

## Pliospalax Primitivus n. sp. (Rodentia, Mammalia) and Anomalomys Gaudryi Gaillard from the Anchitherium Fauna of Sarıçay (Turkey)

*Sarıçay (Türkiye) Anchitherium'lu faunasından Pliospalax primitivus n.sp. (Rodentia, Mammalia) ve Anomalomys gaudryi Gaillard*

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**ABSTRACT:** Two species of micro mammals which belong to the Anchitherium fauna from Sarıçay are described. The first is a new species of Pliospalax known from Turolian (Upper level of Upper Miocene) to Early Villanyian (Latest Pliocene or Earliest Pleistocene) levels. It is described in Middle Astaracian (Upper level of Upper Miocene of Turkey and compared with other known species from Greece, Ukraine and Turkey. The second one is Anomalomys gaudryi known Middle Miocene levels of European localities.

**ÖZ:** Sarıçay Anchitherium faunasından iki mikro memeli türü tanımlanmıştır. Birincisi Turoliyenden (Orta Miyosenin üst seviyesi) Alt Villanyien (En Üst Pliyosen ya da En Alt Pleyistosen) seviyesine kadar bilinen Pliospalax cinsinin yeni bir türüdür. Türkiye'nin Orta Astarasiyen (Orta Miyosenin Üst seviyesi) seviyesinden tanımlanan bu yeni tür Yunanistan, Ukrayna ve Türkiye'nin bazı fosil yataklarından bilinen Pliospalax türleriyle karşılaştırılmıştır. İkinci tür ise Avrupa Orta Miyosen lokalitelerinden bilinen Anomalomys gaudryi'dir.

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## INTRODUCTION

The fossil deposits are located on the east bank of the river Sarıçay (Yusufça Dere) 2.25 km north east of the centrum of Milas and 1.25 km southeast from the new bridge on the Milas-Kırcağız road.

The fossiliferous deposits at Sarıçay were previously discovered and excavated by German group during an extensive survey of Neogene sediments in Turkey. In 1976, Sarıçay was excavated again at the same time as Yenieski-hisar by the English and MTA group with the aim of studying the palaeoecology of Miocene sites in Turkey, especially those at which primate fossils have been found.

The fossil bed contains both micro and macro mammals belonging to the Anchitherium fauna. The micro mammals described below have been collected from the bed 5 which is shown in the section (fig. 2).

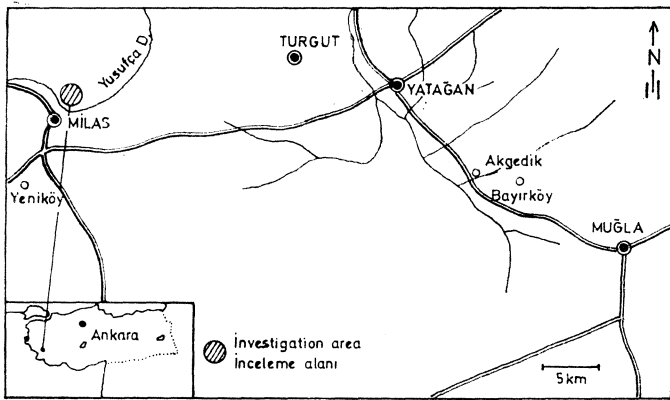


Figure 1: Location map.

Şekil 1: Yer buldu haritası.

## STRATIGRAPHY

According to Becker Platen (1970) the stratigraphy consist of chancing facies of mostly grey, grey - green or white fluviatile silts, sands and gravels with variable calcite content. The vertebrate remains were reported to be in thin layers or lanses at several different horizons, partly concentrated in pockets and partly occurring as isolated specimens (Sickenberg and others., 1975).

According to the unclassified report of the English and Turkish group, two lithological units can be distinguished. The lower unit, which has maximum thickness of 11 m, consists of cyclical silts and gravels above bedded sandstones, and the upper unit which is much thicker, consists of unfossiliferous green.grey silts and sandstones. The two unites are separated by a well developed white calcified horizon. The fossils are concentrated in the top 4 m of lower unit at Sarıçay. A detailed section of the top 4 m of the lower unit is shown fig. 2. The fossils were concentrated at the gravel-silt junction in two levels (beds 5 and 8). The lateral extent of the beds varies considerably. Some of the gravel beds can be traced over 30-40 m, until they are concealed by the overlying Pleistocene deposits, and the others are less than one metre in extent.

