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Early island archaeology and the extinction of endemic fauna in the eastern Mediterranean: problems of interpretation and methodology

Fanis Mavridis

INTRODUCTION

The evidence from the eastern Mediterranean remains controversial concerning the temporal association of extinct endemic fauna with artefacts. In the eastern Mediterranean the problem of human involvement in faunal extinctions lies not only in understanding the complex processes involved in the extinction of the endemic fauna but also in investigating the character and date of the early human presence on these islands. In this paper I will present a synthesis of the present state of research in the eastern Mediterranean together with an evaluation of recent evidence. Since many questions still remain unanswered, I argue that there is a need for an intensification of specialised research combined with the use of modern techniques and analytical procedures in both the archaeological and palaeontological record in order to understand the relevant issues. Research in other regions, and especially in the western Mediterranean, has conclusively demonstrated human involvement not only in the extinction of at least some of the endemic island species but also the ability to colonise insular environments at an early date.

ISLAND ENDEMICS IN THE EASTERN MEDITERRANEAN

Island faunas are unbalanced. This is because they are restricted to a few mammalian species, reptiles, amphibians and birds (Sondaar 1977; 1986; Davis 1985). Animals in island contexts have usually undergone significant morphological changes (see for example Sondaar 1993–4; de Vos 1996; Caloi and Palombo 1996). Pleistocene faunas are known from several eastern Mediterranean islands (Sondaar 1971; Dermitzakis and Sondaar 1979; Sondaar *et al.* 1996). Cervids, elephants, hippos, murids, shrews, birds and reptiles have been reported from Crete, while carnivores, with the exception of otters and possibly mustelins, are lacking (Dermitzakis and de Vos 1984–5; 1987; Lax and Strasser 1992). From other Aegean islands Late Pleistocene species have also been reported. However these mostly come from localities which have not been systematically excavated. Pygmy elephants are known from

Rhodes, Telos, Naxos, Seriphos, Delos, Astypalaia, Kythera as well as other islands. Cervids are reported from Karpathos and Kasos (Marinos and Symeonidis 1976; Kotsakis *et al.* 1976) while some bones also attributed to deer have also been found on Kalymnos and Imbros (Dermitzakis and Sondaar 1979). Small sized deer and micro-mammals are also known from Amorgos in the central Aegean. Moreover, the islands of Seriphos and Melos in the Cyclades preserve fossiliferous Late Pleistocene deposits, a period during which they were already most probably both islands (Dermitzakis and Sondaar 1979, 825–7) (FIG. 6.1). Pygmy hippos and dwarf elephants have also been identified from Cyprus while shrews were possibly present as well as a small carnivore, the genet, and murid remains (see review in Held 1992, 112; Reese 1995) (FIG. 6.2).

In other cases, for example Kythera, the distance from the mainland did not permit the development of endemic forms, while the connection during lower sea-levels in the Upper Pleistocene of the island of Thasos to the mainland explains the balanced fauna present there. In general, the date of all these fossils is rarely certain and in the absence of absolute dates, a Middle or Late Pleistocene date is usually proposed. Several aspects, such as the time of arrival, the rate and timing of species evolution, cannot be established with certainty (Lax and Strasser 1992, 208). Relative chronologies come from the few stratigraphic excavations available (see papers in Reese 1996). As regards absolute dates, those published from Charkadio (Symeonidis *et al.* 1973; Bachmayer *et al.* 1976; 1984) as well as the date of an elephant tusk from Kythnos (Honea 1975; Cherry 1979), either need to be confirmed or corrected by new ones, especially when comparisons with Crete are made. Such confirmation is important, because, for example, the ^{14}C date on a hippo bone from the Katharo basin in Crete gave a date of $12,135 \pm 485$ BP which is now seen as unreliable on the basis of much older estimates from both ESR (electron spin-resonance) (846,000–475,000 BP) and AAR (amino-acid racemisation) (738,000–378,000 BP) techniques (see Reese *et al.* 1996, 47). For Cyprus, the time of the extinction of at least some of the Late Pleistocene species is documented by a series of ^{14}C dates from Aetokremnos, which points towards

