Chapter 17
Small Mammals in the Plio/Pleistocene Sediments of Greece

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Abstract Small mammals represent an important source of biostratigraphic and ecological information at Plio/Pleistocene localities. In this paper, we provide an overview of small mammals from Pliocene and Pleistocene sites in Greece, present fossil rodent and insectivore faunal assemblages and their chronology for select loci, and discuss the applicability of Paleomagnetism and Mammal Neogene (MN) zonation for Greek assemblages. Comparisons and contrasts between the faunas of various sites are attempted in order to trace paleoenvironmental and ecotone changes during each period. Small mammal faunas have been studied at only a few archaeological/anthropogenic Pleistocene sites in Greece, and therefore most of the sites mentioned here bear only paleontological information. Our overview, however, demonstrates that small mammals can be an excellent source of supplementary information for the interpretation of archaeological sites.

Keywords Rodents • Insectivores • Dating methods • Paleoecology • Climatic indications

Introduction

The study of fossil small mammal faunas was a late starter in Greece, with the first investigations undertaken as recently as the 1960s. These early studies initially focused on faunas deposited during Oligocene and Miocene up to the Miocene/Pliocene boundary. Later on, Pliocene sediments (e.g. Ptolemais) were also incorporated in the broad faunal sequence of the Neogene. Pleistocene faunas were not studied until the 1970s, beginning with the localities of Tourkobounia near Athens and Megalopolis in Peloponnese. Fossil faunal collections from these sites originated either from karstic fissure fillings in Mesozoic limestone (Tourkobounia) or from lignite open pits (Megalopolis), providing in both cases a sufficient number of well preserved specimens, and thus an adequate source of information toward biostratigraphy and paleoecology. Here, we present the most important Pliocene and Pleistocene small mammal assemblages from the region and discuss their dating and context. We begin with a review of the main dating methods applied to the sites under discussion.

Dating Methods and Small Mammals

Two major groups of dating methods are used in paleontology: those which produce absolute dating and those which provide a relative chronology. In the first group, methods based on the radioactive decay of isotopes, like Ar^{40}/Ar^{40} and Ka^{39}/Ar^{40}, provide absolute dating results. Although they are not absolute dating methods per se, paleomagnetism and cyclostratigraphy can also indicate absolute ages. In terms of relative dating, the most easily applicable method is the use of faunal correlation to distinguish older from younger assemblages, and, therefore, strata. Small mammals are the most frequently used taxa, as they always outnumber large mammals in a faunal assemblage. This is particularly true for the identifiable skeletal elements. Small mammal paleontology is almost uniquely based on teeth, which provide the most accurate identifications. Due to the strong structure of dental enamel, teeth also preserve better than any other part of the skeleton in the fossil record. Furthermore, the distinctive dental morphology of families, genera, and species allows for their straightforward identification.

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Table 17.1 Faunal zones and their relationship to geological epochs, mammal ages, magnetostratigraphy, and absolute ages (after Gibbard and Head 2009; Palombo et al. 2008; Steininger et al. 1996)

Faunal zones (Mammal Neogene)	Geochronology		Mammal ages	Absolute age (Ma)	Magneto-stratigraphy
	Holocene				
MNQ 26	Pleistocene/Quaternary	Late	Aurelian	0.1	Brunhes
MNQ 25		Middle		0.2	
MNQ 24				0.3	
MNQ 23				0.4–0.5	
MNQ 22			Galerian	0.6–0.7	
MNQ 21		Early		0.8–0.9	Matuyama
MNQ 20				1.0–1.4	
MNQ 19			Villanyan	1.5–1.9	
MNQ 18	Pliocene	Late		1.9–2.2	Gauss
MN 17		Middle		2.3–2.5	
MN 16				2.5–3.3	
MN 15		Early	Ruscinian	3.4–5.3	
MN 14					
MN 8–MN 13	Miocene	Late	Turolian	5.3–11.2	
			Vallesian		
MN 5–MN 7		Middle	Aragonian	11.2–17	
			Astaracian		
			Orleanian		
MN 1–MN 5		Early	Ramblian	17–23.8	
			Agelian		