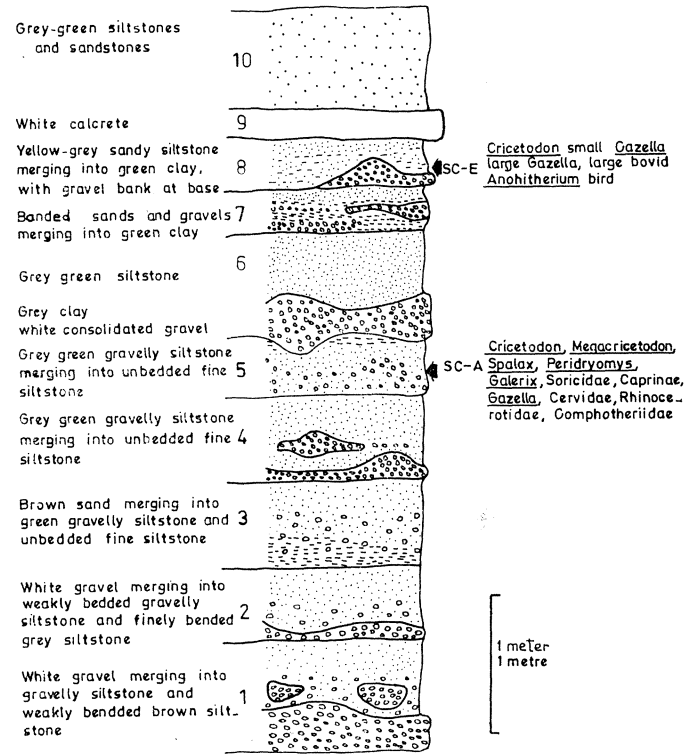


Figure 2: Section of the top half of the lower unit at Sarıçay (Copied from the unclassified report of the English MTA group).

Şekil 2: Sarıçay alt biriminin üst yarısının kesiti (İngiliz ve MTA gurubunun sınıflanmamış raporundan alınmıştır).

## FALEONTOİİOGY

Order: Rodentia Bowdich, 1821

Family: Spalacidae Gray, 1821

Genera: Pliospalax kormos, 1932

Pliospalax primitivus n. sp.

(Fig. 4: 1-14; Plate I, Fig. 1-14; Plate II, Fig. 1.9)

Derivatio nominis: The species is named after its primitive characters.

Type locality: Sarıçay

Age: Middle Astaracian

## DIAGNOSIS

Unworn or little worn  $M_1$  is characterized by two labial and two lingual re-entrant folds and an isolated anterior lobe. All unworn or little worn lower teeth have rather strong mesolophids. The mesoloph of  $M_1$  is variable and its posterior cingulum is well developed.

## Differential Diagnosis

Pliospalax primitivus is the largest form among the other species of this genera (Fig. 3).

