

EARLY PLIOCENE SMALL MAMMALS FROM THE AEGEAN ISLAND OF KARPATOS (GREECE) AND THEIR PALAEOGEOGRAPHIC SIGNIFICANCE¹

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ABSTRACT

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An association consisting of *Muscardinus* sp., *Kowalskia* sp., *Apodemus* aff. *dominans*, Petauristinae gen. et sp. indet. (Rodentia) and *Prolagus* cf. *michauxi* (Lagomorpha) is described. The faunule is of Early Pliocene age and points to a forest biotope. The small but diverse faunule suggests that Karpathos was connected to Anatolia during the Early Pliocene.

INTRODUCTION

The island of Karpathos is part of the Aegean island arc. It is located between Crete and Rhodes (Fig. 3). The island is built up of two allochthonous and one parautochthonous tectonic units consisting of rocks ranging in age from Trias to Eocene (DAVIDSON MONETT 1974). The island must have been part of a land mass during the Oligocene and almost all of the Miocene. Continental and marine sediments began to be deposited in the Late Neogene in several small basins (Fig. 1) near Pygadia (marine, latest Miocene–Early Pliocene to Early Pleistocene), near Lefkos (marine, Early Pleistocene) and in the basin of Ag. Ioannis (marine and continental, Pliocene) (BARRIER ET AL., 1979). An insular fauna of endemic deer (KUSS, 1975), endemic murids and some birds are found in some Late Pleistocene cave deposits. In 1978 P. Y. Sondaar and J. J. M. Leinders (Utrecht Univ.) localized sediments in the basin of Ag. Ioannis which might contain small

mammals; the authors took a large sample from that site in the autumn of 1979.

The basin of Ag. Ioannis

The Neogene of the basin of Ag. Ioannis is poorly exposed in some small ravines and coastal cliffs. Continental deposits consisting of thick deposits of conglomerates, at some places with cross bedding and containing grey and dark-grey silts, are exposed in the north-western part of the basin. These suggest a fluvial (braided river) environment. Rocks which were formed in lagoonal brackish and shallow-marine environments are exposed in the south and southeastern part of the Ag. Ioannis basin. The Neogene is unconformably overlain by several metres of marine Late Pleistocene ('Tyrrhenian') deposits. ANGELIER (1973) and BARRIER ET AL. (1979) report that the Neogene marine sediments are of Pliocene age. The section of Kato Afiartis (Fig. 2) shows at its base a grey-green clay containing small mollusc fragments and few disseminated plant remains. Two samples, together weighing about 2000 kg, were taken from this level at two spots about two hundred metres apart. The samples were washed on 0.5 mm screens in order to concentrate the fossil small mammals remains. The clay is overlain by shallow-marine brackish

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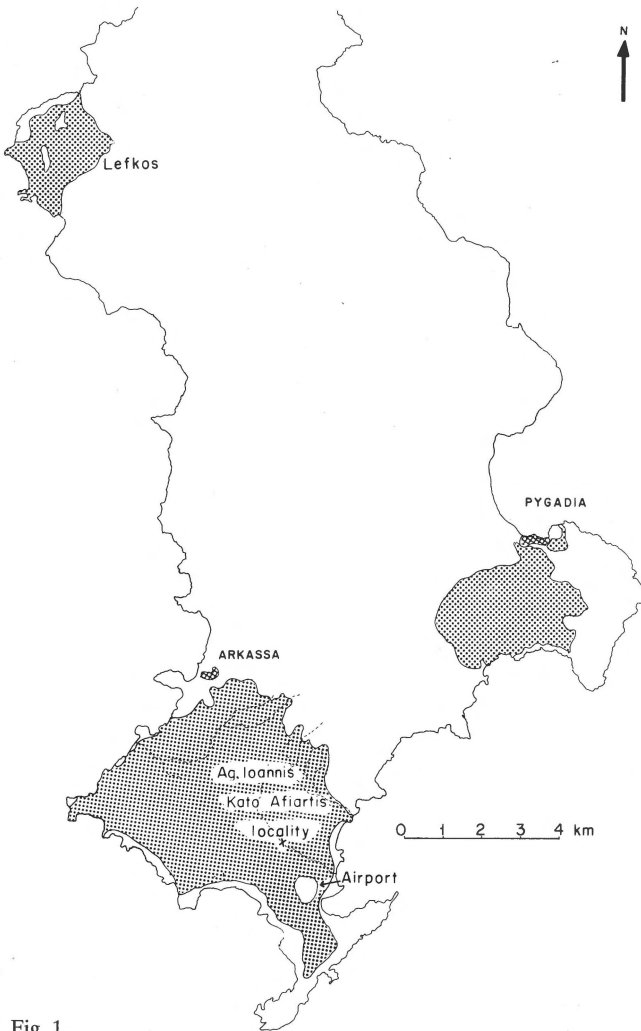


