

FIRST STUDY OF A PLIOCENE RODENT FAUNA FROM ANATOLIA

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SUMMARY. — A first detailed study of fossil rodents uncovered from the Pliocene of Çalta (Ankara, Turkey) is given. The faunal assemblage is represented by nine species, attributed to five subfamilies. Two of the species show asiatic affinities, four are derived from Europe while three are indigenous to Anatolia. The rodent fauna of Çalta claims for typical steppic conditions.

INTRODUCTION

The present rodents of Turkey, peculiarly those of Anatolia, are well known owing to Neuhauser's, Osborn's, Kumerloeve's, Corbet and Morris' works and thanks to the Felten - Spitzenberger - Storch team. According to these works, the rodent fauna of Anatolia includes 50 species gathered into 31 genera and divided among 11 subfamilies.

Contrary to the recent ones, the fossil rodents of Turkey have remained nearly unknown. Thus, no remains have been mentioned in the Paleogene of Turkey, up to now. As regards the Neogene, some succinct works about *Steneofiber* (Calver & Neumayr, 1880; Nafiz & Malik, 1933; Ünay, 1976), *Dipoides* (Ozansoy, 1961) and *Hystrix* (Ozansoy, 1965) are available, as well as interesting faunal prelists in which the determinations scarcely reach the specific level.

The study of the rodents of Çalta (Şen, 1976), whose main results are summarized hereafter, so constitutes the first detailed and complete work, connected with a fauna of fossil rodents found in Anatolia.

The historical, geographical, geological and faunal context of the Çalta locality, situated NW of Ankara, was exposed in two previous publications (Şen & *al.*, 1974; Ginsburg & *al.*, 1974). The peculiar interest of this locality consists in its geographical position (biogeographical cross-roads between Asia, Africa and Europe); in its Pliocene age (Pliocene localities are usually scarce); and in the wealth of its faunal association (which includes two species of continental gastropods, three species of Amphibia, ten species of Reptilia, one bird, fifteen species of large mammals and twelve species of small mammals: one lagomorph, two insectivores and nine rodents).

The detailed study of these rodents leads to systematic and phylogenetic, biogeographical and paleoecological results.

SYSTEMATIC AND PHYLOGENETIC RESULTS

In the faunal list which follows, the relative frequency of each species is indicated in number of specimens (N) and in percentage of the total number of rodents.

	<u>N</u>	<u>%</u>
Muridae		
Murinae : <i>Castillomys</i> n. sp.	20	7.38
<i>Occitanomys</i> sp.	3	1.10
<i>Euxinomys galaticus</i> Şen, 1975	7	2.58
<i>Apodemus dominans</i> Kretzoi, 1959	4	1.47
Cricetidae		
Cricetinae : <i>Mesocricetus</i> cf. <i>primitivus</i> de Bruijn & al., 1970	16	5.90
Gerbillinae : <i>Pseudomeriones abbreviatus</i> n. ssp.	154	56.82
Arvicolidae		
Arvicolinae : <i>Mimomys gracilis</i> (Kretzoi, 1959)	23	8.48
Spalacidae		
Spalacinae : <i>Pliospalax macoveii</i> (Simionescu, 1930).	41	15.12
<i>P. compositodontus</i> (Topachevski, 1969).	3	1.10

So, the rodent fauna of Çalta includes nine species, belonging to eight genera shared out amongst five subfamilies. Compared to other Pliocene localities of Eurasia, this fauna is fairly rich. One has to note the absence of Sciuridae and Gliridae, families which are now widely represented in the coastal regions of Anatolia. Let us underline also that the Çalta fauna is characterized by a predominance of *Pseudomeriones* and *Pliospalax*.

The study of rodents from Çalta reveals four new taxa: one genus, two species and one subspecies. Moreover, two probably new forms are placed in open nomenclature for lack of a sufficient material to define them clearly. Finally, some synonymies and redistributions of species seem to be indispensable.

Castillomys n. sp. is comparable with *C. crusafonti* from Ruscinian localities of Western Europe and of Rhodes, by its dental morphology. Nevertheless it is different from it by its great height and by some dental characters. This new species gives evidence of the differentiation of a peculiar lineage in Anatolia.