P. primitivus differs from P. maeoveii and P. sotirisi (.=P. maeoveii according to Şen, 1976 and Şen and De

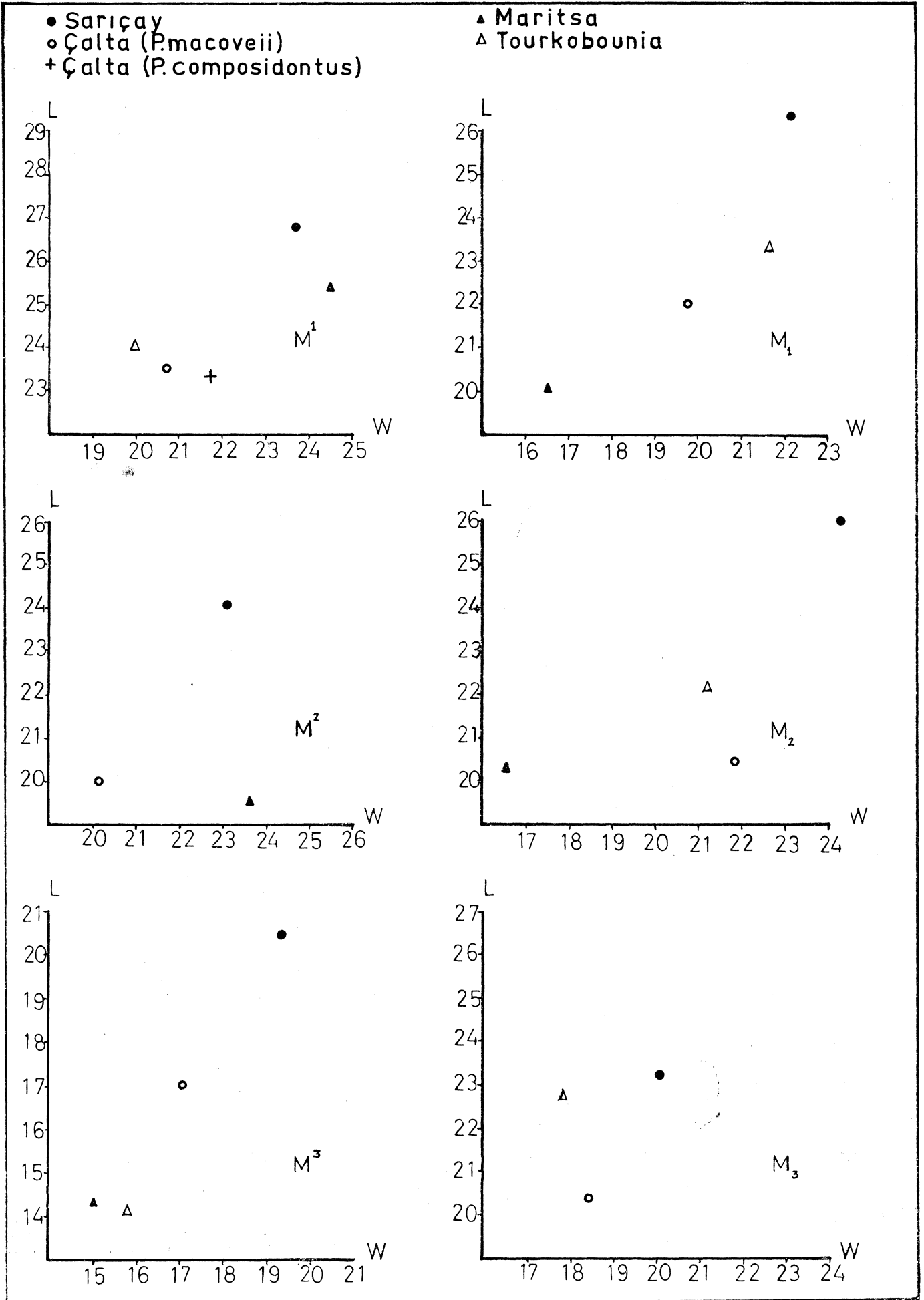


Figure 3: Length-width scatter diagrams of upper and lower teeth of Pliospalax species from Sariçay, Çalta Maritsa and Tourkobounia-I (average measurements are given).

Şekil 3: Sariçay, Çalta, Maritsa ve Tourkobounia-I'deki Pliospalax türlerinin alt ve üst dişlerinin uzunluk - genişlik dağılımı diyagramı (Ortalama değerler verilmiştir).

Bruijn, 1977) in having isolated anterior lobe in  $M_x$ , strong mesolophids in all lower teeth and more developed posterior cingulum in  $M^1$ .

Although *P. primitivus* is similar to *P. tourkoboiiniensis* in having isolated anterior lobe in  $M_1$ , there are other differentiating features such as strong mesolophid in all lower teeth and more developed posterior cingulum in upper  $M_i$ .

*P. primitivus* is rather different from *P. composidontii* in that, the  $M_i$  of Sariçay species has longer than that of *P. composidontus*. Although, the  $M_x$  of *P. composidontus* is worn (Topachevski, 1969; fig. 6, p. 18) the posterior cingulum does not fuse with the entoconid. In the samples of Sariçay, this fusion is present in little worn teeth.