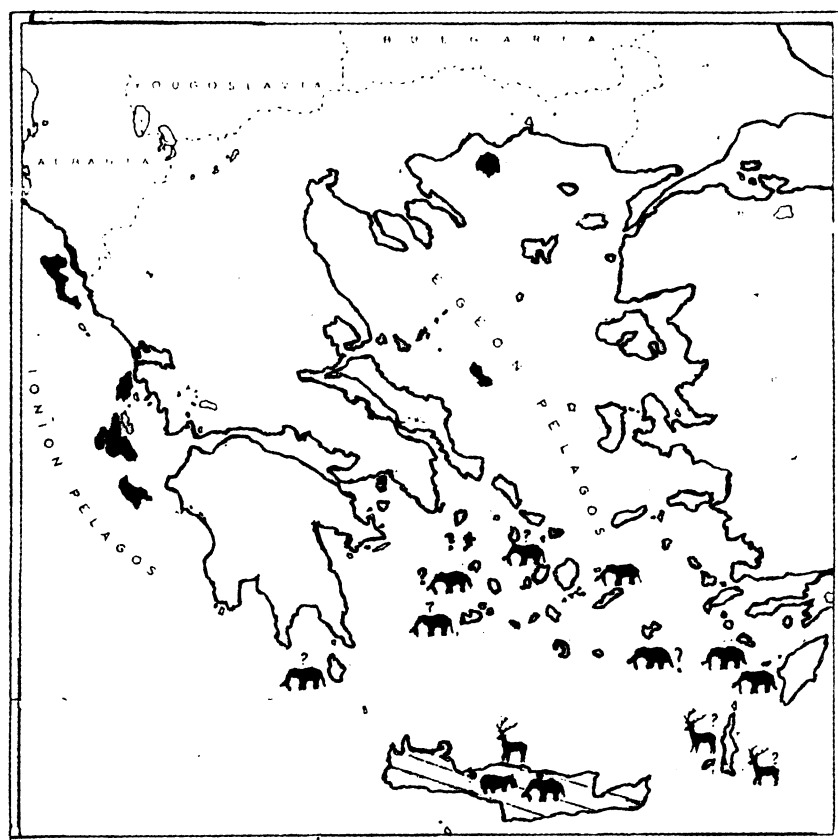
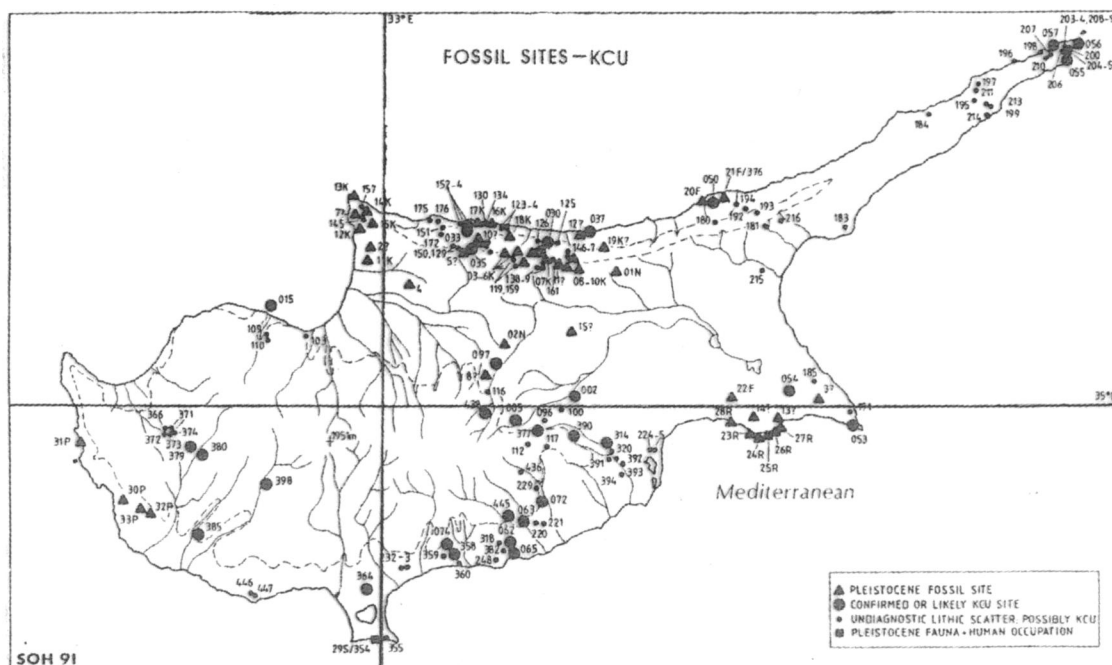


