# Ain't no mountain high enough

## Man and the environment in the uplands of Crete from the Neolithic to the end of the Roman period

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**Für Oma, die sich bestimmt sehr gefreut hätte**

# Foreword

This is the revised version of my dissertation which was accepted as a doctoral thesis by the Philosophical Faculty of Ruprecht-Karls-Universität Heidelberg in July 2012. With its publication, a process that took several years to complete comes to conclusion, and although the title will be awarded only to me, a much greater number of people have contributed in one way or another.

Thanks are due to my supervisor, Prof. Dr Diamantis Panagiotopoulos, for discussion and critical comments, but most of all for taking me to Crete for the first time in 2006—an experience that proved seminal in more ways than anyone could have guessed. I am also grateful to Prof. Dr Thomas Meier, who readily agreed to act as my second reviewer, and to Prof. Dr Jonas Grethlein for being kind enough to chair my viva. I have to thank Jennifer Moody for then unpublished information, for lively discussion and for answering all my questions about Sphakia and the Cretan environment in general. Simon Stoddart of Magdalene College deserves special mention among those people at the Department of Archaeology and the Faculty of Classics in Cambridge who made me feel welcome during my time there.

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Nuremberg, April 2014 Christine Esther Widmann

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Unless stated otherwise, all photos are by the author.

# Chapter 1

# Introduction

*One must think big, otherwise what is the point of history?*

Fernand Braudel 1941, in a letter from Mainz to his wife in Algeria

Arriving at Chania with the overnight ferry from Piraeus, one sees the April sun rise behind the houses girdling the Venetian harbour, a Mediterranean sun that a few hours later will burn every patch of unprotected skin in this coastal town. But turning one's head inland, to the south, one sees a mountain range towering in the middle distance, and a closed blanket of snow covering the slopes. This is probably not what most people would connect with Europe's southernmost piece of land. But Crete is an island of contrasts and environmental diversity. One of the largest islands in the Mediterranean, about 50 per cent of it is made up of mountains, and the peaks of the Psiloritis massif, ancient Ida, rise up to 2456 m height, those of the Dikti, Thriphti and Asterousia ranges and especially the Lefka Ori to hardly less. At least since the Neolithic, parts of these mountains have been exploited by humans. The view from Chania makes it obvious that conditions in these uplands are different from those in the plain, and that they can be extreme at times. The environment must always have had a tremendous impact on the life of people up there—their survival depended on it.

The dependency of man on nature is much more immediately obvious in the past[1] than it is in modern western society, where it is often implied that humans

[1] Renfrew – Bahn 2008, 231.

and nature are two separate entities. This notion—sometimes called 'dualism'—has been argued to be essentially rooted in the Jewish-Christian tradition of man being at war with nature[2]. Scholars of the 17$^{\text{th}}$ century such as Descartes, Leibniz or Bacon provided philosophical justifications for the right and indeed the imperative for man to subdue nature, and this technocratic view still governs most political decisions. However, at the same time, the philosopher Spinoza promoted a contrasting model of pantheism, namely that of *monism*, viewing God, humans and nature as only artificially separable. To consider man and nature as an indivisible unity is the fundamental idea of what has become known as 'deep ecology'[3]. Although it may not always be as perceptible as with regard to the past, it is argued here that today as much as then, man must be seen as a part of nature, one player in the game (or rather, in the ecosystem), albeit one of the most powerful ones (unfortunately often abusing his power)[4].

Ecological conditions determine, at least to a certain extent, human actions and behaviour in economic, social and cultural aspects. What cannot be doubted is that these actions, activities and behaviour impact the environment. The environment reacts with alteration; man then has to adapt to these changes and so forth. This continuous mutual change known as the 'Red Queen hypothesis'[5], the interaction of man and environment, presents the core idea of the present study. The focus on the mountains means that these interactions take place in an ecologically special, in many ways marginal ecosystem[6]. In fact, the idea for this thesis—which was not my own, but that of my supervisor, Prof. Dr Diamantis

[2]See White 1967, 1203. See Groh – Groh 1991b, 13–19. 35–37 and Jamieson 2011, 2–6. 20–22 for discussion. See also Soper 1995, 38. 49–50. 57–61; Walsh 2008, 551.

[3]The term goes back to a 1973 article by Norwegian philosopher Arne Naess (Naess 1973). For the history and influence of the opposing notions see Devall 1980.

[4]Cf. Rogers 2004, 274. The reciprocal interaction can also be described by Actor-Network Theory, which ascribes agency to non-human features (Walsh 2008, 549). Cf. Darvill 1999; Jusseret 2010. Mark A. Blumler summed up: "In the old dualistic view of humans as separate from nature [...], we were thought either to civilize and improve nature (the progressionist view) or, more recently, to have degradational impacts on nature (the environmentalist view). The latter perspective, which assumes that natural disturbance is rare, persists but is slowly receding before the increasing evidence that the reality is complex [...]. A metaphor for nature more in line with current ecological theory would be a kaleidoscope, within which humans are enmeshed and have diffuse and often conflicting impacts" (Blumler 1996, 30).

[5]van Valen 1973, 17.

[6]For a discussion of this notion see below, p. 125.

Panagiotopoulos—was triggered somewhat by the experience of the crass contrast one spring between the beginning bathing season in the beach resorts on the coast and a snowstorm, with icicles hanging from every ledge, at Zominthos, 1200 metres high in the Psiloritis. The Minoan villa that is being explored here[7] is situated four hundred metres above the limit of permanent settlement in modern Crete, and the question of what people could have done up here can certainly not be answered if one assumes that climate and environment were exactly the same then as they are today. To assess *how* conditions differed in the past, an interdisciplinary approach is not only favourable but essential. The reconstruction of environmental conditions and their development over time requires the evaluation and combination of research from geology, geography, climatology, archaeobotany, archaeozoology and ecosystem analysis as well as history and written sources. The available archaeological testimonies have to be interpreted in the context of these environmental conditions and the aforementioned continuous reciprocal action; ethnological observations can potentially help to fill the gaps.