Fig. 1. Distribution of Neogene and lowermost Pleistocene sediments on the island of Karpathos. A cross indicates the site at Kato Afiartis from which micromammals have been collected.

limestones, calcarenites and grey marls containing gastropods and pelecypods (e.g. Pectinidae, *Ostrea*). Samples taken from marine microfossils from this sequence contain poor associations of benthonic foraminifera and ostracodes. One of these samples contains an ostracode association belonging to the *Cytheridea acuminata acuminata* Zone of Sissingh (V. Tsapralis, pers. comm.) which would imply a Late Miocene age (SISSINGH, 1972). BARRIER ET AL. (1979) and ANGELIER (1973), however, report that the marine sediments in the basin have a Pliocene age; the small mammals from the underlying level suggest a Pliocene age also.

TAXONOMY

The faunas from both sites are considered as one association because they contain the same faunal elements and because they are from the same level.

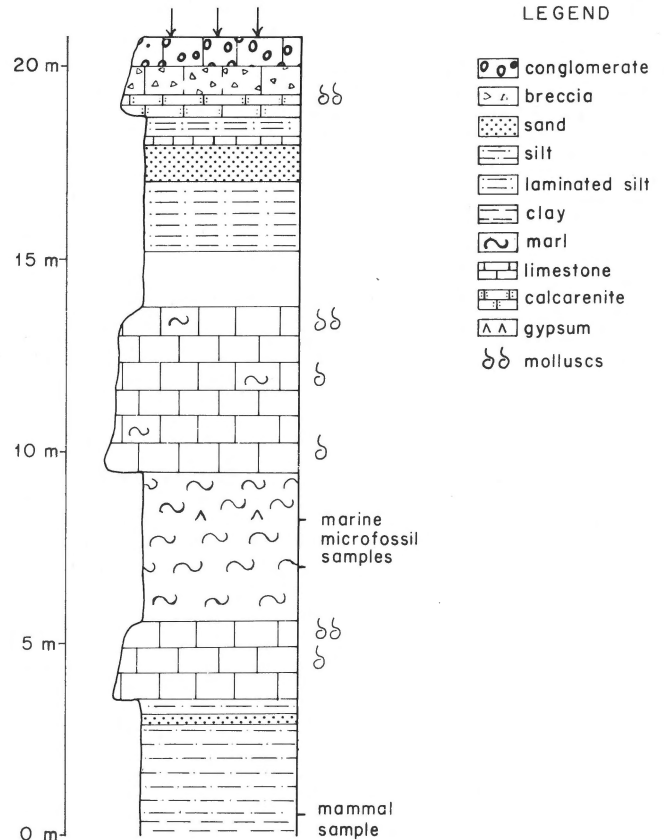


Fig. 2. Sampled section in the Kato Afiartis region; levels containing fossil mammals and marine microfossils are indicated.

Rodentia

Gliridae Thomas, 1897

Muscardinus sp.

(Plate 1, Figs. 1 and 2)

Material and measurements: P⁴ length 0.80, width 0.91; M¹ length, 1.84, width 1.46.

Remarks

The two teeth from Karpathos have been compared with extant *Muscardinus* (Linnaeus), with the Pliocene *M. pliocaenicus* Kowalski 1963 and with the Late Miocene *M. vireti* Huguency & Mein, 1965 and *M. davidi* Huguency & Mein, 1965. The dental pattern of the P⁴ agrees with that of *M. avellanarius* and *M. pliocaenicus*; the P⁴ of *M. vireti* has a third ridge. The four-rooted M¹ from Karpathos has six ridges, the M¹ of *M. avellanarius* and *M. pliocaenicus* has five ridges; the M¹ of *M. vireti* has six ridges, that of *M. davidi* has five ridges and an incomplete sixth ridge. The teeth from Karpathos are slightly larger than those of *M. vireti*, *M. davidi* and *M. pliocaenicus*, but are of about the same size as in *M. avellanarius*.