Holotype; A right  $M_1$  no. MMS/m. 15, Fig.4:1, PL II: Fig1. Measurements of holotype: 26 X 21,5  
Measurements and material

	Length		number	Width	
	range	mean		mean	range
$M_1$	25.5-28.0	26.4	5	22.1	21.0-24.0
$M_2$	24.0-28.5	26.0	4	24.3	24.0-25.0
$M_3$	22.5-24.0	23.2	2	20.0	18.0-22.0
$M^1$	25.5-28.5	26.9	6	23.6	21.0-25.5
$M^2$	23.5-25.0	24.1	5	23.1	21.5-25.0
$M^3$	20.0-21.0	20.5	3	19.3	18.0-20.5

### Description

$M_1$ . The unworn two teeth (Fig.4: 1,2) show two lingual and two labial re-entrant folds. The antero-labial and the postero-lingual re-entrant folds are confluent, so the anterior lobe is isolated. The deepest postero-labial re-entrant fold ends at about 1.7 mm from the occlusal surface. The postero-lingual is the shortest one. In the slightly worn teeth, the posterior cingulum fuses with the entoconid, with further wear, the protoconid fuses with the anterior cingulum at a later stage of attrition entoconid and metaconid fuse.  $M_i$  has one anterior and one posterior root centrally connected by a cret.

$M_2$ . An unworn tooth (Fig.4: 5) shows one well developed labial which ends at about 1.7 mm from the occlusal surface like that of  $M_1$  and one lingual re-entrant fold. Second lingual fold is deep but closed. It has the trace of very small antero-labial fold in the antero-labial corner of its occlusal surface. The mesolophid is strong. It can be seen in the worn teeth. In the worn teeth, the postero-lingual fold is developed as an enamel island.  $M_2$  is two rooted.

$M_3$ . The morphology of  $M_3$  is very similar to that of  $M_2$ . But the posterior lobe is more reduced. In an unworn tooth, (Fig.4: 8), one labial reaching to the basis of the crown and three lingual re-entrant folds can be seen. The central one of the three lingual folds is open lingually, the others are closed. The Antero-lingual fold between the anterior cingulum and the metaconid is long but shallow. The closed postero-lingual fold is deep. It is seen as an enamel island in the worn teeth. The mesolophid is rather strong.

$M_i$ . A slightly worn  $M_i$  (Fig. 4:9) has one lingual, three labial re-entrant folds, The lingual fold ends at about

2.5 mm from the occlusal surface (Pl. 1:4a). The postero-labial fold is shorter and not as deep as the others. The posterior cingulum is well developed. In the worn specimens, two labial folds are seen due to the fusion of the posterior cingulum with the metacon. Four out of six specimen have variable sized mesoloph.  $M_i$  has one thick lingual and two thin labial roots.

$M_2$ . An unworn tooth (Fig.4:12) shows one lingual fold which ends at about 2.5 mm from the occlusal surface and one less deep labial re-entrant fold. The latter is separated into two branches by mesolophid. The paracon is connected with the protocon by a cret nearly parallel to the anterior cingulum. There is a shallow and closed fold which disappears quickly by wear between this cret and the anterior cingulum. The metacon is fused with the posterior cingulum. The mesoloph is well developed in all  $M^2$  and reaches to the labial border in one sample. In the worn teeth, the anterior branch of the labial fold is developed as an enamel island.

$M^3$ . The crowns of the two  $M_3$  are higher anteriorly than posteriorly. One of these teeth (Fig.4: 13) has one lingual and one labial re-entrant folds. They are confluent. Although the other (Fig; 4: 14) is unworn, it does not show lingual fold. The shapes of these two IP are not completely similar to each other so, they show different pattern especially in their anterior lobe. A worn  $M_3$  shows one labial forked fold.

### Discussion

This group is first found among the Ancliitherium fauna. With the absence of any contemporary group, at this level it is incomparable. But, according to Kormos (1932), *Pliospalax* which is known from Turolian to Early Villanyian is characterized by the presence of two lingual and two labial re-entrant folds in unworn  $M_i$ . This description given for *Pliospalax* is so general that, it also involves the Middle Astaracian forms found in Sariçay. To interpret Middle Astaracian forms of Sariçay as a new genera, a new description for *Pliospalax* is needed. Such a classification is not quite sound at present since the history of this family is not well known in the Miocene and Pliocene. Therefore, for the present time, Sariçay population is interpreted as a new species of this genera.

Sometimes, the traces of mesoloph/id and posterior cingulum are seen in *Pliospalax* species of younger levels. But, these properties are not as common and as well developed in any population of *Pliospalax* described up to the present time as Sariçay population. For instance, no description can be found for the stratigraphically younger *Pliospalax* species which has strong mesolophids in all lower teeth whereas all the lower teeth of Sariçay species show strong mesolophids without exception.