The landscape and ecology of Crete have been subjected to analysis several times since the 1970s, sometimes with a view to antiquity; the economic potential of its upland regions have been described mainly for the Archaic, Classical and Hellenistic period. But these studies have had contradictory results, which will be examined here in a wider context. In addition, some of them are confined to a certain period of time—an approach which proves to be inadequate: in order to identify changes in environment, economy and society, the time spans considered need to embrace more than 'just' a couple of centuries, since many of these changes—at least the ones identifiable today—are long term and do not take place suddenly[8].

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[7] Publication is so far only preliminary; see Sakellarakis 1983, 488–500; Sakellarakis – Panagiotopoulos 2006; Panagiotopoulos 2007; Sakellarakis 2007; Sakellarakis 2008 and <`http://www.archaeology.org/interactive/zominthos`> (26/9/2011).

[8] Cf. Dickinson 1994, 11; Redman 1999, 122–123; van der Leeuw *et al.* 2004, 112. The approach taken here is definitely 'longue durée'. It has not been possible to generate new, first-hand data, but after all, archaeology "n'est rien de plus et rien d'autre qu'une réécriture: c'est-à-dire dans la forme maintenue de l'extériorité, une transformation réglée de ce qui été déjà écrit. Ce n'est pas le retour au secret même de l'origine; c'est la description systématique d'un discours-objet" (Foucault 1969, 183).

Climate and soils, which vary according to elevation, region and time, are decisive factors for agricultural options in the mountains. Working the soil with ploughs and fertilizers changes its 'natural' constitution. Vegetation determines which areas are suitable for pasturage, and sheep and goats then impact the environment through browsing and grazing, their hooves, and their droppings. The question of former ubiquitous forest cover is one of the most intensely debated ones in environmental research and indeed archaeology in Crete. All too often, the answer to this question has been given without discussing all available evidence. What will become clear not only in this respect is that it is untenable to treat 'Crete' as one homogeneous unit[9].

The environment also to some extent determines the settlement pattern, *i. e.* the locations, spacing and size of habitation sites. The connection between landscape and settlement location is particularly palpable at the Bronze Age/Iron Age transition, when there is an undeniable shift to the uplands for settlement. But choosing a location for a dwelling has always been ruled by consideration of a combination of topography, available resources and social factors. The size to which a settlement could grow depended to some degree on these factors as well[10]. Besides these more physical aspects, the environment also has an impact on social structures[11], on the relationship between different groups exploiting different landscapes, and on religious ideas: it is clear that many ancient cult places were chosen for their natural characteristics, and it can mostly only be guessed what the deeper meaning associated with them may have been. With respect to the Mediterranean mountains, this is a phenomenon illustrated by the setting of the Minoan peak sanctuaries or later Greek cult places to Zeus, but parallels exist around the world.

All these aspects—the influence of the environment on settlement, economy, society and religion—can be argued to be more pronounced in the mountains than

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[9] Rackham 1996, 17; Alcock 1999, 178; Aalen 2004, 13; Haggis *et al.* 2007b, 690.

[10] 0.2 hectare is the size at which a single family home turns into a hamlet (Hayden 2004, 47 with reference to Jennifer Moody). For the difference between 'village' and 'hamlet' see Bryson 1996, 286.

[11] See Simmel, 1968, 466; Olshausen 1996, 7 (with references).

in the lowlands[12], and it will be explored here how they manifested themselves in the uplands of Crete.

It is impossible to speak about Cretan (pre)history without reference to pottery phases. This presents certain problems which I am unable to resolve, but in want of any better system, these terms are used here solely to indicate a certain date. However, because of the persistent troubles with the chronology of Aegean prehistory, these dates are mostly 'relative', and I have largely refrained from giving 'absolute' numbers[13]. It has to be made clear that pottery styles are not suitable for describing a period of time, and terms such as "the early LM IIIC people"[14] should not be used under any circumstances.

The present study is not a gazetteer of all known sites of Crete, nor would it have made sense, in my opinion, to compile a catalogue: there is no point in lengthy detailed descriptions of sites from which no environmental data are forthcoming. Moreover, although an elevation of 400 m served as a rough guide for choosing case studies and areas of interest, it quickly became clear that altitude alone could not be the only feature that made a place eligible for study: it would have been foolish to omit Azoria, one of the best-researched sites in Crete and within sight of Vronda and Kastro, just because it falls short of the given limit by thirty metres and is, technically speaking, not really set in a mountain environment. On the other hand, a site like Sybrita, at about 600 m height, was left out because of its setting on an isolated hill—at least Azoria can be claimed to be a foothill of the Thriphti range. However, even when taking such justifications into account,

[12] "In mountains, themes such as power, symbolism, ritual, and economy [...] interact in numerous ways with the environment to provide a more richly textured cultural signature than in many of the more familiar lowland landscapes" (Wilkinson 2003, 184). "Considered over the generations, mountain life was very stable, far more so than life in the plains. [...] Considered over the centuries, however, mountain life was unstable, because virtually unsustainable. It depended on vulnerable soils, on fragile forests, and on the numerical stability of dense population" (McNeill 1992, 145–146).

[13] "Contrary to some regrettable terminology frequently encountered in introductory textbooks of Archaeology (the purported contrast between relative and 'absolute' time), *all* time is relative" (Dincauze 2000, 85).

[14] Nowicki 2001, 32. Cf. Peatfield 2009, 254: "when we classify material and organize it into the categories we have created, we do so in order to illuminate our understanding of the culture that created that material. All too often, however, once established, our categories become fossilized into typological orthodoxies into which material must be neatly fixed. We should remember that all our terminologies and categories are to some degree artificial. They are our constructs, not those of the Minoans."

it is clear that the choices made here retain a large element of arbitrariness and subjectivity. It has to be hoped that overall, these choices will produce a balanced picture, which has certainly been the aim of the study.

Ideally, the results from the excavation of a site can be connected with the development of the landscape around it, which may well hold the clues to success or failure of a settlement. The idea of considering sites in their landscape setting is by no means new, but the notion of landscape as a palimpsest, inscribed with the activities of humans over the millennia, which is fundamental to this study, has seldom been applied to Crete[15].