Fig. 6.1 (left) Elephants, hippopotamuses and cervidae from the Aegean and islands with possible or definite pre-Neolithic and Aceramic/Early Neolithic (Sporadhes, Crete) occupation.

Fig. 6.2 (below). Fossil localities and Aceramic Neolithic sites on the island of Cyprus.



the 11th millennium cal. BP (Simmons 1999, 208–9, 213–14). Clearly, there is important evidence from Cyprus not only for the earliest human occupation but also for the survival of some of the endemic species during the Early Holocene (for a discussion of the evidence see Simmons 1996; Reese 1996; Vigne 1996; Bunimovitz and Barkai 1996; Olsen 1999; Grayson 2000).

THE EVIDENCE FROM PALAEOANTHROPOLOGICAL LOCALITIES AND ARCHAEOLOGICAL SITES

The information available from most excavated palaeontological localities provides no evidence concerning a pattern of anatomical representation which might imply human involvement in the formation of such as-

semblages (Hamilakis 1996, 232). Moreover, such detailed studies are rare despite the numerous excavations already published (but see Rose 1996; Hamilakis 1996). Excavations at several cave sites in Crete such as Sentoni Cave (Hamilakis 1996, 236; 1998, 93), Gerani Cave III (Jarman 1996, 216) and Simonelli Cave (Malatesta 1980; Hamilakis 1996; Lax 1996) do not support a stratigraphic association of the Late Pleistocene fauna and prehistoric human remains. The preservation status and anatomical representation of the bone assemblages (Jarman 1996) as well as the absolute dates available (Reese *et al.* 1996) lead to the same conclusion. In the case of Gerani Cave II (Dermitzakis and Sondaar 1979, 817; Dermitzakis and de Vos 1987), most palaeontologists support the view that the extinction of *Candiacervus* was by Neolithic people, while the presence of *Mus minotaurus* bones in Holocene deposits needs further confirmation (Dermitzakis and de Vos 1987, 403; Lax and Strasser, 1992, 216; Strasser and Lax 1993). The indications are stronger that some of the smaller mammals could have survived into the Holocene. This may be explained by their size and smaller home range in micro-habitats barred to larger forms (Guilday 1967, 124). Therefore, remains of beech marten (*Martes foina*) and badger (*Meles* sp.) from Gerani Cave II, Mavromouri Caves I and VII as well as from the upper layers of Lico Cave, are generally considered to be Holocene and probably introduced by humans to the island of Crete (Steensma and Reese 1996, 159). However, bones of these species from Simonelli Cave are considered as Late Pleistocene (Caloi 1980; Steensma and Reese 1996, 164). Marten and murid remains are also known from Neolithic Knossos (Jarman 1996, 217). It seems that shrews and possibly mustelids are some of the few mammalian species that survived until the present (Reumer 1996, 173). In Cyprus, traces of gigantism in the Khirokitia murids may be related to a large endemic rodent living on the island in the Pleistocene (Held 1992, 113), but more evidence is needed from new excavations. Several micro-mammal remains such as murid mice and shrews have also been found (Davis 1984; 1989; Croft 1989), but it is not always possible to identify them to species (Davis 1989, 194). Therefore, the comparison of Late Pleistocene and Holocene species is not straightforward. This indicates that the picture we have concerning the Late Pleistocene species that survived into the Holocene as well as the species that were introduced by man is not always clear. In general, some of the smaller species identified in Early Neolithic sites are not present in the Late Pleistocene record of islands such as Crete. It is not evident whether the absence of some species from the palaeontological record is due to their introduction by the first settlers or, in relation to the archaeological sites, because of their rarity or lack of association with humans (Jarman 1996, 219).