If the presence of strong mesoloph/id and posterior cingulum in lower and upper teeth are interpreted as archaic

- (1) In *P. sotirisi*, the postero-labial fold extends nearly to the basis of the crown (De Bruijn et Van der Meulen, 1975, Pl. 6 fig. 1b) this fold is shorter in *P. raacoveii* (Şen, 1977 PL XIV, fig. 3b). The length of this fold shows that *P. sotirisi* is more evolved. So, whether *P. sotirisi* and *P. raacoveii* are really synonymous or not seems doubtful.

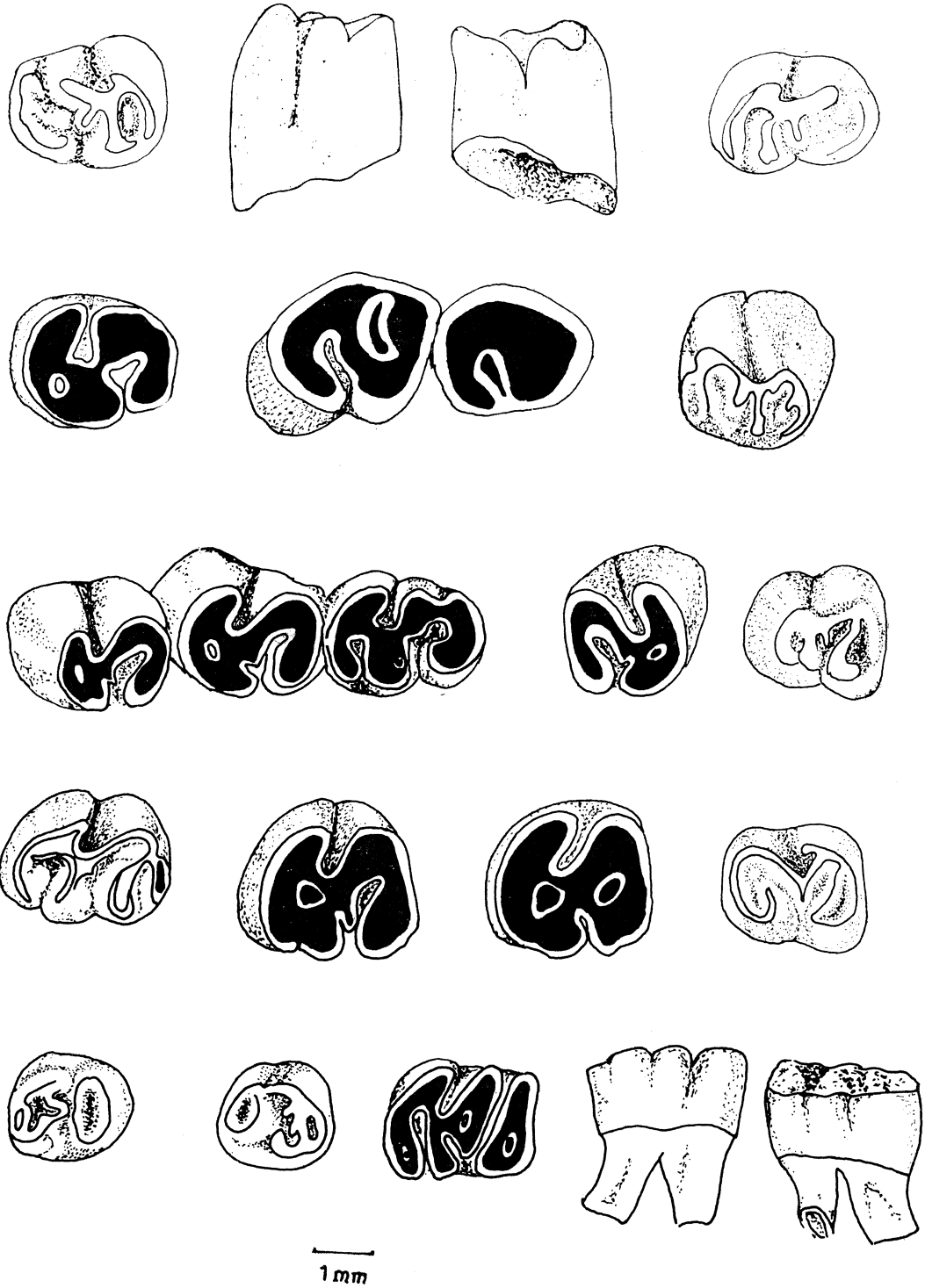


Figure 4: *Pliospalax primitivus* n. sp. 1a) Occlusal view of  $M_1$  dext. Holotype, X10 1b) Labial view of the same specimen 1c) Lingual view of the same specimen; 2) Occlusal view of  $M_1$  sin., X10; 3) Occlusal view of  $M_1$  sin., X10; 4) Occlusal view of  $M_1 - M_2$  dext., X10; 5) Occlusal view of  $M_2$  dext., X10; 6) Occlusal view of  $M_1 - M_2$  sin., X10; 7) Occlusal view of  $M_2$  dext., X10; 8) Occlusal view of  $M_2$  sin., X10; 9) Occlusal view of  $M_2$  dext., X10; 10) The occlusal view of  $M_2$  dext., X10; 11) Occlusal view of  $M_2$  dext., X10; 12) Occlusal view of  $M_2$  sin., X10; 13) Occlusal view of  $M_2$  dext., X10; 14) Occlusal view of  $M_2$  sin., X10; *Anomalomys gaudryi* Gaillard 15a) Occlusal view of  $M_2$  sin. X15; 15b) Lingual view of same specimen; 15c) Labial view of same specimen; 15c) Labial view of same specimen.

Şekil 4: *Pliospalax primitivus* n. sp. 1a) Sağ  $M_1$  in çiğneme yüzeyinden görünümü, Türörnek, X10; 1b) Aynı örneğin dış yüzden görünümü; 1c) Aynı örneğin iç yüzünden görünümü; 2) Sol  $M_1$  in çiğneme yüzeyinden görünümü, X10; 3) Sol  $M_1$  in çiğneme yüzeyinden görünümü, X10; 4) Sağ  $M_1 - M_2$  nin çiğneme yüzeyinden görünümü, X10; 5) Sağ  $M_2$  nin çiğneme yüzeyinden görünümü, X10; 6) Sol  $M_1 - M_2$  ün çiğneme yüzeyinden