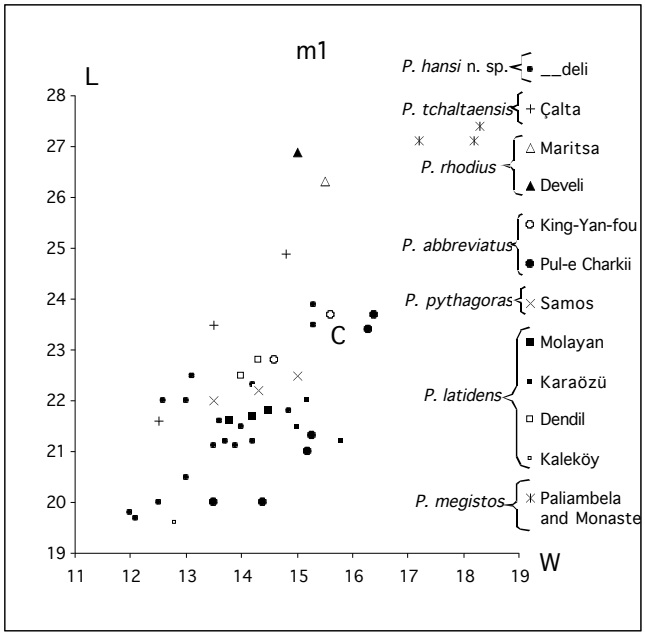
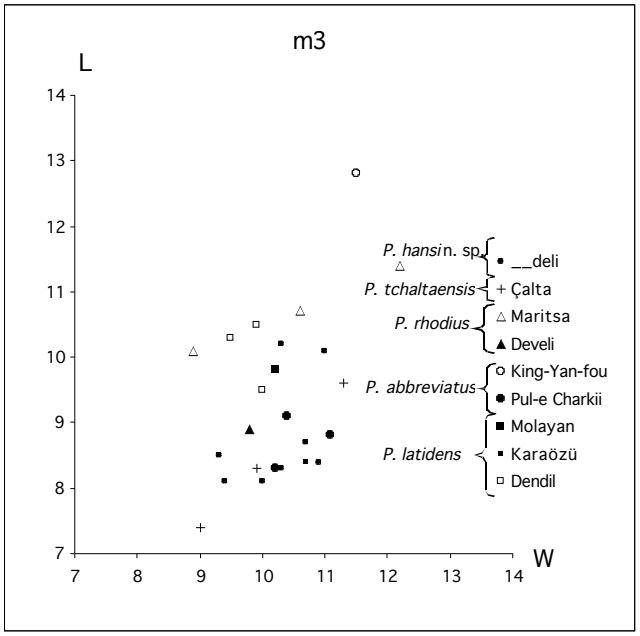
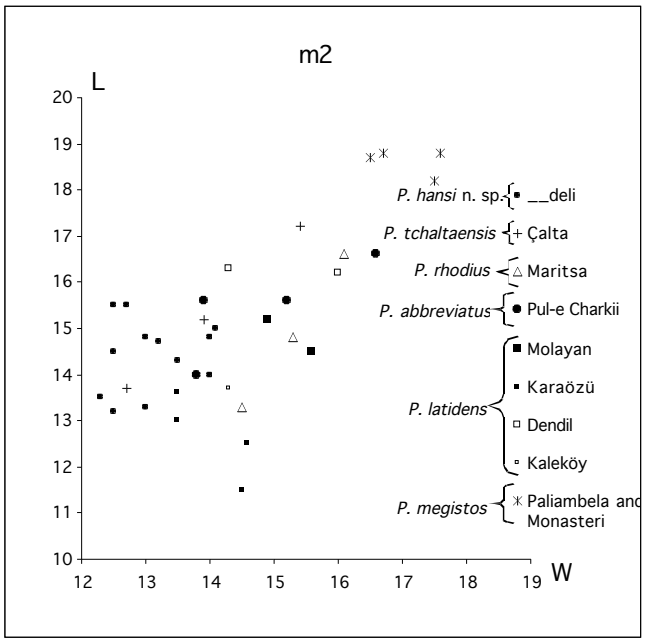


Fig. (2). Scenario of ancestor-descendant relationships of several *Pseudomeriones* species (adopted from Sylvestrou & Kostopoulos 2007).