It is not only the interactions with the environment that have been neglected in academic study of antiquity[16]. It is also high time that the people were put back into the record—too much has been written about works of art, admired by the idle city elite, and enough ink has been spilled about the pastimes of the upper crust. Granted, the archaeological record favours the well-off. But for sure, the real life of real people in the past was in the vast majority of cases very different: "the countryside of Airs, Waters, Places is a natural landscape without labour; the countryside I shall present here is a countryside of farmers and toil"[17]. In terms of meaning, 'nature', 'environment' and 'landscape' are not the same and not interchangeable; each has certain specific overtones[18]. 'Nature' is often thought of as a pristine, unmodified environment and has mostly positive connotations; to

[15] Wilkinson 2003, 4. 7; Haggis 2002, 122. Cf. Betancourt 2006, 38: "Natural resources include rocks, minerals, soils, and other geological features as well as a region's local plants and animals. They can make the difference between a successful economy and a hopeless failure. Rich natural resources may be factors in the original decision to settle an area, and they may significantly affect the lives of those who have them. To achieve the successful maintenance of a settlement, balance must be achieved between population and resources. Someone must take steps to ensure enough food and other supplies to support the population from one harvest to the next, and increases in population can only be accommodated if resources (local or imported) are increased proportionately." The concept of the landscape as a palimpsest was first put forward by O. G. S. Crawford (Crawford 1953, 51).

[16] See Whitley 2001, 57.

[17] Osborne 1987, 17. Cf. Rehak – Younger 2001, 465: "Much attention has been devoted in recent decades to major theoretical constructs of politics, state theory, and the state of the profession. One of the consequences is that the lived life of individuals has all but been neglected. We should want to know more about the Minoans themselves, for if ever there was a goal of archaeology, it is the study of people, especially at the commonest level." See also Walsh 2008, 550.

[18] For some thoughts see Jamieson 2011, 1–2.

characterize something as 'natural' is to ascribe it moral righteousness[19]. Although there are problems with such a definition, 'nature' is used here for those elements on the planet that are in their essence not brought into being by humans. The central concept of ecology, *'umwelt'*, was first defined by the Swedish biologist and philosopher Jakob von Uexküll in 1909. According to him, *'umwelt'* describes the section of the environment of a living being with which it interacts. Therefore, different individuals can have the same environments, but different *umwelten*[20]. The term 'environment' is used here very much in the Uexküll sense and can include one or more ecosystems—yet another difficult term[21]—in a given region. Other scholars have later drawn a similar distinction between 'environment' and 'landscape', defining the former as everything that objectively exists and the latter as the perceived part of it. Although this distinction has more recently been attacked by those following a contructivist approach, according to which there is no objective totality, 'landscape' is used here to mean a region, modified or not and including humans, as it is perceived by a person. The reasons for this, as well as other possible definitions, are discussed in more detail in the chapter on methodology. Having said all this, the distinction between the terms is not at the centre of the present study, and it is clear that the decision to use one or the other term in a particular sentence is still somewhat arbitrary[22].

None of these entities is stable: they are all constantly changing, and not all change is human-induced[23]. As has been said above, man depends on nature, now as ever. Although one is obviously tempted to assign educational value to a study like this, in that it can provide references for sustainable behaviour, it would be naïve to hope that people would learn from the past and change their ways. "A significant body of thought, headed by the economist Julian Simon, asserts that carrying capacity is infinitely flexible—that in the modern world, technological improvements will always keep productivity running well ahead of population increases. [...] Only time will tell if this proposition is true over

[19] Birnbacher 1991, 60–61; Jamieson 2011, 162–168.
[20] von Uexküll 1909, 248–253.
[21] See Simmons 1993, 49; Jamieson 2011, 150–151.
[22] As Jamieson 2011, 2 said, "having alerted us to some of the complexities involved, I will do my best to ignore them".
[23] Cf. Horden – Purcell 2000, 339.

the long term. We archaeologists know that it has never been true in the past; we make our living off history's counter examples"[24]. It is therefore probably not a good argument that some thing or other represents the 'sensible' system of agriculture or environmental management and that the people of old would have practised it because they were sensible. This is what one would wish for, but it is not clear how many examples there are where people have done what is sensible rather than what is convenient[25]. There is very little evidence from antiquity for the existence of such a thing as ecological thought that would or even could have ruled economic or social decision-making: "If they did not spoil the landscapes of the Mediterranean as we do, but as it is sometimes (wrongly) claimed they also did, it was neither because they were especially 'in tune with' the landscape, nor merely because their technological limitations protected it against their (alleged) ignorance of how it 'really worked'. Having said that, of course, at least on the local scale their future often depended on taking the long view—as does ours, but now on a global scale"[26].

[24] Fagan 2000, 247.

[25] Cf. Ponting 2007 *passim*; Diamond 2006 *passim* (for critcism of Diamond's ideas see McAnany – Yoffee 2010; Middleton 2012); Wilkinson 2003, 217. Cf. however also Butzer 1972, 12; Rackham – Moody 1996, 209–210. See also Meier 2005, 275, who renounces characterizations of past people as lacking a sense of risk: "Denn auch wir handeln in voller Kenntnis erheblicher Naturrisiken häufig so, als läge die Wahrscheinlichkeit, dass sie sich realisieren, entgegen aller teuer bezahlten Gutachten bei Null". Why, he asks, should earlier generations have had a greater sense of responsibility? See also Baillie 1998, 13–14; Haupt 2012, 18–19; Middleton 2012, 271.

[26] Shipley 1996, 13. For the question of 'ecological thought' in antiquity see Hughes 1980; Hughes 1983; Sonnabend 1996, 151 footnote 1 (with references); Dillon 1997, 113–114; Ettrich 1999b; Desideri 2001, 17. The potential of archaeological studies for providing 'lessons' for the present and the future has been variously assessed by Redman 1999, 4. 214 and Redman *et al.* 2004, 1–2.