görünümü, X10; 7) Sağ  $M_2$  nin çiğneme yüzeyinden görünümü, X10; 8) Sol  $M_2$  ün çiğneme yüzeyinden görünümü, X10; 9) Sağ  $M_2$  in çiğneme yüzeyinden görünümü, X10; 10) Sağ  $M_2$  in çiğneme yüzeyinden görünümü, X10; 11) Sağ  $M_2$  in çiğneme yüzeyinden görünümü, X10; 12) Sol  $M_2$  nin çiğneme yüzeyinden görünümü, X10; 13) Sağ  $M_2$  ün çiğneme yüzeyinden görünümü, X10; 14) Sol  $M_2$  ün çiğneme yüzeyinden görünümü, X10; *Anomalomys gaudryi* Gaillard 15a) Sol  $M_2$  nin çiğneme yüzeyinden görünümü, X15; 15b) Aynı örneğin dış yüzden görünümü; 15c) Aynı örneğin iç yüzünden görünümü.

features, then it can be argued the *Pliospalax* species in younger levels were derived from the Miocene groups. Actually, the properties of the teeth of this species are scattered to the younger *Pliospalax* species. However, the stratigraphically oldest *Sarıçay* species is larger and rather hypsodont. So, the relationship among the *Pliospalax* species may be rather complex from the evolutionary point of view. But, by the specialities of the properties of this species such as, the snape, the simplified structure and the hypsodonty of the teeth are much closer to the stratigraphically younger *Pliospalax* species than *Anomalomys* which was considered as the ancestor to *Pliospalax* (De Bruijn and others 1970) The presence of *Anomalomys* and *Pliospalax* in the same bed also proves that the former to be ancestor to the latter is impossible.

Genera: *Anomalomys* Gaillard, 1900  
*Anomalomys gaudryi* Gaillard, 1900  
 (Fig.4: 15; Plate II, Fig. 9)

1900 *Anomalomys gaudryi* Gaillard (non vidi)  
 1925 *Anomalomys gaudryi* Schaub, 66-68  
 1928 *Miospalax imonacensis* Stromer,  
 1946 *Anomalomys gaudryi* Viret and Schaub, 342-352  
 1953 *Anomalomys gaudryi* Schaub and Zapfe, 162.  
 1967 *Anomalomys gaudryi* Kowalski, 9-10.