The Mammal Neogene (MN) zonation system (Table 17.1) depends on the above variations in mammalian dentition. In order to obtain a relative chronology, small mammal assemblages are referred to an already dated reference faunal list, created mainly for West and Central Europe (De Bruijn et al. 1992). The MN zonation becomes less accurate when the sites are widely separated geographically from those of the reference fauna, because of the observed regional differences between faunas (e.g. Doukas 2003). Therefore, it is critical for researchers to combine all of the above-mentioned techniques. The site of Ptolemais represents the only case in Greece where all techniques have been applied.

Table 17.2 Pliocene localities mentioned in the text, their abbreviations and dating

Locality name	Abbreviation	Date
Kardia	KRD	MN 14
Spilia 1	SPL 1	MN 14
Karpathos?	KRP	MN 14
Komanos 1 low	KOM 1 L	MN 14
Komanos 1 high	KOM 1H	MN 14
Vorio 1	VOR 1	MN 14
Tomea Eksi 3	TOM6-3	MN 15
Vorio 3/3a	VOR 3/3a	MN 15
Notio 1	NOT 1	MN 15
Vevi	VE	MN 15
Spilia 3+4	SPL 3+4	MN 15
Apolakkia 2	APO	MN 15
Archipolis	ARCH	MN 16a
Kastoria 1	KST 1	MN 16
Tourkovounia 1	TB 1	MN 16
Limni 6	LI	MN 16
Damatria	DAM	MN 16

Pliocene Faunas

The Ptolemais lignite mines (NE Greece), Vevi (NE Greece), and Tourkobounia 1 (Athens) yielded the most important Pliocene faunas with an age ranging from MN14 to MN16. Other sites from different areas of Greece, including localities in the Dodecanese in south eastern Greece (Karpathos, Archipolis, and Damatria) and localities in northern Greece (Kastoria, Limni, and Spilia) (see van der Meulen and van Kolfschoten 1986; Koufos 2001 for maps; Doukas 2005; Makris 2009) are not reviewed here due to the inadequate number of identifiable specimens. All the names and corresponding abbreviations, as well as the dates obtained (or postulated) for these sites are given in Table 17.2. The faunas of all Pliocene sites are listed in Table 17.3.

In Ptolemais, the material comes from several lignite mines. Miocene (MN12, 13) and Pliocene (MN14, 15) fossil

Table 17.3 The small mammals of the Pliocene localities

Pliocene species	KRD	SPL1	KRP?	KOM 1 L	KOM 1H	VOR1	TOM6-3	VOR 3/3a	NOT 1	VE	SPL 3+4	APO	ARCH	KST 1	TK 1	LMN 6	DAM
Talpidae										x							
Archeodesmana sp.										x							
Asoriculus sp.										x							
Blarinella sp.										x							
Tamias sp.				x													
Sciurus anomalus									x						cf.		
Pliopetaurista dehneli					cf.			x									
Castoridae indet.					x			x	x								
Microtodon sp.				x													
M. komanensis				x	x			aff.									
Allocricetusehiki				x	x												
Pliospalax tourkobouniensis															x		
Prospalax priscus									x								
Apodemus sp.														x			
A. dominans							?	?	x					x	x	x	
A. cf. *dominans*																	x
A. cf. *mystacinus*																	
A. atavus				x	x	x	x	x	x								
Rhagapodemus frequens									x					x			
R. athenensis/frequens															x		
R. athenensis																x	
R. primaevus				x	x	x	x	x									
Micromys cf. *praeminutus*																x	
M. bendai						x	x	x									
M. steffensi				x	x												
Mus sp.										x							
Occitanomys adroveri				x	x												
O. brailloni						x		x									
O. magnus									x								
Orientalomys similis															x	x	
?Thallomys sp.																	x
Promimomyscor	x	x	x	x	x	x											

(continued)

Table 17.3 (continued)