The lack of faunal remains belonging to rodents, amphibians, reptiles, and insectivores may be partly the

result of inadequate recovery techniques. By contrast the importance of birds for the economy of early settlers, as indicated by the sites of Aetokremnos on Cyprus and Youra in the NE Aegean, is significant. Relevant work in the Pacific and West Indies points to a massive loss of birds and reptiles because of human colonisation (Olson and Jones 1984; Steadman and Olsen 1985). However, Held (1992, 126), states that 'while colonisation rates of avian and reptilian taxa since the Pleistocene cannot be inferred from the palaeontological and archaeological records, the persistence of many Pleistocene taxa on sampled Mediterranean islands suggests that extinction rates remained low during prehistory'. During the Neolithic, the domesticated animals as well as some wild species (e.g. shrews, martens, mice, hare, deer, badger), which were absent from the Late Pleistocene record, were brought to the islands (Groves 1989, 46). What is evident from the few systematically excavated and published sites is that where EN sites are known, a clear faunal replacement is indicated. This is dominated by the domesticates and the commensals of the early sedentary societies (Croft 1989; Held 1992, 112; Jarman 1996, 221). Only the identification of microfauna in new excavations will help clarify the issue. The question of the extinction of larger animals is even more complicated for most of the eastern Mediterranean islands and has not been satisfactorily resolved, especially in light of the excavations at Aetokremnos. It is of importance to mention that besides Aetokremnos, other localities from Cyprus provide evidence of burned bones or cultural remains associated with bones of extinct fauna (Reese 1995, 139; Simmons 1999, 25). Additionally, and despite the absence of intensive excavations, AAR and ESR dates indicate that several localities were broadly contemporary with Aetokremnos (Reese 1995; 1996). This evidence suggests that Phanourios populations could have been larger and more widely spread on the island (Simmons 1999, 214).

In the Aegean, the co-occurrence of Neolithic people and Late Pleistocene fauna has been reported from the Cave of Charkadio on the island of Telos (Symeonidis 1972; Symeonidis *et al.* 1973; Theodorou 1983; Bachmayer *et al.* 1984). The excavators claim that there is a stratigraphic correlation between the pygmy elephants and the cultural remains and furthermore that some bones were modified by humans (Bachmayer and Symeonidis 1974). However, Doumas (1976, 139–41), who made a small scale trial excavation, identified a 50 cm thick and rather disturbed upper layer which contained pottery dated from the Neolithic to post-Byzantine times. The Neolithic pottery under study (Mavridis in prep.) indicates a rather late date, at a transitional phase to the EBA. The excavators accept that there are inadequate data for the factors of extinction (Theodorou 1988, 187), while at the same time claiming evidence exists which contradicts the identification of the site as a natural deposit (Theodorou and Symeonidis 1994,

261). At Charkadio there is clearly a need for more information to be published concerning stratigraphic, sedimentological and taphonomic data and the application of an appropriate analytical framework in relation to the structure of the bone assemblage and the cultural remains identified. There is still no clear indication that an association of Late Pleistocene species and prehistoric man existed at Charkadio. While the date of the cultural remains can be securely traced on the basis of typological affinities, the date of the last surviving endemic animals on the island is uncertain. However, if the human cause of the extinction of Late Pleistocene fauna is confirmed by further analysis of the recovered material, it will be the latest attested presence of large herbivores in the Mediterranean associated with a Final Neolithic occupation. The locality of Armathia on the island of Kasos gives some additional information about the survival of Late Pleistocene species into the Holocene (cf. Masseti, this volume).