The genus *Occitanomys* is only represented at Çalta by a few isolated molars, which do not allow well to define all the characters of the species, whence the provisional designation *Occitanomyssp.* By its dental pattern, this form is closer to *O. adroveri* (Upper Turolian, Western Europe) than to *O. brailloni* (Ruscinian, Western Europe). Therefore, it is to be supposed that a dichotomy could have occurred at the end of the Turolian in Europe, and that *Occitanomys* sp. of Çalta would be the descendant of *O. adroveri* during the Ruscinian in Asia Minor, as *O. brailloni* is its descendant in Europe nearly at the same epoch. Only future discoveries will allow to clear up the relationships of these species.

The description of *Euxinomys galaticus* Şen, 1975 allows to define the systematic position of three already known fossil species. Indeed, the two species *pusillus* and *schaubi*—which were first referred to the genus *Stephonomys*, then transferred to the genus *Parapodemus*—, as also the species *Parapodemus similis* from the Catacombs of Odessa, are easily integrated in *Euxinomys*. Thus the long discussion which opposed Thaler (1966), Misonne (1969) and Michaux (1969 & 1971) about the classification of these species is brought to a close.

Although *Mesocricetus* of Çalta evokes *M. primitivus* of Maritsa (Rhodes Island) by its dentition, morphological differences do not allow it to be completely assimilated to this species. The deficiency of the material leads not to propose a new specific term to designate the form from Çalta. The discovery of this species in this locality adds a new link to the very incomplete chain of the story of the genus *Mesocricetus*.

The abundant material of Çalta belonging to *Pseudomeriones abbreviatus* contributes to a better knowledge of the systematic position of this genus among the Gerbillinae and allows to define the variations within the species, inside several populations of this species. This leads to distinguish three populations inside this species: the first one in China, *P. abbreviatus abbreviatus* (Teilhard), the second one in Rhodes, *P. abbreviatus* n. ssp. I and the third one in Anatolia, *P. abbreviatus* n. ssp. II.

The rich material of Çalta attributed to *Pliospalax macoveii* confirms the importance of intraspecific variation among the Spalacinae, as was already observed by some authors for recent species. It includes morphotypes corresponding to the species *Pliospalax macoveii*, *P. simionescui* of Moldavia and *P. sotirisi* of Rhodes. This naturally leads to place both latter species in synonymy with the first one, that is to say with *P. macoveii* which was first described.

BIOGEOGRAPHICAL IMPLICATIONS

The study of fossil rodents from Anatolia hardly began at all. Consequently all the information provided by the Çalta rodents constitutes a first contribution to the biogeographical story of this country. Beyond this purely local interest, the discovery of rodents at Çalta contributes to a better knowledge of the area of distribution of some genera and species.

Thus, the genus *Occitonomys*, regarded up to now as a form endemic to Western Europe also exists at Çalta, which remarkably enlarges its area of distribution. The genus *Castillomys* and the species *Apodemus dominans* and *Mimomys gracilis* were known in Europe and in Rhodes only; their presence at Çalta widens their area of distribution toward the East.

In a general way, the rodent fauna of Çalta is made up of elements of various origin. As a matter of fact, it includes autochthonal elements as well as species from European or Asiatic origin.

The autochthonal elements are *Mesocricetus* and *Pliospalax*. The genus *Mesocricetus* and the subfamily Spalacinae have a similar distribution which is limited today to Anatolia and to the regions close to it. It is interesting to underline that these forms already occupied the same area during the Pliocene.

The Asiatic elements of this fauna are *Euxinomys* and *Pseudomeriones*. These genera are known in China, in the South of USSR and in Asia Minor. Çalta is the only locality where they are associated. The distribution of *Euxinomys* reaches Greece to the West, whereas one finds *Pseudomeriones* in Rhodes Island and also in North Africa. This gives evidence of intercontinental links between North Africa, Anatolia and Eastern Europe on the one hand, between Anatolia and Eastern Asia on the other hand.

The species from European origin are *Castillomys* n. sp., *Occitanomys* sp., *Apodemus dominans* and *Mimomys gracilis*. The two latter species often appear in the faunal lists of numerous localities of Central and Eastern Europe, whereas the other two present affinities with forms known in Western Europe.

It appears that, during the Pliocene as well as now, Anatolia played the part of faunal cross-roads between the three continents.

PALEOECOLOGICAL IMPLICATIONS

The study of rodents provides evidence to interpret the environment of Çalta during the Pliocene.