Pliocene species	KRD	SPL1	KRP?	KOM 1 L	KOM 1H	VOR1	TOM6-3	VOR 3/3a	NOT 1	VE	SPL 3+4	APO	ARCH	KST 1	TK 1	LMN 6	DAM
Mimomys sp.																	
M. occitanus											x	x		x			
M. cf. *hassiacus/septimanus*															x		
M. gracilis													cf.			cf.	
M. hajnackensis																cf.	cf.
M. davakosi							aff.	x									
Dolomys nehringi									x			x					
Propliomys hungaricus									x								
Pliomys hungaricus														x			
P. graecus															x	x	
Keramidomys sp.														x			
Glissackdillingensis															x		
G. minor				x					x								
Myomimus sp.												x					x
M. roachi																cf.	
M. maritsensis									x								
Dryomimus eliomyoides														cf.	cf.		
Dryomys sp.															x	x	
Eliomys sp.																x	
Hystrix sp.																	x
H. major																	

rodent assemblages have been studied in detail (Doukas 2005; Hordijk and De Bruijn 2009). As can be seen in Table 17.3, MN 14 is represented by different species at different sites; however, the genus *Promimomys* predominates. As the Pliocene advances, it brings about the extinction of *Promimomys* from sites that date to MN 15, 16, and 16a; while the genera *Mimomys*, *Apodemus*, *Keramidomys*, *Rhagapodemus*, *Dryomimomys*, *Pliomys*, *Eliomys*, and *Orientalomys*, among others, become more prevalent. Remarkable in the Vevi assemblage is the first appearance of the genus *Mus*. Unfortunately, this record is based only on one first upper molar (M1), and does not allow more inferences. Absolute dating methods have only been applied at the Ptolemais localities through a high-resolution model, into which the fossil rodent record is integrated. The high-resolution model is based on cyclostratigraphy, paleomagnetism, pollen, and radioactive isotopes (^{39}Ar/^{40}Ar; Steenbrink et al. 1999, 2000; Van Vugt et al. 2001). This model facilitates the dating of other sites that have yielded (or could yield in the future) similar faunal remains, but do not necessarily meet all the requirements necessary for the application of a high-resolution dating model like the one used in Ptolemais.

Pleistocene Faunas

Several localities from mainland Greece, Crete, and the Dodecanese dating to the Pleistocene have yielded small mammal assemblages; their names, the corresponding abbreviations and dates are given in Table 17.4. The related small mammal faunas are listed in Tables 17.5, 17.6, 17.7, and 17.8. Some of these localities are ascribed to a MN, but most of them are dated just as "Pleistocene", or sometimes as Middle or Upper Pleistocene (De Bruijn and van der Meulen 1975; Mayhew 1977a; Koufos 2001). We should also mention two cave sites, Kitsos and Franchthi in the mainland, which were excavated by archaeologists; parts of their stratigraphy were dated to the Pleistocene and yielded small mammal material, also included in Tables 17.4 and 17.7 (Jullien 1973; Chaline 1981; Payne 1973, 1982). These are the only Greek Pleistocene sites published to date that document both archaeological and small mammal assemblages (but see discussion of Megalopolis below).

A comparison between the faunas of mainland Greece and Crete indicates a strong island character of the Cretan small mammal assemblages, which belong to a limited number of endemic genera and species (Table 17.8): *Crocidura zimmermanni*, *Kritimys kiridus*, *K. catreus*, *Mus bateae*, and *M. minotaurus*. Among these, the endemic *C. zimmermanni* is the only Pleistocene relic among the modern Greek fauna. Sporadic appearances are made by *Apodemus*, *Glis*, and *Oryctolagus* among the Cretan assemblages, whereas the

Table 17.4 Pleistocene localities mentioned in the text, their abbreviations and dating