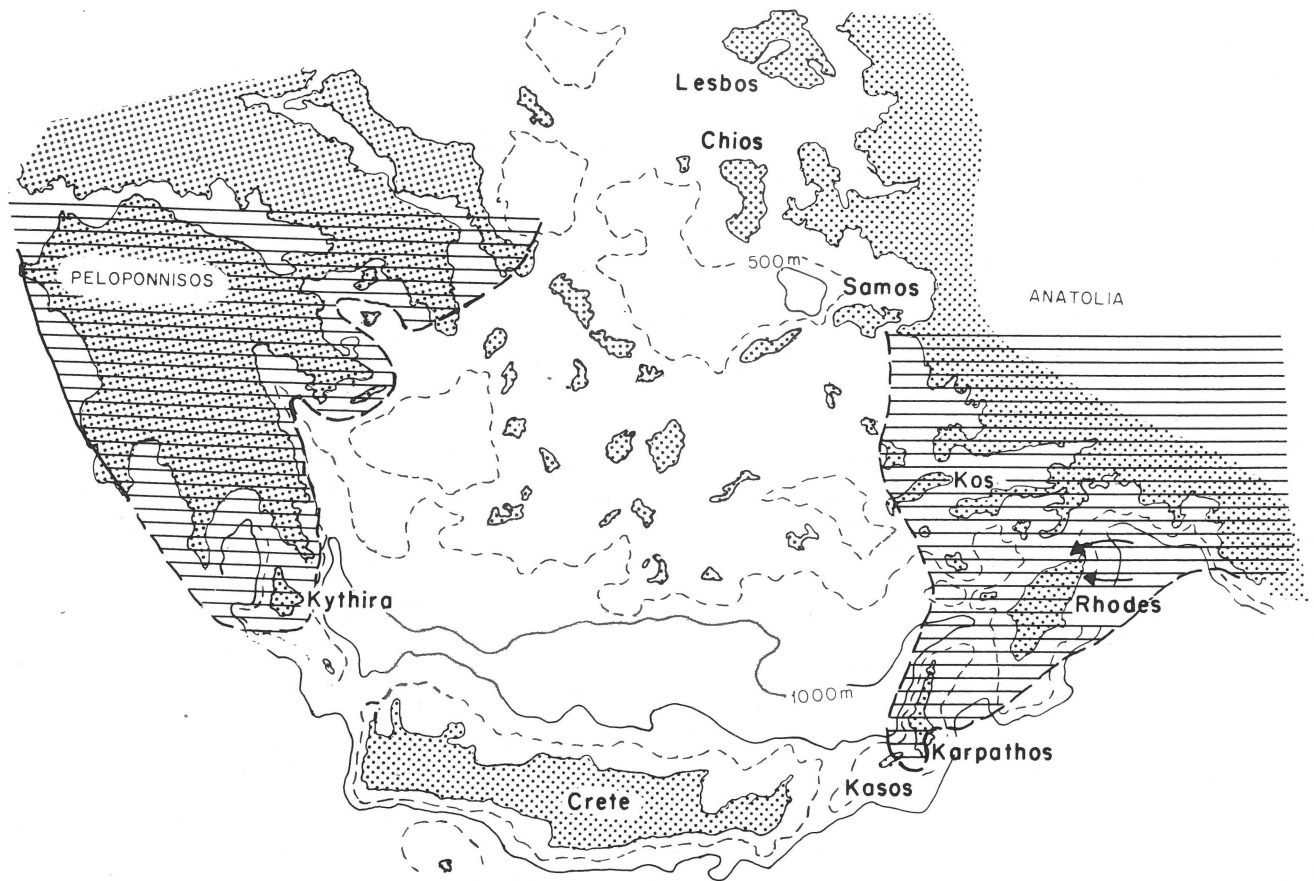


Fig. 3
Palaeogeographic configuration of the South Aegean region in the Early Pliocene. Arrows near Rhodes indicate direction of Late Pliocene transgression. The hatched area represents the assumed land mass in the Pliocene.

Cricetidae Rochebrune, 1883

Kowalskia sp.

(Plate 1, Figs. 3, 4, 5 and 6)

Material and measurements: M_1 width 1.23; M_2 length 1.82, width 1.50; M_2 width 1.39; M^1 width 1.39; M^3 length 1.63, width 1.39.