### Some technicalities

Secondary literature and data published after September 2013 have not been included. Ancient authors are abbreviated according to Liddell – Scott and Lewis – Short. Numbering of books, chapters and verses in ancient texts follows the respective edition listed in the bibliography. The choices I have made in respect to the names of ancient authors are unpopular but truer to the original. Transliteration of Greek names and toponyms follows the example set by John Pendlebury: "Orthography and the transcription of modern Greek names is a problem. I confess to inconsistency"[27], a principle somewhat justified by Greek scholars seemingly sticking to it even when it comes to their own names. In those cases where the modern and the ancient name of a place differ, the latter is used when referring to the period in which this appellation was used, whereas the former stands for any other remains at the site and the location itself. Abbreviations of journal and series titles as well as the reference system follow, as far as possible and sensible, the rules devised by the German Archaeological Institute (DAI), available from <`http://www.dainst.org/en/publication-guidelines?ft=all`> (25/9/2011).

### Chronology and abbreviations

| | | | | | |
|---|---|---|---|---|---|
| NL | — | Neolithic | G | — | Geometric |
| FNL | — | Final Neolithic | LG | — | Late Geometric |
| EBA | — | Early Bronze Age | EO | — | Early Orientalizing |
| BA | — | Bronze Age | O | — | Orientalizing |
| EM | — | Early Minoan | A | — | Archaic |
| MM | — | Middle Minoan | C | — | Classical |
| LM | — | Late Minoan | H | — | Hellenistic |
| EIA | — | Early Iron Age | ER | — | Early Roman |
| EPG | — | Early Protogeometric | R | — | Roman |
| PG | — | Protogeometric | LR | — | Late Roman |

### Modern Greek terms

| | | |
|---|---|---|
| *agrími* | — | Cretan wild goat |
| *alóni* | — | threshing floor |
| *farángi* | — | gorge |
| *kafenío* (pl. *kafenia*) | — | coffee house |
| *kalderími* | — | cobbled mule track |
| *mantináda* | — | rhyming couplets, often performed to music |
| *metóchi* | — | seasonal farmstead with fields around it |

[27] Pendlebury 1939, xxv.

| | | |
|---|---|---|
| *mitáto* | — | shepherd's hut, built of stone |
| *oropédio* (pl. *oropedia*) | — | mountain plain |
| *plateía* | — | village square |

**Latin botanic taxa**

**1) Plants**

| | | |
|---|---|---|
| *Acer sempervirens* | — | Cretan Maple |
| *Ailanthus altissima* | — | tree-of-heaven |
| *Arbutus unedo* | — | strawberry tree |
| *Asphodelus aestivus* | — | asphodel |
| *Asphodeline lutea* | — | Yellow asphodel |
| *Avena* sp. | — | oat |
| *Bupleurum kakiskalae* | — | endemic plant of the carrot family |
| *Celtis* sp. | — | hackberry |
| *Centaurea solstitialis* | — | Yellow Starthistle |
| *Ceratonia siliqua* | — | carob |
| *Cistus creticus* | — | rock-rose |
| *Crataegus heldreichii* | — | hawthorn |
| *Cupressus sempervirens* | — | cypress |
| *Erica arborea* | — | tree-heather |
| *Ficus carica* | — | fig |
| *Hordeum* sp. | — | barley |
| *Juniperus phoenicea* | — | Land-juniper |
| *Lathyrus sativus* | — | grass pea |
| *Olea europea* | — | olive |
| *Olea oleaster* | — | wild olive |
| *Origanum dictammus* | — | diktamus |
| *Petromarula pinnata* | — | endemic bellflower |
| *Phoenix theophrasti* | — | Cretan palm |
| *Pinus brutia* | — | Calabrian pine |
| *Pistacia lentiscus* | — | lentisk |
| *Pistacia terebinthus* | — | terebinth |
| *Platanus orientalis* | — | plane tree |
| *Polygonum idaeum* | — | knotgrass |
| *Pyrus amygdaliformis* | — | wild pear |
| *Quercus brachyphylla* | — | deciduous oak |
| *Quercus coccifera* | — | prickly oak |
| *Quercus ilex* | — | holm oak |
| *Quercus macrolepis* | — | valonia oak |

| | | |
|---|---|---|
| *Tilia* | — | lime-tree |
| *Triticum aestivum* | — | bread wheat |
| *Triticum dicoccum* | — | emmer |
| *Triticum durum* Desf. | — | macaroni wheat |
| *Ulmus minor* | — | elm |
| *Vicia ervilia* | — | bitter vetch |
| *Vicia faba* | — | broad bean |
| *Viola scorpiuroides* | — | Yellow Violet |
| *Zelkova cretica* | — | *amebelitsiá* |

### 2) Animals

| | | |
|---|---|---|
| *Bos primigenius* | — | aurochs |
| *Bos taurus* | — | domestic cattle |
| *Canis familiaris* | — | dog |
| *Capra aegagrus creticus* | — | *agrími* (Cretan wild goat) |
| *Capra hircus* | — | domestic goat |
| *Capreolus capreolus* | — | roe deer |
| *Cervus elaphus* | — | red deer |
| *Dama dama* | — | fallow deer |
| *Felis silvestris cretensis* | — | wild cat |
| *Gallus gallus domesticus* | — | chicken |
| *Lepus europaeus* | — | hare |
| *Meles meles* | — | badger |
| *Ovis aries* | — | domestic sheep |
| *Sus domesticus* | — | domestic pig |
| *Sus scrofa* | — | wild pig |


**Figure 1.1:** Map of Crete with some of the sites mentioned in the text. 1 Hyrtakina – 2 Lissos – 3 Tarrha – 4 Frangokastello Plain – 5 Phoinix – 6 Araden – 7 Anopolis – 8 Mouri – 9 Askyphou Plain – 10 Kolokasia Kastro – 11 Asi Gonia – 12 Eleutherna – 13 Tylissos – 14 Axos – 15 Iouchtas – 16 Psychro Cave – 17 Tzermiado Kastello – 18 Katharo Plain – 19 Lato – 20 Monastiraki Katalimata – 21 Kavousi – 22 Praisos – 23 Katelionas basin – 24 Lamnoni basin – 25 Chametoulo – 26 Ziros – 27 Debla – 28 Elyros – 29 Kamares – 30 Sentoni cave – 31 Imbros gorge – 32 Asphendos plain – 33 Plakias – 34 Agios Ioannis – 35 Hierapydna – 36 Idaian Cave – 37 Kato Symi – 38 Zominthos – 39 Gortyn (Map: open source, modified by Jeremy O. Richardson)