Locality name	Abbreviation	Date
Kalavarda 2	KLV 2	MN 16b
RemaAslan	ASL	MN 17
Kardamena	KRM	MN 17
Gerakarou 1	GER	MNQ 18
Kastoria 2	KST	MN 18
Megalopolis TH 1	THO	MNQ 18
Choremi 1	CHO 1	Middle Pleist
Choremi 2	CHO 2	Middle Pleist
Choremi 3	CHO 3	Middle Pleist
Choremi 4	CHO 4	Middle Pleist
Lagada	LGD	MNQ 18
Pyrgos	PRG	?MNQ18
Marathousa	MAR	MNQ 19
Kaiafas	KAF	MNQ 19
Tourkovounia 2	TB 2	MNQ 19
Kalymnos	KLM	MNQ 19
Alikes	ALK	?MNQ19
Ravin Voulgarakis	RVL	MNQ 20
Apollonia 1	APL	MNQ 20
Zeli 2	ZEL	MNQ 20
Zeli 2A+B	ZLI	MNQ 20
Volos	VOL	MNQ 21
Petralona Cave	PTR	Middle Pleist
Arnissa	ARN	Upper Pleist
Kitsos Cave	KTS	40 kBP
Franchthi Cave	FRN	40 kBP
Sphinari	SPH	Upper Pleist
Cave between Canea-Suda	CCS	Upper Pleist
Stavros micro	SID	Upper Pleist
Stavros macro	SA	Upper Pleist
Stavros cave	SG	Upper Pleist
Akrotiri	AKR	Upper Pleist
Cape Maleka 1	MAL 1	Upper Pleist
Cape Maleka 3	MAL 3	Upper Pleist
Liko	LIP	Upper Pleist
Gerani 2	GE2	Upper Pleist
Sourida	SOU	Upper Pleist
Mavromouri	MAV	Upper Pleist
Simonelli cave	SIM	Upper Pleist
Gumbes B	GUB	Upper Pleist
Rethymnon fissure	RES	Upper Pleist
Skaleta	SKA	Upper Pleist
Bali 1	BA1	Upper Pleist
Bali 2	BA2	Upper Pleist
Milatos 1	MI1	Upper Pleist
Milatos 2	MI2	Upper Pleist
Milatos 3	MI3	Upper Pleist
Milatos 4	MI4	Upper Pleist
Sitia 1	SIT 1	Upper Pleist
Kharoumes A	KHA	Upper Pleist
Kharoumes 4	KH4	Upper Pleist
Kharoumes 5	KH5	Upper Pleist
Xeros	XE	Upper Pleist

Table 17.5 The small mammals of the Pleistocene localities MN16–MN18

Species	*KLV 2*	*ASL*	*KRD*	*GER*	*KST 2*	*MGP*	*LGD*	*PRG*
Apodemus dominans			cf.		x			
A. mystacinus				cf.			cf.	
A. sylvaticus/flavicollis							cf.	
Mimomys sp. *polonicus?*				x				
M. reidi			cf.		cf.			
M. pliocaenicus		x			x			
M. pitymyoides					x			
M. newtoni					x			
M. ostramosensis							x	
Jordanomys majori							cf.	x
Myomimus sp.			x					
M. roachi					x		x	
Hystrix major				x				
Pliomys episcopalis					x			
Borsodia sp.				cf.				
Clethrionomys sp.					x			
Kislangia rex						x		

Table 17.6 The small mammals of the Pleistocene localities MN19–MN 21

Species	*MAR*	*KAF*	*TB 2*	*KLM*	*ALK*	*RVL*	*APL*	*ZEL*	*ZLI*	*VOL*
Erinaceus sp.			x							
E. europaeus							x			
E. praeglacialis			x							
Talpa sp.						x				
Desmaninae indet	x									
Crocidura sp.			x							
C. kornfeldi	x		x			x				
Sorex minutus	x					cf.				
S. (Drepanosorex) praearaneus	x					x				
Asoriculus gibberodon	x		x							
A. castellarini						cf.				
Neomys fodiens/anomalus			x							
Beremendia fissidens	x		x			x				
Sciurus sp.		x	cf. anomalus	x						
Spermophilus sp.	x									
S. nogaici						x				
Cricetinus koufosi	x					x				
Cricetulus migratorius		cf.	x							x
Pliospalax senii						x				
S. nehringi				x						
Apodemus mystacinus		x	x			x		x	x	x
A.sylvaticus/flavicollis	x	x		x				x	x	x
A. sylvaticus						x				
A. flavicollis			cf.							
Mimomys sp.	x				x					
M. savini		x				x		x	x	
Micromys minutus									cf.	
Mus aegeaus				x						
Meriones tristrami				x						
Jordanomys majori		x		x						