The Aetokremnos excavations showed that the extinction event was a complex process and natural variables as well as local factors are important for the consideration of such events (Simmons 1999, 333). It is unknown whether extinction was a generalised phenomenon (note for example the absence of such evidence from Crete) or if either Cyprus or Telos served as refugia for several Late Pleistocene species just as Wrangel island served as one for the last woolly mammoths (Martin and Steadman 1999, 42).

Of relevance to this discussion are the models proposed for explaining the processes of extinction: the Blitzkrieg model proposed by Martin (1984) was also used to explain the Late Pleistocene/Early Holocene extinctions on some of the islands but has proved not to be applicable in all cases. Not all extinctions were rapid. Moreover, several species co-existed with human occupation on the islands during the Holocene and only became extinct after hundreds of years. In this case, another model, the so called Sietzkrieg (Diamond 1989), or low attrition model (Simmons 1999, 325), may also be appropriate for the long term co-existence of humans and endemic species as for instance in Mallorca (Burleigh and Clutton-Brock 1980; Waldren 1991; 1994). In the eastern Mediterranean the only secure evidence comes from Aetokremnos where the overall picture indicates that the process was a rapid one (Simmons 1999, 333).

For Crete, the evidence from both palaeontological and archaeological localities is controversial. The extinction event has been explained as the indirect result of the human permanent occupation, which involved the introduction of several species and the clearance of the land (Lax and Strasser 1992; Strasser and Lax 1993; Reumer 1996; Dermitzakis and de Vos 1985). However, the AAR and ESR dates available (Reese *et al.* 1996) do not confirm the possibility of the co-existence of man and Late Pleistocene animals, even if the possibility is accepted of earlier visits to Crete before the well-at-

tested Neolithic occupation (Cherry 1990; Broodbank and Strasser 1991). Therefore in the Aegean, the dates and causes of the extinction of minor species and large mammals need further clarification by future excavations. In other regions of the world the rather late date for human colonisation combined with intensive research has yielded important clues for the understanding of the extinction of endemic species. Such cases are the islands of Madagascar, Hawaii and New Zealand (Diamond 1989, 787; MacPhee and Burney 1991; Anderson 1989; 1995). In the western Mediterranean, several cave sites on Mallorca indicate the human predation of *Myotragus* perhaps as early as 8570 ± 350 BP (UCLA 1704) or even earlier. In that case, *Myotragus* did not disappear from the record until the introduction of the domesticated animals at about 4650 ± 120 BP (QL-988) (Cherry 1992). In Sardinia sites dated to the late 8th–early 7th millennium BP preserve evidence of introduced domesticates as well as elements of the Pleistocene fauna which survived until that date. Furthermore, on Corsica there is an absence of large wild game in the Neolithic levels but an indication of hunting of *Prolagus* (Cherry 1990; Vigne 1987; 1996). Apart from the evidence from Holocene sites and despite the difficulty in identifying early hunter-gatherer sites on the Mediterranean islands, in other places of the world very early maritime expansion is indicated testifying in some cases the human involvement in the extinction of island endemics (Sondaar 1987; Sondaar *et al.* 1993/94; Morewood *et al.* 1999, 284).