# Part I

# Theory

# Chapter 2

# Methodological considerations

*Toute philologie, comme toute histoire et comme toute archéologie, doit être pénétrée de géographie; tout nom doit évoquer un site, une région, avec sa position, son climat, ses ressources.*

Louis Robert, Journal des Savants 1961, 99

An assessment of man-environment interactions in the past requires, one would think, first of all a reconstruction of the environment before any human influence was possible, the pristine state of nature in the area or region of interest[1]. Yet already this is a debatable concept, for several reasons. Environments are constantly changing even without human interaction[2]. Nature must not been treated as a "passive, static backdrop to cultural change"[3]. The decisive point is rather which changes are 'natural' and which can be attributed to human impact (and by this I do *not* mean 'impact' as a necessarily negative influence disturbing some alleged balance of nature[4]). This is often difficult to establish, as will become clear in the following. To avoid misconceptions, an understanding of the type of

[1]Cf. Wiseman – Zachos 2003b, 10: "If we were to study the interaction between humans and their environment, we reasoned, one of the first steps must be to determine what that natural setting was—that is, what the landscape and other aspects of the environment were like over time."

[2]Redman 1999, 199–203: "there is no absolute when one refers to the natural state of the environment". His discussion of the question whether the reconstruction of an *unaffected* environment is possible or not fails to convince however. In the high mountains of Crete, there may be a landscape that contradicts the claim of constant change, see Rackham – Moody 1996, 192.

[3]Blumler 1996, 28.

[4]Blumler 1996, 27–34.

ecosystem we are dealing with and its internal processes is necessary. Important aspects are climate, vegetation, geology (including water resources) and fauna. Ultimately, all environmental reconstruction has to rely to some extent on the principle of uniformitarianism, in that it assumes that behaviour of man, animals and plants in times past did not differ fundamentally from their behaviour today[5]. Not only for humans, but even for animals plants this has been called into question[6]. This seems to support the unsettling constructivist point of view, which denies that objective knowledge is possible. All descriptions of 'the world', and hence also of environments, are governed and filtered by the respective researcher's personal, social and cultural conditioning. It is only with an acknowledgment of these premises that any insight into the past can be attempted at all.

The arrival of humans on the scene must be established archaeologically and then be correlated with the environmental data, both geographically and chronologically, in order to show how the environmental conditions at the time did (or did not) influence people's choice of settlement location. Attempts to do things the other way round and prove the presence of humans from environmental data are doubtful at best, since environmental phenomena can have many different causes producing the same result. The relevant data will mostly have to be retrieved by methods that can be united under the labels of 'environmental archaeology' and 'landscape archaeology'. The former has been described as a "bridge between human activities and environmental processes in the past"[7]. The methods often, but not in all cases, require careful excavation to retrieve the necessary materials (see below).

Through study of the economical behaviour of the groups in question (via botanical and faunal macroremains and for example soil chemistry) parallel with pollen analysis, geomorphological survey, *etc.*, the impact of humans on their environment will hopefully be established[8]. Possible changes in the environment

[5]Dincauze 2000, 29; Branch *et al.* 2005, 3.
[6]Milner 2005, 33; Diehl – Sirocko 2010, 19–21.
[7]Denham 2008, 469. For an overview of theoretical and methodological problems see Dincauze 2000, 78.
[8]In modern ecology, impact is calculated with the so-called IPAT equation:

$$\text{impact} = \text{population} \times \text{affluence} \times \text{technology}$$

(affluence = the consumption of goods per person; technology = the environmental impact per quantity of goods consumed) (Ehrlich *et al.* 1977, 720).

resulting from this impact (plus those not influenced by man, such as climate and its effects[9]) may then have necessitated adaptation to these changed conditions. This adaptation may again have had some impact on the environment, and so forth. As mentioned above, in evolutionary theory, this principle has come to be known under the name 'Red Queen Hypothesis', after a character in Lewis Carroll's 'Through the Looking Glass', who explains to Alice that in her world, "it takes all the running you can do, to keep in the same place"[10].

**Figure 2.1:** The Red Queen from Lewis Carroll's 'Through the Looking Glass' (from Carroll 2009, 144)

The reconstruction of past environments is hampered by a great many factors, however. Reconstruction of human impact is entangled with reconstruction in general. To be able to reconstruct anything at all, data must be available, which is unfortunately very often not the case. The further one goes back, the less evidence is left[11]. This cannot be helped, but unfortunately in many cases not even the meagre data potentially obtainable, not even plant and animal remains are collected. In other cases, the material retrieved is not subjected to all conceivable

[9]Large-scale human impact on climate is a recent phenomenon.
[10]Carroll 2009, 145. For the hypothesis see van Valen 1973, 17; Dincauze 2000, 5. Cf. Binford 1983, 203.
[11]Allen 2001, 185.

examination. For example, skeletal isotope analyses are of great potential value for modelling the economy and diet of a group, although the relation of such data, which naturally mostly stem from burial sites, to the settlement where these people lived, will more often than not be a big problem. However, since this method has as yet very rarely been applied to remains from Crete, it must unfortunately be largely left aside in this study[12]. The fact that no environmental data are forthcoming is in my opinion the biggest problem in this kind of study[13].