(continued)

Table 17.6 (continued)

Species	*MAR*	*KAF*	*TB 2*	*KLM*	*ALK*	*RVL*	*APL*	*ZEL*	*ZLI*	*VOL*
Kalymnomys majori			x							
Sicista subtilis	cf.					x				
Myomimus sp.						x				
M. roachi			x	x						
Glis sp.		x	x							
G. sackdillingensis		x								
G. glis						aff.				
Eliomys quercinus			x							
Lagurodon sp.									x	
L. arankae	x	cf.		cf.		x	x	x		
Hystrix refossa				x						
Pliomys episcopalis		x							x	
Kislangia sp.						x				
Microtus sp.				x				x	x	
M. (Allophaiomys) rufoi		cf.								
M. pitymyoides						x				
M. arvalidens										x
M. (Tibericola) eleniae			x							
Lagurus pannonicus										x
L. arankae			x							
Leporidae						x	x			
Oryctolagus lacosti				x						

Table 17.7 The small mammals of the Middle and Upper Pleistocene

Species	*CHO 1*	*CHO 2*	*CHO 3*	*CHO 4*	*PTR*	*ARN*	*KTS*	*FRN*
Erinaceus europaeus/praeglacialis					cf.			
Soricidae	x			x				
Crocidura leucodon						x		
C. russula						x		
Sorex minutus						x		
S. araneus						x		
S. runtonensis					cf.			
Rhinolophus sp.					x			
R. ferrumequinum topali					x			
Myotis sp. I–II					x			
M. blythi oxygnathus					x			
Pipistrellus sp.					x			
Sciurus vulgaris			cf.					
Spermophilus citellus						x	x?	
Castor fiber		x	x					
Cricetulus sp.								x
C. migratorius						x		
Mesocricetus newtoni						x		
Allocricetus bursae simplex					x			
Spalax sp.								x
S. chalkidikae					x			
S. microphthalmus						x		
Apodemus sp.				x		x		

(continued)

Table 17.7 (continued)

Species	*CHO 1*	*CHO 2*	*CHO 3*	*CHO 4*	*PTR*	*ARN*	*KTS*	*FRN*
A. mystacinus					crescendus	x		cf.
A.sylvaticus/flavicollis								x
A. sylvaticus			cf.					
Mimomys sp.		x		x				
M. savini	aff.	aff.	aff.	aff.				
Muridae gen. et. sp. indet.			x					
Mus sp.			x					x
M. spretus				cf.				
Sicista subtilis						x		
Parasminthus brevidens					x			
Dryomys nitedula						x		
Gliridae					x			
Pliomys episcopalis			aff.					
Clethrionomys glareolus						x		
Microtus sp.						x		
Microtus (Pitymys) sp.						x		
M. arvalis						x		
M. cf. *arvalis/socialis*								x
M. guentheri						x		
M. (Chionomys) nivalis						x		x
M. (Pallasiinus) praeguentheri					x			
Pitymys sp.								x
Arvicola sp.					x			
A. cantiana/terrestris						x		
Lagurus lagurus						x		
Lepus sp.						x		
L. ?terraerubrae Kretzoi					x			
Oryctolagus sp.					x			
Ochotona pusilla						x		

Rattus sp. should be considered as intrusive, and not of Pleistocene origin (Mayhew 1977b; Reumer 1986).