THE COLONISATION OF THE EASTERN MEDITERRANEAN ISLANDS BY HUMANS

The recent research on the eastern Mediterranean islands has produced new, important evidence for the earliest phases of occupation at either a pre- or proto-Neolithic level (Guillaine and Briois 2001; Peltenburg *et al.* 2001; Todd 2001). On the island of Cyprus, the Aceramic Neolithic proved to be more complex than originally thought. Specialised sites of different character were excavated (Simmons 1998 *a, b*). The Aceramic Neolithic site of Shillourokambos, dated one millennium earlier than the Khirokitia phase, provided evidence of the earlier cattle on the island (Guillaine *et al.* 1995; 2000). As the possibility of the extinction of several species before the Neolithic occupation cannot be ruled out, the cultural and economic aspects of a possible earlier occupation is an important field of research in the eastern Mediterranean. The implications of such an early occupation for the extinction of island endemics is very important, especially after the excavations at Aetokremnos (Hadjisterkotis *et al.* 2000; Reese 2001; Simmons 2001). The archaeological record from the Aegean islands and Crete is still ambiguous in relation to the human presence, not only in a pre- or proto-Neolithic stage, but also during the Early or even Middle Neolithic (Cherry 1981; 1990; Broodbank 1999).

However, there is growing evidence which could support a pre- or proto-Neolithic cultural stage, not only on Cyprus and but also on some of the Aegean islands, an issue further associated with the beginning of agriculture in both areas. In general, early island sites, particularly those from the western Mediterranean, share common characteristics. They are mainly rock shelters. Their material culture is usually idiosyncratic with no clear parallels with mainland cultures, and burials are only occasionally found. Subsistence activities are characterised by the exploitation of marine resources and the hunting of endemic species and sometimes of birds. Such evidence comes from Corsica (Vigne and Desse-Berset 1995; Vigne 1996), Sardinia (Sondaar *et al.* 1986; Hofmejer and Sondaar 1992; Hofmejer 1997; Sondaar 1987; Vigne 1987; 1996; Cherry 1990; 1992), and Mallorca (Waldren 1991; 1994; Alcover 1991) as well as from islands in the Adriatic (Bass 1998, 165). Most of these early sites are characterised as Mesolithic (Vigne and Desse-Berset 1995). For the Palaeolithic, traces of occupation are generally uncertain although it seems that seafaring was practised at this time (Held 1989; Cherry 1990; Schule 2000). Elsewhere, there is abundant evidence for the pre-Neolithic use of seagoing craft from areas such as the southern Asia where hunter-gatherers reached Australia at least 40,000 years ago (Groube *et al.* 1988) and the Melanesian islands in the Late Pleistocene or even earlier (Allen *et al.* 1988).

According to the evidence available from recent excavations, it seems that the presence of a sedentary way of life could also have been a possibility at this early stage in the eastern Mediterranean. This could have involved subsistence activities based on hunting, gathering and fishing in addition to husbandry. Based on this evidence, models of island colonisation which support the human presence on the Aegean islands only from the Late Neolithic or even later (Cherry 1981; 1990) cannot be easily applied. The Cave of Youra in northern Sporadhes, is a very good example of this conclusion (see below). Recent research provides several indications of Late Pleistocene–Early Holocene sites in the Ionian and the Aegean islands. Unfortunately, most of them are known only from surface finds and no further information about the character of occupation or the subsistence activities practiced by the inhabitants, is currently available.

In this respect the evidence of Palaeolithic occupation on the Ionian islands is very important if one takes into consideration the fact that Zakynthos and Kephallonia were connected but not with mainland Greece at the time of the Last Glacial Maximum 18,000 years ago (van Andel and Shackleton 1982). Most of the sites known from these and other islands of the area, are dated on artifactual evidence, to the Early and Middle Palaeolithic (Kourtessi-Philippaki 1996; 1999; Dousougli 1999). Late Palaeolithic finds have also been reported (Sordinas 1983), but the evidence is still uncertain. However, the Middle Pleistocene finds from