Remarks

The specimens from Karpathos are best classified in *Kowalskia*. The scanty remains do not allow specific determination. The anteroconid of the M_1 is more like that of *K. fahlbuschi* Bachmayer & Wilson, 1970 than that of the central European Pliocene species of the genus. The presence of well developed mesolophs and mesolophids does not fit with the diagnosis of *K. lavocati* Hugueney & Mein, 1965.

Muridae

Apodemus aff. *dominans* Kretzoi, 1959

(Plate 1, Figs. 7 and 8)

Material and measurements: M_2 length 1.43, width 1.27; M_2 width 1.31; M_3 length 0.97, width 0.90; M_3 length 0.98, width 0.93; M^1 width 1.38; M^2 length 1.68, width 1.47.

Remarks

These *Apodemus* specimens are distinctly larger than the

specimens of *Apodemus dominans* Kretzoi, 1959, but smaller than those of *A. jeanteti* Michaux, 1967. *A. dominans* is common in Pliocene deposits of Europe; it has been found in Ptolemais, Macedonia (VAN DE WEERD, 1979) in Tourkoubounia, Athens (DE BRUIJN & VAN DER MEULEN, 1975) and in Maritsa, Rhodes (DE BRUIJN ET AL., 1970). *Apodemus* specimens similar in size and morphology to those from Karpathos have been found in the Pliocene Apolakkia Formation in Rhodes (unpublished collection, Utrecht).

Sciuridae Gray, 1821

Petauristinae gen. et sp. indet.

(Plate 1, Fig. 9)

Material and measurements: one DP^4 , width 3.21.

Remarks

The posterior part of a left DP^4 of a petauristine has been found. It shows a large metaconule and a small metacone. The presence of a species of flying squirrel points to a forest biotope.

Lagomorpha

Prolagus cf. *michauxi* Lopez Martinez, 1974

(Plate 1, Figs. 10, 11)

Material and measurements: P² length 1.27, width 2.15; P₃ length 1.68, width 1.58; and some molars.

Remarks

The P² shows a long hyperloph; this morphotype is not known to occur in associations older than the latest Turolian. The enamel on the precone is thin, interrupted close to the occlusal surface only. In size and morphology the specimens resemble those of *P. michauxi*. This species is known from the Pliocene (Ruscinian) of Spain and France (LOPEZ MARTINEZ, and Greece (Ptolemais: VAN DE WEERD, 1979).

DISCUSSION AND CONCLUSIONS

The presence of *Apodemus* and *Prolagus* cf. *michauxi* suggests a Ruscinian (Pliocene) age for the faunule. The absence of Arvicolidae suggests an early Ruscinian (Early Pliocene) age. The presence of *Muscardinus* and the petauristine (flying squirrel) suggests a wooded biotope for the fauna.

The presence of the five taxa of small mammals in an association of about 20 identifiable teeth shows that the association originates from a diverse fauna. Such faunas are present on large land masses only; insular faunas are characterized by low diversities. We therefore assume that Karpathos was part of a large land mass during the Early Pliocene.

The Aegean region was part of a land mass during the Middle Miocene (DROOGER & MEULENKAMP, 1973; GUERNET, 1978). Middle Miocene marine deposits on the isle of Kos (BIGNOT & GUERNET, 1976) show that the sea invaded the Aegean area most probably through a seaway between Karpathos and Crete. Marine Messinian deposits as far north as the Strimon basin (MEULENKAMP, 1979) show that large parts of the Aegean area were covered by the sea during the latest Miocene. Figure 3 illustrates the palaeogeographic configuration in the Early Pliocene on the basis of evidence from the literature and the data from Karpathos. See MEULENKAMP ET AL. (1979) for data from Kythira; DROOGER & MEULENKAMP (1973) for a summary from Crete; MEULENKAMP ET AL. (1972) for data from Rhodes; and DESIO (1931) for faunal lists from Kos. Arrows indicate the direction of the Late Pliocene transgression near Rhodes (the marine Kritika Formation). Rhodes became isolated from Anatolia during the latest Pliocene-earliest Pleistocene. No data are available to indicate the time when Karpathos became isolated.