On mainland Greece, the localities that provide sufficient material for comparisons and statistical analyses are Tourkobounia 2 (TB 2), Megalopolis (MGP), and Arnissa (ARN) (Tables 17.5, 17.6, and 17.7). The remaining sites in Table 17.4, while certainly interesting, did not provide enough specimens for comparative analyses (De Bruijn and van der Meulen 1975; Mayhew 1977a; van der Meulen and Doukas 2001). Tourkobounia 2 dates to the Early Pleistocene, and its assemblage must have been deposited during an interglacial period, as reflected by the dominance of the Muridae family (van der Meulen and Doukas 2001). Arnissa dates to the Late Pleistocene. It contains extant species that still survive in the modern Greek fauna (Mayhew 1977a). These extant species correspond to a steppe/open vegetation, as well as a rocky environment; which, in terms of dating, conforms to glacial conditions in Northern Europe (Mayhew 1977a). Relics of glacial fauna are found within the Arnissa assemblage (*Lagurus lagurus*, *Ochotona pusilla*, *Mesocricetus newtoni*, and *Sicista subtilis*); these species become extinct in Greece after the Pleistocene. This succession and gradual replacement of species marks the advent of the Holocene with different climatic and vegetation conditions.

Among these sites, Megalopolis stands out because its complex fossil record comprises both large and small mammals, as well as evidence of human presence. Mammal faunas that were collected from four levels of the entire Megalopolis basin indicate a Middle Pleistocene age (Sickenberg 1975; Fejfar and Heinrich 1979). Faunal remains from the whole Megalopolis basin were described by Sickenberg (1975) who identified 11 species of large mammals: carnivores, proboscideans, hippopotami, four different cervids, a water buffalo, a horse, and a rhinoceros. A remarkable specimen in the fossil assemblage from the Marathousa Member is an upper third molar (M3) of a hominin (Sickenberg 1975; Marinos 1975; Xirotiris et al. 1979; Harvati 2016). More recently, human presence in the Megalopolis basin has been further attested to by the discovery

Table 17.8 The small mammals of the Cretan Upper Pleistocene localities

	SPH	*CCS*	*SID*	*SA*	*SG*	*AKR*	*MAL 1*	*MAL 3*	*LIP*	*GE2*	*SOU*	*MAV*	*SIM*	*GUB*	*RES*	*SKA*	*BA1*	*BA2*	*MI1*	*MI2*	*MI3*	*MI4*	*KHA*	*KH4*	*KH5*	*XE*	*SIT1*
Soricidae							x		x																		
Crocidura zimmermanni			x	x											x			x		x		x	x		x		
Apodemus sp.																											x
Mus bateae			x			x																					
M. minotaurus		x							x	x	x	x	x	x	x	x				x	x	x					
Kritimys sp.																											x
K. kiridus							x	x									x										aff.
K. catreus	x		x	x	x												x	x	x		x		x	x	x	x	
Rattus sp.										x																	
Chiroptera									x																x		
Gliridae			x																								
Myoxus sp.			cf.																								
Oryctolagus sp.										x																	