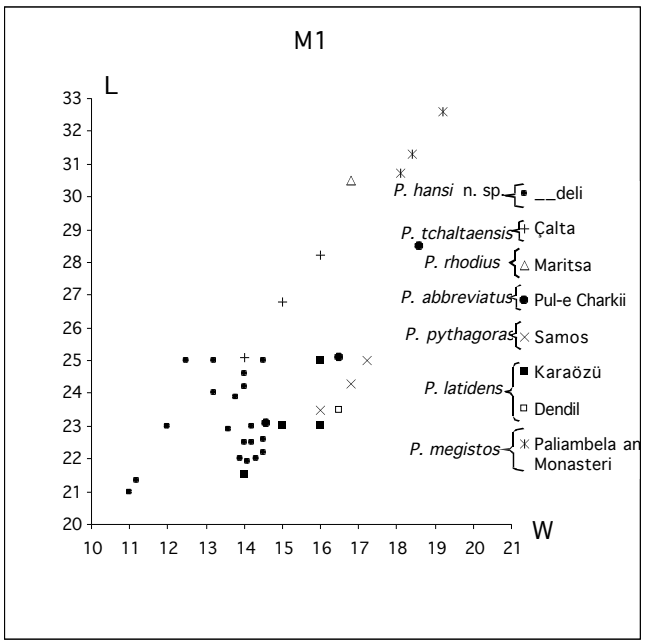


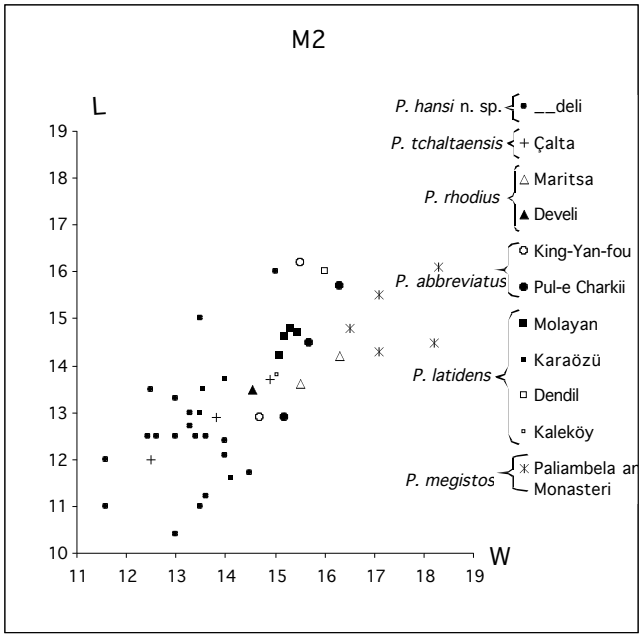
Fig. (3). Length-width scatter diagrams of m1 and m2 of *Pseudomeriones* species from different localities.

Fig. (4). Length-width scatter diagrams of m3 and M1 of *Pseudomeriones* species from different localities.

China from Anatolia and evolved firstly into *P. abbreviatus* [14, 15] which [4], evolved into *P. complicidens* later in China [20]. In Anatolia, *P. latidens* must have evolved into *P. rhodius* [16] and *P. megistos* [10] through *P. pythagorasi* [17] and into *P. tchaltaensis* through *P. abbreviatus* and then *P. hansi* [10] (Fig. **2**). Evolutionary trends inside the genus are towards the increase in the height of the crown, the length and symmetry of anteroconid of m1, the decrease in the width of M1 and m1 and the strength of the labial arm of anteroconid, the size of posterolophid, the width of anterolabial sinusid on m2 and the number of roots in m2 (two). This evolutionary scenario complies with the observation of [6] too, except the fact that its *P. rhodius* [3, 18, 19] consists of only three rooted M2-morphotypes. It should be noted that *P. latidens* of Dendil shows two rooted morphotypes as well [13], suggesting a more advanced form than İğdeli species. Morphologically *P. rhodius* is almost as much developed as *P. tchaltaensis* because the crowns of the teeth of Çalta species are as high as those of *P. rhodius*, their M1 and m1 are narrow and their anteroconid is strong, the mezosinus of M2 is deep and the protosinusid of m2 is shallow.