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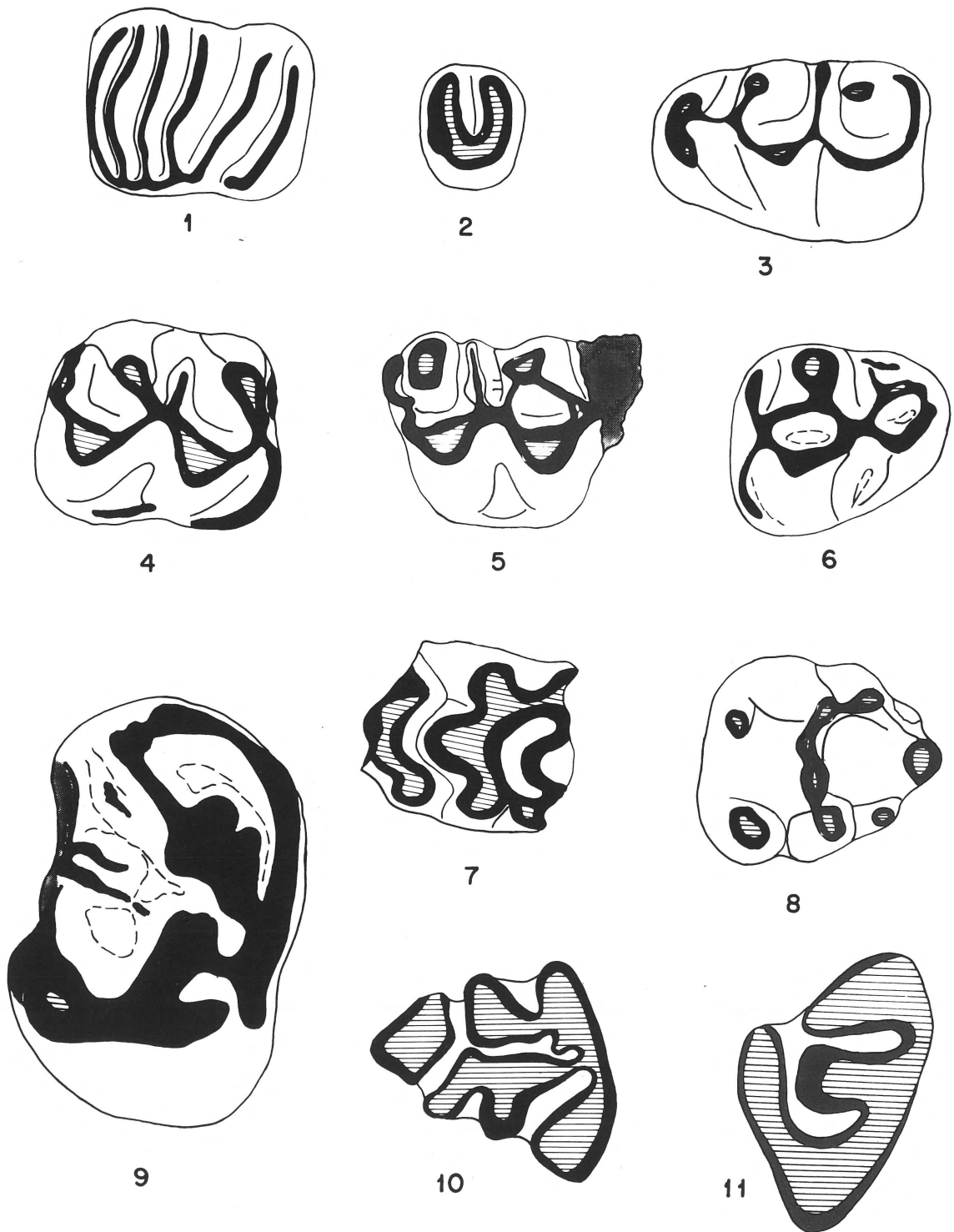


Plate 1

Muscardinus sp.:Fig. 1: M¹ dex.Fig. 2: P⁴ dex.*Kowalskia* sp.:Fig. 3: M₁ sin.Fig. 4: M₂ dex.Fig. 5: M¹ dex.Fig. 6: M³ sin.*Apodemus* aff. *dominans*:Petauristinae gen. et
sp. indet.:*Prolagus* cf. *michauxi*:Fig. 7: M¹ dex.Fig. 8: M² sin.Fig. 9: DP⁴ sin.Fig. 10: P₃ sin.Fig. 11: P² sin.

Enlargements approximately x 20.