Kephallonia, which was an island throughout the Pleistocene, are regarded as an exception to the proposed models for late colonisation of most of the Mediterranean islands (Cherry 1992, 33). As far as the Aegean islands are concerned, a Late Palaeolithic site has been excavated on the island of Thasos in the N Aegean where mines for the extraction of ochre were identified (Koukouli-Chrysanthaki 1996, 86). The mines could have also been in use during the Mesolithic, Neolithic or even later but there is currently insufficient evidence (Koukouli-Chrysanthaki and Weissgerber 1999, 136). The presence of the antelope *Saiga tatarica*, which became extinct towards the end of the Pleistocene, represents a *terminus ante quem* for the dating of the site. The other species identified are characteristic of a balanced fauna indicating that a land bridge connected the island with the mainland. Moreover, recent surveys on the island of Alonnesos in the NW Aegean by the Ephorate of Palaeoanthropology-Speleology, identified Middle Palaeolithic and Mesolithic sites. According to the researchers (Panagopoulou and Kotjabopoulou pers. comm.), the geological reconstruction of the area does not rule out the possibility that very narrow stretches of water could have been crossed at an early date. These sites can be added to others known from the area (Sampson 1996a, b, c). Unfortunately, these sites either because of their character, such as the Palaeolithic ochre mine on Thasos, or due to methods of field research, such as survey rather than excavation, do not relate directly to questions of animal exploitation patterns.

The systematic excavations at the Cave of Cyclope on the island of Youra in northern Sporadhes, gave the most important new evidence for a pre- or proto-Neolithic occupation of the Aegean islands (Sampson 1996a, b, c; 1998). There is also clear evidence relating to the character and economic status of the inhabitants of the cave. In particular, the thick layers excavated contained thousands of fish bones, marine molluscs and land snails as well as an important component of bird remains (Sampson 1996a, b, c). A female skull was present in this level. The lithic material is typically Mesolithic and obsidian artefacts were present in the Upper Mesolithic layers (Sampson 1998), confirming the evidence of early seafaring in the Aegean identified at Franchthi Cave in the Argolid (Perlès 1979). It is therefore indicated that the presence of exchange systems and navigation was widespread in the Aegean at this early date. The antiquity of these Mesolithic levels at Youra is confirmed by a series of radiocarbon calibrated dates which range from about 8500 to 6500 BC, but more are yet to come from the deepest horizons (Sampson 1998, 11). However, the most important evidence comes from the study of animal bones, which confirm that domesticated animals, probably pigs, were present on the island (Trantalidou in press). These bones are present from the deepest Mesolithic levels of the site (Sampson pers. comm.). This evidence of domesticated animals in association with Mesolithic oc-

cupation does not only characterise the cave site on the islet of Youra. Bones of domesticated animals come from another Mesolithic site, the Theopetra Cave in Thessaly (Rowley-Conwy and Newton 2000; Newton and Rowley-Conwy in press; Kyparissi-Apostolika pers. comm.). Moreover, the excavations at the site of Grava on the island of Corfu, identified a Late Palaeolithic/Mesolithic occupation where, according to the excavator 'a wild goat economy showing a tendency of domestication' was present (Sordinas 1996, 76). This evidence from the Aegean is neither unique nor exceptional. Very early stages of domestication have been reported from the Near East (Hayden 1990, 45), as well as from Anatolia (Vigne *et al.* 1999; Roodenberg 1998) and the Balkans (see papers in Bonsall 1985).

DISCUSSION

The evidence from the excavations at Youra is very important since it provides an answer to the question of how such remote islands could have been exploited and colonised at this early date. Here an early phase of human presence on a relatively remote and small Aegean island is indicated. This occurred at a time when some kind of sedentary economy was practiced, as indicated by the presence of domesticated species, although fishing, bird hunting and shell collecting imply a mixed economy. The site of Aetokremnos on Cyprus has several parallels to the pre-Neolithic culture of the Middle East as well as to the Aceramic Neolithic of Cyprus and could represent another model of island exploitation, since endemic species were hunted even though these had low rates of reproduction. The presence of a few bones that might belong to introduced species has been explained in a different way (Simmons 1999, 332), but the possibility that they were deliberately introduced is regarded as possible. The presence of Late Pleistocene species does not exclude a similar occupation to that found at Youra or the other Mediterranean islands. However, at present the available data are inconclusive. It has to be added whether different cultural traditions, environmental variables or other aspects related to the early island societies in the Mediterranean played a role. Therefore more information is necessary before any secure interpretation of the evidence is possible.