The Gerbil *Pseudomeriones abbreviatus* is very close to the recent *Meriones* because of its dentition. The latter lives today in Anatolia in a steppic environment. More generally the present Gerbillinae live in the regions extending from the steppe to the savanna across the desert, but they are always either absent or very scarce in the wet regions where the vegetation is dense. The relative abundance (56 % of the rodent material) of *Pseudomeriones* at Çalta tends to indicate an environment of steppic type.

The presence of *Pliospalax* (two species) and its relative abundance (16 % of the material) peculiarly reinforces the previous interpretation. The recent Spalacinae, living underground, are mainly confined to steppic regions.

The Muridae provide further evidence in support of this interpretation. As a matter of fact, Misonne (1969) has shown that in the tropical and subtropical regions today more than forty species of Muridae coexist on the same territory. The number of species decreases as the local dampness and the density of the vegetation diminish. There are only five species left in steppes and savannas and there is none in deserts. At Çalta, the Muridae include four species and represent only 12 % of the material. One is bound to notice the concordance of these data with Misonne's observations.

The Arvicolidae have a diet which requires a constant, although poor, vegetation. The presence of *Mimomys gracilis* at Çalta (8.5 % of the material) does not oppose the former interpretation.

Finally, it is to be underlined that rodents corresponding to an arboreal niche are lacking at Çalta. As far as their absence constitutes an argument, it may speak for a steppic environment.

Thus, the observations about the rodents converge to lead us to interpret the environment of Çalta during the Pliocene as a steppic one. It may be added that the other vertebrates of Çalta also lead to the same interpretation.

AGE OF THE FAUNA

Because in Turkey there are no studied fossil rodents which could be compared with those of Çalta, the relative age of this locality in relation to other places of Anatolia can only be sought with the help of large mammals.

In the regions neighboring Anatolia, it is the Maritsa locality in Rhodes Island which has provided the rodent fauna most comparable to that of Çalta. This locality contains fifteen species of rodents among which four species also exist at Çalta: *Apodemus dominans*, *Mesocri-*

cetusprimitivus, *Pseudomeriones abbreviatus* and *Pliospalax macoveii*. However, these four species present more advanced features at Çalta. Moreover, the forms which appeared later in the Pliocene of these regions, such as *Mimomys*, *Euxinomys*, etc. are missing in the fauna from Maritsa. Therefore, the fauna of Çalta is more recent than that from Maritsa.

There is another locality rather close to Çalta: Tourkobounia-I, near Athens. The fauna of this fissure-filling only comprises four of the genus known at Çalta: *Euxinomys*, *Apodemus*, *Mimomys* and *Pliospalax*. Other genus which can be regarded as archaic such as *Occitonomys*, *Castillomys* and *Pseudomeriones* are lacking in this fauna. On the other hand it includes *Sciurus cf. anomalus* and *Glis sackdillingensis* which recalls the Pleistocene species of Anatolia and Eastern Europe. One may infer that the fauna of Çalta is older than that of Tourkobounia-I. It should be remembered that de Bruijn and van der Meulen (1975, p. 337) conclude "... the age of Tourkobounia is tentatively estimated to be Early Villanyian (Latest Pliocene or Earliest Pleistocene)".

Let us point out that the Apolakkia locality (Rhodes Island) will soon provide another term of comparison. This fauna which has not yet been described includes *Mimomys* (de Bruijn & al, 1970).

Some species from Çalta, especially *Apodemus dominans*, *Mimomys gracilis* and *Pliospalax macoveii*, have already been described or mentioned in five other Pliocene localities of Eastern Europe: Csarnota-2 and Ostramos-I in Hungary, Weze-I in Southern Poland, Maluşteni and Berejti in Rumania. Nevertheless, among the rodents represented in these faunas, European species unknown in Asia Minor predominate.

In Western Europe, several Ruscinian localities (Sete, Seynes, Nimes, Serrat-d'en-Vacquer, Lama: in Chaline & Michaux, 1974) include the genera *Castillomys*, *Occitonomys*, *Apodemus* and *Mimomys* also found at Çalta; but the fauna of Western Europe shows peculiarities due to the ecological and biogeographical nature of this part of Europe during the Pliocene.

As pointed out by de Bruijn & al. (1970, p. 582) "... the Maritsa fauna is somewhat older than those of Sete and Nimes" and as these latter localities date from the Upper Ruscinian, according to Michaux (1973), one may conclude that the Çalta fauna is of Upper Ruscinian age and that is more recent than the Maritsa fauna.

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