P. Horden and N. Purcell have described the difficulties as follows: "Mustering copious models and statistics from the journals of modern ecology can certainly suggest the possible forms that answers to ecological questions about Antiquity may take [...]. Yet historical evidence is still needed to decide which of the suggested forms can appropriately be projected back onto the past; and that evidence is rarely sufficient to the task. The requisite demographic particulars are lacking for any period before the early modern one [...]. And the palaeobotany and palaeozoology that would, for an ecologist, be their essential complements are simply not available on a sufficient scale to permit a properly scientific ecological history of the Mediterranean spanning millennia. As we shall hope to show, the character of Mediterranean ecosystems can certainly be indicated—but it cannot

[12] Isotope studies have been published for Late Roman skeletons from Gortyn (Fornaciari *et al.* 1988; Mallegni – Bartoli 2004), for LM IIIC Armeni and for two skeletons from the Neolithic cave of Gerani (Tzedakis – Martlew 1999, 80. 216–217; Richards – Hedges 2008); see below, page 53 footnote 185. Strontium isotope analysis on bones from LM II-III tombs at Knossos (Nafplioti 2008) is meaningful for determining the origin of the individuals but not their way of life. Skeletal analysis for diseases have been undertaken for Bronze Age Armeni (McGeorge 1987) and (without isotope studies) Protobyzantine Eleutherna (Bourbou 2004). DNA from Middle Minoan human bones has been analyzed by Hughey *et al.* 2013.

[13] If confirmation is needed, T. F. Tartaron's assessment of the situation in southern Epirus can without difficulty be taken on for Crete: "Very little is known about the plants and animals actually exploited by Bronze Age communities [...], because floral and faunal remains were rarely saved at all in early excavations, and are mentioned only in passing, if at all, in archaeological reports" (Tartaron 2004, 141). See also Sarpaki 2000; Vaughan 2000, 4–6; Vitelli 2000, 10. J. McGlade however argues that it is not a shortage of data, but the "continuing practice of rendering palynological, anthracological and carpological data as discrete analytical and classificatory entities, devoid of any epistemological discussion" and the frequent borrowing of models from human ecology and ecological anthropology although "[m]uch of this work is of questionable utility with respect to generating convincing models of social-natural interaction" (McGlade 1995, 116).

be described with anything like the degree of specificity that an ecologist would consider respectable"[14].

Those environmental changes with the greatest impact on the life of people, like droughts or epidemic diseases, would have happened and possibly been overcome within ten years and are therefore hardly detectable in the archaeological record[15]. Even major events like for example the Thera eruption in the 17$^{\text{th}}$ century BC need not leave a trace in contemporary material culture, demonstrating that "[n]ot only does this stalemate keep archaeologists humble in the face of their own uncertainties, it shows clearly that societies can absorb destructive events by dispersing their effects throughout the cultural system, so that there are no clear correlations"[16]. In addition, human response to environmental change depends on the change being perceived, "and for most of human existence, perception has been effective only in the short term"[17]. The only way to trace an adaptation to a changing environment is to demonstrate that a clear change in the economy of a group happened within ten to twenty years[18]. However, even if a change is visible, the reasons for it are not immediately inferable; again, very different causes may have the same indistinguishable outcome. This makes it very clear that a high chronological resolution is the key prerequisite to all environmental reconstruction[19]. The only method which allows dating more precise than to a range of decades is dendrochronology, which requires certain conditions of preservation that are hardly if ever present in the Aegean. Moreover, in Aegean archaeology, there is always the question of 'high' or 'low' chronology, which makes correlating archaeometric data (such as $^{14}$C-dated foraminifera) with archaeological data

[14] Horden – Purcell 2000, 47–48. Cf. Whitelaw 2000, 145; Meier – Tillessen 2011, 20.

[15] McGhee 1981, 163; Dincauze 2000, 68. 76. Cf. Gutzler 2000, 215–216; Meier 2005, 259. 262.

[16] Dincauze 2000, 70. Cf. McGlade 1995, 123; Walsh 2008, 556. Mass graves could potentially supply evidence for such events.

[17] Dincauze 2000, 73. This is certainly still true today, at least as regards the public.

[18] Dr Thomas Knopf, Institut für Ur- und Frühgeschichte Tübingen (*pers. comm.* 2008); cf. Maise 1998, 198.

[19] Cf. McGhee 1981, 163; Maise 1998, 198. 217–218; Dincauze 2000, 185–186; Bintliff 2002, 422–423; Schibler 2004, 87. "So to develop a more effective understanding of the ways in which humans interacted with their environments, and in turn, how those environments acted back on the human populations, both in specific cases and more generally, we need far finer resolution in both cultural and environmental datasets, and in particular, more direct associations between both sets of patterns—linking cause and effect—as well as more detailed modelling of the potential dynamic interactions" (Whitelaw 2000, 145).

(such as ‘abandoned before MM II’) even more difficult. It has hence with good reason been criticized that most publications concerning environmental changes in the Aegean do not fulfill the prior condition of high chronological resolution, but still try to correlate the ecological processes in geomorphology and vegetation with changes in human behaviour as reflected in the archaeological record. It is common but not good practice to assume, rather than prove, that changes in the two spheres happened at the same time or are causally related and to treat uncertain indications of human impact as proofs[20].

Determining the sequence of events is a vital necessity in exploring man-environment interactions, but not the only one: the spectrum of accessible resources and attainable choices must be examined, and the social frame and the consequences of implementation of such decisions must be kept in mind too.

The resources attainable for the population of a certain settlement can be investigated via analysis of site exploitation territory as developed by E. S. Higgs and C. Vita-Finzi[21]. It must be borne in mind however that the environment may have changed over the centuries or millennia, that once available supplies may have been used up or vanished due to climatic shifts or that wells, for example, can dry up. Adding to this problem, it must even be acknowledged that unless there is direct evidence of use, the reconstructible natural resources around a certain site must count as *potential* resources only—their mere existence does not prove their exploitation[22]. In the case of farming societies, site catchment includes the distance to potential fields, which can show a considerable degree of variation[23].

These factors will mostly be determined by a geological soil survey. However, the categorization of soils in a given region into those well suited for agriculture

[20] Halstead 2000, 110–111; Whitelaw 2000, 145. Cf. Maise 1998, 199: “Klimatischer oder ganz allgemein ökologischer Determinismus ist nicht geeignet, die Vielfalt der kulturellen Veränderungen zu erklären. Es ist aber sicherlich genauso falsch anzunehmen, dass markante klimatische Einschnitte nicht zu sozialen Veränderungen geführt haben könnten, die sich ihrerseits als Wandel in der archäologischen Kultur niederschlagen können.”