It is important here to note that a distinction between colonisation and short visits is necessary (Cherry 1990, 198). While several important aspects, such as seasonality studies, are not yet available we do know from the evidence at Youra that the model of occasional visits to the island is not supported. This evidence includes a burial, the presence of domesticates, extensive exploitation of local resources and thick occupational layers. Several models proposed for the process and date of the colonisation of the eastern Mediterranean islands also need to be reconsidered. These include Sondaar's proposal (1987, 160) that the absence of endemic species with high rate of reproduction was the main rea-

son for the absence of human groups from the eastern Mediterranean islands at an early date. Alternatively Lewthwaite (1989) suggested that the western Mediterranean islands, in contrast to the eastern ones, were more conducive to a foraging lifeway, i.e. a pre-adaptation to subsequent Neolithic economies. In this respect, the impoverished and rudimentary material culture of these early sites (Cherry 1992) is now being clarified. Regional differences (see for example Bowdler 1995; Bass 1998) in terms of the origin, cultural characteristics and human adaptations to the variable conditions present on different islands now emerge as decisive factors in our understanding of the colonisation processes.

Antecedent stages of the well known Aceramic or EN sites are gradually coming to light. It is possible that existing regional cultural and environmental variables, such as the presence of domesticates or the survival of Pleistocene species, could represent reasons which affect the colonisation of some, at least, of the islands. Other aspects such as symbolic or social parameters, exchange patterns and the presence of specific resources could also affect patterns of island exploitation (Mavridis 1998).

In this respect, the character and date of the occupation at the site of Maroula on the island of Kythnos needs to be reconsidered. Recent research confirmed the evidence of the excavations conducted in the 1970s where burials, obsidian, thousands of molluscs and fish bones were found (Sampson pers. comm.). Furthermore, the excavations at Franchthi Cave contributed to the understanding of the Mesolithic cultural stage in the Aegean. In relation to the Upper Palaeolithic, there is evidence not only for a dependence on a wider range of resources in almost all subsistence activities such as fishing, shell gathering and hunting but also well documented sea crossing (Perlès 1979; 1990; Shackleton 1988; Hansen 1991). These cultural and economic attributes, are connected with the earliest secure evidence for mortuary ritual in Greece which supports an intriguing image of social complexity in the Early Holocene (Cullen 1995, 270). It seems that at least some of the elements which constitute the Neolithic culture stage were adopted much earlier as part of a system that also produced the complex societies of the Upper Palaeolithic and Mesolithic (van Andel and Runnels 1988, 98; Renfrew and Aspinall 1991; Jameson *et al.* 1994).

CONCLUSIONS

This brief overview of the character and date of the early colonisation of the eastern Mediterranean islands together with the causes of the extinction of endemic fauna showed that the data available are still inconclusive. By contrast, there is growing evidence related to the human presence at a pre-or proto-Neolithic stage, something which most researchers do not reject. Combined with the evidence from the Aetokremnos site on

Cyprus, the impact of man on the endemic fauna need to be further explored in a wider perspective. Taking into consideration the problems associated with the research of early sites and palaeontological localities, especially in the Aegean, future research needs to concentrate on aspects such as:

- i. identification and excavation of early sites.
- ii. reconstruction of the history of endemic species by relative and absolute age control.
- iii. new research methodology, which should take into consideration cultural practices, disposal strategies and taphonomic processes in order to understand how specific deposits have been created.
- iv. broadening the theoretical discussion beyond the environmental deterministic models in order to understand the cultural aspects of the early colonists, reasons for the early colonisation of islands as well as the role of man in the extinction of island endemics.

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