Locality: *Sarıçay*

Age: Middle Astaracian

Material and measurements: 1 left  $M_2$ , 17 X 13.5

Description

$M_2$  The occlusal surface of  $M_2$  consists of three transversal lobes. The antero-labial and the second lingual synclinal are confluent. Postero-lingual one ends at the middle of the occlusal surface. In the anterior lobe, the trace of first lingual synclinal is seen. The presence of the funnel in the middle lobe is also seen clearly. The mesolophid is short and does not reach to the lingual border of the tooth. A narrow lingual synclinal separates the mesolophid from the entokonid. The posterior ridge is connected with the hypoconid. Another narrow and long fold separates the entoconid from the posterior cingulum. In the posterior lobe, a small enamel island is present. It has one anterior and one posterior root.

#### Discussion

Although there is single  $M_2$ , it allows specific determination because it shows typical characters of *Anomalomys gaudryi*. The structure of this tooth is more closely similar to the samples described by Schaub (1925) and Schaub and Zapfe (1953) than the samples figured by Viret and Schaub (1946). The crowns of the teeth of *A. gaudryi* from Opole (Kowalski, 1967) are higher than the *Sarıçay* tooth. According to Fejfar (1972), the samples such as, *A. gaudryi* from Opole and *Miospalax monacensis* Stromer (1928) are more evolved Sarmation types of *A. gaudryi*

The measurements of *Sarıçay* tooth are seen to be between the minimum and maximum measurements of the  $M_2$  of *Anomalomys gaudryi* from different localities (Fi. 5).

*A. gaudryi* is known from many Miocene faunas of Europe, e.g., Neudorf (Helvetian), San Quirico near Barcelona (Upper Vindobonian), La Grive St. Alban (Upper Vindobonian), Steinheim am Albuch (Sarmatian) and Opole (Sarmatian).

	La Grive	Neudorf	Opole	Sarıçay
Length	1.56-1.86	1.71-1.79	1.50-1.60	1.70
Width	1.26-1.60	1.12-1.25	1.20- 1.40	1.35

Figure 5: The; comparison of the measurements of *A. gaudryi*'s  $M_2$  from different localities

Şekil 5: Çeşitli lokalitelerden bulunan *A. gaudryi*  $M_2$  ölçülerinin karşılaştırması.

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## PLATE I

Pliospalax primitivus n. sp.

- Figure 1: M<sup>1</sup> dext. X10  
 Figure 2: M<sup>1</sup> dext., X10  
 Figure 3: M<sup>1</sup> dext., X10  
 Figure 4: M<sup>1</sup> dext., X10; 4a) From lingual; 4b) From labial.  
 Figure 5: M<sup>1</sup> dext., X10  
 Figure 6: M<sup>1</sup> dext., X10  
 Figure 8: M<sup>2</sup> sin., X10  
 Figure 8: M<sup>2</sup> dext., X10  
 Figure 9: M<sup>2</sup> sin., X10  
 Figure 10: M<sup>2</sup> sin., X10  
 Figure 11: M<sup>2</sup> sin., X10  
 Figure 12: M<sup>3</sup> dext., X10  
 Figure 13: M<sup>3</sup> sin., X10  
 Figure 14: M<sup>4</sup> sin., X10

## LEVHA I

Pliospalax primitivus n. sp.

- Şekil 1: Sağ M<sup>1</sup>, X10  
 Şekil 2: Sağ M<sup>1</sup>, X10  
 Şekil 3: Sol M<sup>1</sup>, X10  
 Şekil 4: Sağ M<sup>1</sup>, X10 4a) iç yüzden; 4b) Dış yüzden  
 Şekil 5: Sağ M<sup>1</sup>, X10  
 Şekil 6: Sol M<sup>1</sup>, X10  
 Şekil 7: Sol M<sup>2</sup>, X10  
 Şekil 8: Sağ M<sup>2</sup>, X10  
 Şekil 9: Sol M<sup>2</sup>, X10  
 Şekil 10: Sol M<sup>2</sup>, X10  
 Şekil 11: Sol M<sup>2</sup>, X10  
 Şekil 12: Sağ M<sup>3</sup>, X10  
 Şekil 13: Sol M<sup>3</sup>, X10  
 Şekil 14: Sol M<sup>3</sup>, X10

## PLATE II

Pliospalax primitivus n. sp.