[21] Vita-Finzi – Higgs 1970. For a discussion of some of the problems—including that of the changing environment—of this approach see Flannery 1976, 91–95. See also Renfrew – Bahn 2008, 262. 264–265.

[22] Wagstaff – Augustson 1982, 106; Brown 1999, 46. See Alcock 1999, 176 for an example from Crete.

[23] A survey conducted on Melos in the 1970s recorded travelling times between five minutes and six hours (Wagstaff – Augustson 1982, 108. 110 with Table 10.5); cf. the results of similar research in Messenia (van Wersch 1972, 178) and see also Allbaugh 1953, 245.

and those less suited, which is commonly undertaken in archaeological projects, has been criticized on the grounds that such an evaluation, like so many other things, is utterly relative. Instead of aiding archaeological reasoning, it creates the danger of relying solely on geological characteristics[24]. Moreover, soils may have changed: the impact of earthquakes is not restricted to destruction of architecture, nor to potentially promoting social upheaval. They also initiate or further environmental change; although they "do not themselves transform the whole landscape, [. . . ] they act together with the longer-term evolutions of climate and human activity [by loosening unconsolidated material, disturbing drainage patterns *etc.*], punctuating the *longue durée* and playing an essential role in bringing about environmental change"[25].

## 2.1 Reconstructing climate[26]

Climate determines which plants and animals prosper and is therefore decisive for the survival of man, even more so since the introduction of agriculture. In cereal-growing societies, bad years—*e. g.* wet summers—could easily lead to crop failure and famine. Numerous examples from the central European Middle Ages are well documented, and it has been argued that prehistoric communities would have been even more susceptible to climatic variability, and that cultural reactions to these influences may be reflected in the archaeological record[27].

Climate reconstruction must always start with global conditions, which are dependent on a number of natural cycles, few of which are perfectly understood[28], and which only in very recent times have begun to be disrupted through human

[24]Horden – Purcell 2000, 231: "There is no absolute quantity of land anywhere: its value and potential depend on the choices and perceptions of those who make use of it." Cf. Wallace 2003, 610. 614 footnote 54.

[25]Horden – Purcell 2000, 326. On the impact of tectonics on human land-use see Bailey *et al.* 1993. Cf. Zangger 1998, 228.

[26]For an in-depth account see Bradley 1999. "[Es] gilt [. . . ] allerdings, sich gewisser Einschränkungen bewusst zu sein. Das Klima ist ein chaotisches System, detaillierte Rekonstruktionen sind daher unmöglich" (Maise 1998, 209).

[27]Maise 1998, 211. 216–217. 232–233. Weiss – Bradley 2001 even named climate change as the sole cause of the breakdown of several societies. For a critical assessment and suggestions see Maher *et al.* 2011.

[28]See Maise 1998, 204–206 for a brief introduction to sunspot activity; see also p. 69.

impact. What is known about them must of course be taken into account for past climates on all scales, which otherwise can be reconstructed only through proxy indicators[29]. Broad-scale temperature trends can be detected in deep-sea cores. They contain foraminifera (microfossils) which are sensitive to changes in temperature. In addition, ratios of fatty lipids (organic molecules) from the cells of marine organisms have been shown to reflect cold and warm conditions[30]. Deep-sea cores also contain pollen of species that may thrive only in certain climatic conditions. The same applies to pollen cores from wetlands, but their catchment area will be more limited. On this more regional scale, growth rings in trees also record wetter, drier or colder years[31]. A method with great potential, especially for Crete with its many caves, is isotope analysis in speleothems (stalagmites and stalactites), which allows precise temperature and precipitation reconstructions[32]. Animals can serve as climate proxies too—an obvious (but not necessarily straightforward[33]) example being the woolly mammoth—, as can sediments such as loess[34]. For historical periods, written sources can provide valuable clues, even though they may tend to record one-off events rather than long-term changes[35].

There are claims that deforestation would always have altered local climate to drier conditions[36], though archaeologically this is hard to prove. The way in which climate reconstructions have been used sometimes in archaeology has been criticized, and this criticism shall serve as a warning not to do the same: "Des-

[29]"You can say that something was caused by climate, as of a changing species distribution, but not that something *was* climate. Palaeoclimatologists fail to understand this when they talk about the 'proxy' evidence for climate: there is no other sort of evidence. All data for climate, past and present, even the measurements of [. . . ] thermometers [. . . ] are proxy. More fundamentally, [. . . ] the data are not evidence for climate, they are part of it" (Evans 2003, 96).

[30]Renfrew – Bahn 2008, 232–233.

[31]Renfrew – Bahn 2008, 244–245.

[32]See Renfrew – Bahn 2008, 241 for a short introduction and Bar-Matthews *et al.* 2003, Vollweiler *et al.* 2006 and Mangini 2007 for some applications and results.

[33]As a rule of thumb: the bigger the animal, the bigger the range of environments to which it can adapt; see Renfrew – Bahn 2008, 251. See also Mainland 2008. For a successful correlation of the evidence from faunal remains and climate data see Schibler 2004 (the success is of course largely down to exceptional preservation of organic materials in the lakeshore settlements in southern Germany and Switzerland).

[34]Renfrew – Bahn 2008, 242–244. Sediment layers in flood horizons in Crete have been used as climatic indicators, see Moody 2000; Moody 2005b. See also Morris 2002, 58. 72–76.

[35]Bradley 1999, 442. See however Evans 2003, 99–100.

[36]Charney *et al.* 1975; Dincauze 2000, 154–155. See, however, Goudie 1993, 316–317. See also Vanhaverbeke – Waelkens 2003, 19.

pite the fact that archaeologists commonly use environmental or climatic change as an explanatory device, archaeology has no theoretical basis or standardised set of techniques, such as those used by most other palaeoenvironmental disciplines, explicitly designed to detect or investigate such occurrences. Archaeological interpretations of past climatic change generally takes the following form. The archaeologist first notes an event in the archaeological record, such as population decline or abandonment of a region, introduction of a new subsistence pattern, or widespread civil unrest, which requires explanation. He then notes that evidence produced by some other palaeoenvironmental discipline suggests that the region underwent an environmental change at approximately the same time, and concludes that the two events are related: that social or cultural change was caused by environmental change, and ultimately by climatic change"[37]. To prevent this jumping to conclusions, it can only be stressed time and again that relating climatological and archaeological data requires a high chronological resolution.