DISCUSSION AND CONCLUSIONS

The study of the *Pseudomeriones* (Rodentia) material from İğdeli (Central Anatolia, Turkey) validates the presence of a new species, *P. hansi*, characterized by the length/ width ratio of M1 and of m1 (1.59 and 1.60 respectively). The M2



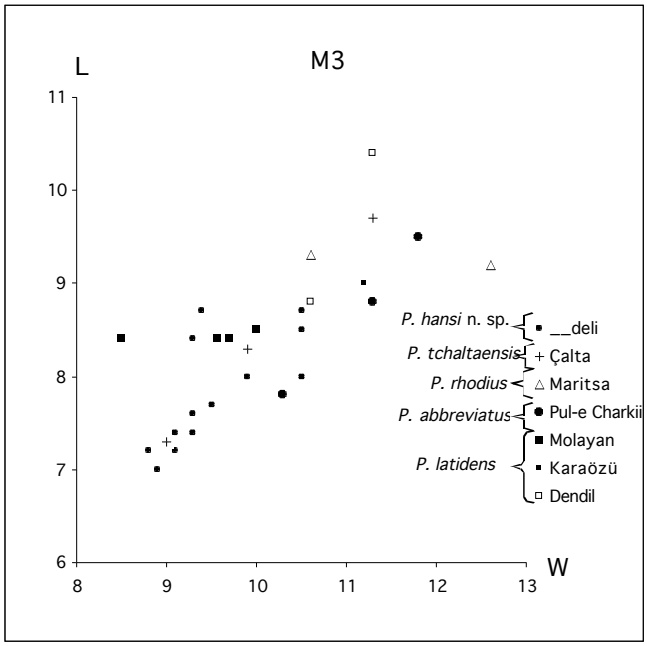


Fig. (5). Length-width scatter diagrams of M2 and M3 of *Pseudomeriones* species from different localities.

has a deep lingual sinus. m1 has a symmetric triangular anteroconid with a moderate labial arm reaching to the base of the protoconid. A phylogenetic analysis based on dental characters emphasizes close relationships among the *Pseudomeriones* species. According to the suggested evolutionary scenario, these species originated from population of *P. latidens*. *P. hansi* clade, originated from the same ancestral stock, led to the widely distributed Late Turolian *P. abbreviatus*, which, in its turn, splits during Ruscinian into two geographic lineages: a West Asian one represented by *P. hansi* and its possible descendant *P. tchaltaensis* and an East Asian one that led to *P. complicidens* [10].

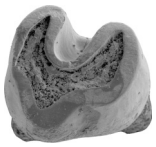
PLATE I

6 **7**

Figs. (6, 7). m1 dext.

8 **9**

Figs. (8, 9). m2 sin.



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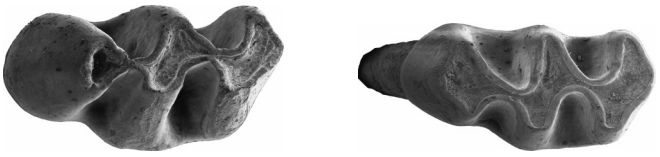
Figs. (10). m3 dext.



11 **12**

Figs. (11, 12). M1 dext.

13 **14**

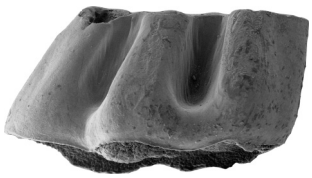
Figs. (13, 14). M2 sin.

15 **16**

Figs. (15, 16). M3 sin.

17

Fig. (17). Labial view of m1 a dext.



18

Fig. (18). Lingual view of m1 a dext.

1 mm.

All figures X 20

İğdeli locality is assigned to the Early Pliocene/Early Ruscinian (MN 14) age on the basis of the occurrence of *Promimomys insuliferus*.

ACKNOWLEDGEMENTS

I am indebted to my supervisor Engin Ünay (Ankara), for encouragement and providing the material studied in my work. I deeply thanked Hans de Bruijn (Utrecht) who has taken the S.E.M. photographs in the study for his thoughtful review and I am also grateful for Scientific Researches Projects Department of Cumhuriyet University (CUBAP, F-129, 2002).

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Received: May 8, 2009 Revised: June 5, 2009 Accepted: June 29, 2009