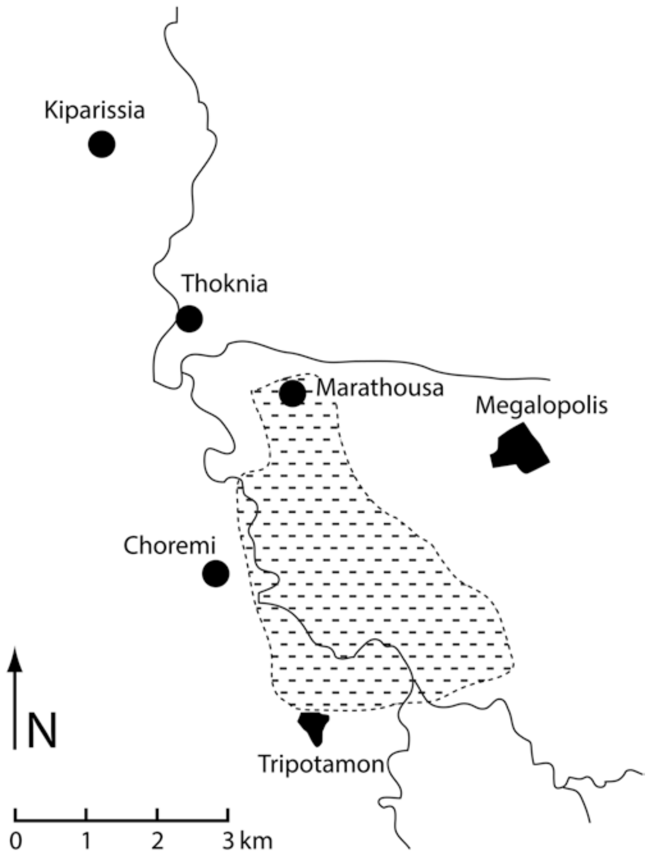

Fig. 17.1 The Megalopolis lignite mine map with localities mentioned in the text

of a new Lower Paleolithic archaeological site, Marathousa 1, in the Megalopolis lignite mine (Fig. 17.1) (Panagopoulou et al. 2015; see also Harvati 2016; Tourloukis 2016).

Sickenberg's (1975) assessment of the stratigraphic position of the Marathousa Member was later modified by Benda et al. (1987), who, using small mammals as their baseline, proposed a late Villanyian age for the lower lignite bed exposed in the Thoknia open cast lignite mine (Table 17.7). There have been multiple successive campaigns in the mines of Thoknia (TH 1–4) and Choremiou (CHO 1–4), which were conducted in the basin of Megalopolis between 1980 and 1995. Their goal was to provide a clearer stratigraphic correlation between these localities. According to Van Vugt (2000) and Van Vugt et al. (2001), the Megalopolis section is dated to the Middle Pleistocene on the basis of small mammal paleontology, and to the lower Brunhes based on magnetostratigraphy. The astronomical tuning of the lignite gives ages of ~900 ka for the base of the section and ~350 ka for the top (Van Vugt 2000). Since we know of no other available magnetostratigraphic data from Pleistocene sediments in Greece, the Megalopolis sequence can offer only faunal grounds for comparisons with other sites. However, based on such comparisons, the Megalopolis magnetostratigraphic dates can be used to date sites with similar faunal remains.

Comparison Between Pliocene and Pleistocene Faunas

There are important differences in small mammal faunal structure between the Pliocene and the Pleistocene in Greece. The Pliocene, especially when compared with the Miocene, is more uniform in composition (Hordijk and De Bruijn 2009). The advent of the Pliocene (MN14) is characterized by the immigration of arvicoline voles (Arvicolinae), which represent a new biostratigraphic tool in addition to the already existing ones (e.g. Murids); the distinction between MN 14 and MN 15 is based only on arvicolines. In the Pleistocene, the dominance of arvicolines varies. There are instances (e.g. Kalymnos, Varkiza) where *Apodemus mystacinus* is dominant. An exception to this is the Arnissa fauna, where *Microtus* predominates (van der Meulen and Doukas 2001).

Evaluation of the Small Mammal Studies

Fossil small mammals provide valuable stratigraphic and ecological information. Various groups of rodents and insectivores have proven to be important stratigraphic and ecological markers, with insectivores being especially important as paleoclimatic indicators (Reumer and Doukas 1985). Arvicolines can be extremely useful in providing dating information for Pleistocene sites (Koenigswald et al. 1992). Murids, represented here by the extant genera *Apodemus* and *Mus*, are used as both stratigraphic and ecologic indicators (Weerd 1976).

When compared with Central and Western Europe, the Eastern Mediterranean faunas show low biodiversity during the Pleistocene, which could have been caused by either low temperatures or aridity. The phenomenon of the Asian Summer Monsoon may be one of the reasons for aridity in the Eastern Mediterranean (Reumer et al. 2002). During the Asian Summer Monsoon, hot humid air rises over South Asia; this heat moves westward through a wave pattern, causing dry air to descend on the Eastern Mediterranean (Reumer et al. 2002). As a result, extremely dry weather conditions occur at a seasonal level (July–August), limiting the availability of food and water resources on which the small mammals rely for their survival.

Final Remarks

There are evident differences in faunal structure between the Pliocene and Pleistocene. The Pleistocene locality of Megalopolis, given the presence of a hominine M3 and Lower Paleolithic archaeological remains, should be further investigated.

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