- Figure 1: M<sub>1</sub> dext., holotype, X10; la) From labial; lb) From lingual  
 Figure 2: M<sub>1</sub> sin., X10  
 Figure 3: M<sub>1</sub> sin., X10  
 Figure 4: M<sub>a</sub> dext, X10  
 Figure 5: M<sub>s</sub> dext, X10  
 Figure 6: M<sub>3</sub> sin., X10  
 Figure 7: M<sub>i</sub> - M<sub>a</sub> sin., X10; 7a) From labial  
 Figure 8: M<sub>i</sub> - M<sub>a</sub> dext, X10  
 Anomalomoys gaudryi Gaillard  
 Figure 9: M<sub>2</sub> sin., X15; 9a) From lingual; 9b) From labial

## LEVHA II

Pliospalax priniitivus n. sp.

- Şekil 1: Sağ M<sub>1</sub>, türörnek, X10; la) Dış yüzden; lb) İç yüzden  
 Şekil 2: Sol M<sub>1</sub>, X10  
 Şekil 3: Sol M<sub>1</sub>, X10  
 Şekil 4: Sağ M<sub>s</sub>, X10  
 Şekil 5: Sağ M<sub>a</sub>, X10  
 Şekil 6: Sol M<sub>s</sub>, X10  
 Şekil 7: Sol M<sub>i</sub> - M<sub>s</sub>, X10; 7a) Dış yüzden  
 Şekil 8: Sağ M<sub>i</sub> - M<sub>a</sub>, X10  
 Anomalomoys gaudryi Gaillard  
 Şekil 9: Sol M<sub>a</sub>, X15; 9a) İQ yüzden; 9b) Dış yüzden





1



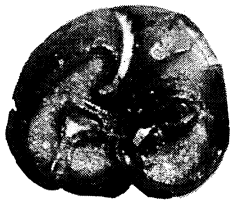
2



3



4



5



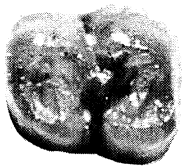
6



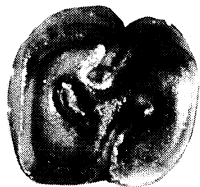
4a.



4b.



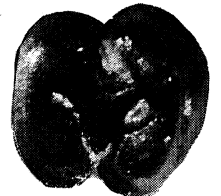
7



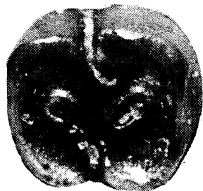
8



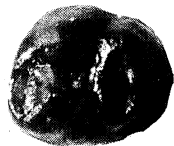
9



10



11



12



13



14





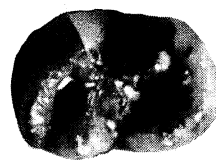
1



1a.



1b.



2



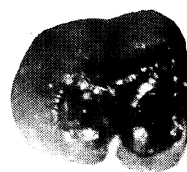
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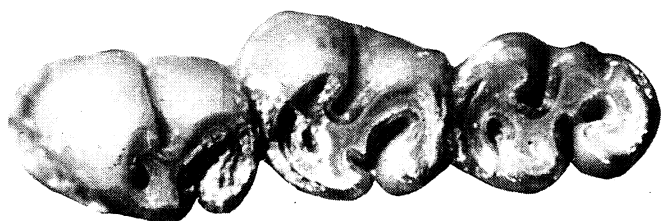
4



5



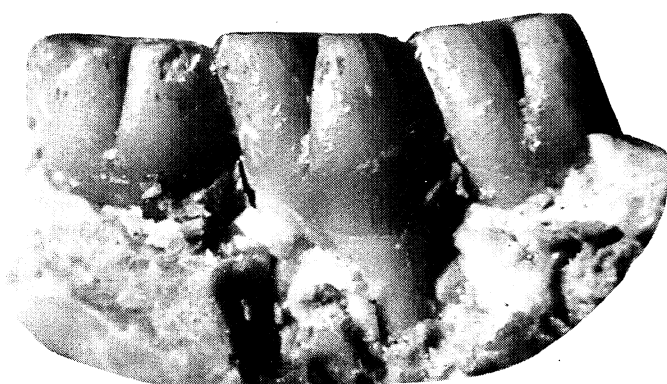
6



7



8



7a.



9



9a.



9b.