## 2.2 Geology[38]

Knowledge about the geology and geomorphology of a given region provides an indispensable background to all further study. What is more, geological methods are essential for landscape reconstruction and the question of environmental change. Whereas the chemical composition of bedrock cannot have changed within human time scales, it is important to understand whether soils have moved: they can be washed down the slopes. The reasons for such a development can be both 'natural' (wind and sheet erosion) and anthropogenic (deforestation), or a combination of the two, but may not be determinable. Crete bears a high potential for landscape reconstruction through geological analysis because of the abundance of karstic dolines which have been shown to act as archives of sediment history, often being the only places in which soils of any considerable massiveness can be found at all[39]. Since the examination of soil profiles to assess whether anything like this has happened must be left to specialists, geological surveys are nowadays often

[37] McGhee 1981, 162–163. See also Issar 1998, 113 and Mackil 2004, 493–494 for some thoughts.
[38] For an in-depth account see for example Rapp – Hill 1998.
[39] See Siart 2006, 18; Siart *et al.* 2009, 2.

part of excavation projects. The application of social theory to geoarchaeological problems has been called for but is seldom if ever realized[40].

## 2.3 Reconstructing vegetation

The first thing to look at in palaeovegetation studies is geology, since soils are a decisive determinant of what grows where. The second natural influential factor is climate, and here a degree of caution is necessary: knowledge about past climates can help to assess what plants were present, but for some periods the only available information about climatic conditions comes from plant remains—so to use the same set of data for both purposes would be a classical case of circular reasoning[41].

Given that climate can be reconstructed by other means, the analysis of plant remains, be it macroscopic or microscopic, can provide valuable information about the environment and about the diet of people (and animals), about the function as well as about seasonality of sites. Preservation of organic material through waterlogging can be excluded almost completely in the case of Crete. Macroscopic remains therefore include burnt timber, charcoal[42], charred grains and seeds, reeds or their impressions on pots as well as straw in burnt mud-bricks. There are severe difficulties with this type of evidence, and no assemblage of macroscopic plant remains should be taken to reflect the complete economy and consumption habits of people: "the abundance of a plant species in a group of samples need indicate only that it was, for various reasons, commonly preserved; conversely, plant resources which were not placed near pottery when it was being produced, or near fires, would be rare archaeologically, but could nevertheless have been important components of the economy"[43]. Therefore, such evidence is more likely to provide clues about food production than about food consumption[44]. However, the greatest problem, as usual, is that plant remains are often inconspicuous on

[40] Jusseret 2010.
[41] Wilkinson – Stevens 2003, 82.
[42] For some of the difficulties in evaluating charcoal samples in general see Asouti – Austin 2005. Charcoal from excavations in Crete has not often been available for analysis (Rackham 1990, 35; Moody 2012, 251).
[43] Dennell 1977, 364. Cf. Sarpaki 1992, 72.
[44] Hastorf 1988, 120–121.

excavations and need to be retrieved by wet sieving or flotation, which even today is not a standard procedure on excavations; note therefore that there are far fewer botanical than zoological assemblages (see Tables 13.1, 13.2, 13.3 and 13.4)[45].

Potentially preserved microscopically small parts of plants are (among others[46]) phytoliths and pollen. Phytoliths are the silica components of plant cells that will survive in almost any context long after all other parts of the plant have decayed. Unfortunately, so far not a single phytolith study from Crete exists[47]. Pollen cores on the other hand have been examined; their number is small however since wet sites in which pollen could be preserved are not numerous[48].

**Pollen** While the potential and value of palynology is undoubted, pollen records are not as straightforward as one might be tempted to think[49]. The first difficulty is preservation. Even in wet sites, pollen deteriorate, rendering their identification less easy than it is with modern pollen. This is a problem that needs to be overcome by the archaeobotanist in the laboratory. But the result of those efforts, represented in pollen diagrams, must be evaluated critically by anyone who works with them; one needs to be aware of the pitfalls of these handy figures. To begin with, deterioration of pollen is differential with respect to different species[50], so that a comparatively low value for one species does not necessarily correspond to its real importance. Another central question is that of catchment area: not all pollen in a sample necessarily originate from the close surroundings. Intensive research has revealed a correlation between the size of a wet site and its catchment area. The prevalent direction of wind is also of significance, as is the type of vegetation around the site—which, of course, can only possibly be known through

[45] See however also Sarpaki – Bending 2004, 126—even with ideal retrieval methods, assemblages may be small for reasons of preservation.

[46] See Rowe – Kershaw 2008 for a useful summary.

[47] See Tyree 2000 for potential applications.

[48] The Mediterranean summer drought is particularly unfavourable to the preservation of pollen in sediments (Bottema 1994, 48) so that they cannot be retrieved from excavated archaeological sites either (see Renfrew – Bahn 2008, 246).

[49] For problems with pollen in general see Dincauze 2000, 353–357; Haupt 2012, 26–28. For problems with pollen as indicators of anthropogenic activities see Butzer 1982, 177–184; Allen 2001, 173–175.

[50] Examples of species with easily decaying pollen are maple, juniper and chestnut, all of which grow in Crete (Butzer 1982, 180). On chestnuts in Crete see also Rackham – Moody 1996, 82–83; Moody 2012, 250.

pollen analysis[51]. However, pollen can travel over long distances not only through the air—the lower their weight, the further they will fly[52]—, but also in the water of streams feeding the coring site. If they are incorporated in soil which erodes into a stream, they not only originate from another geographical context, but, what is maybe worse, they can be hundreds or even thousands of years older than those deriving from plants growing in the actual period of study. Therefore, a pollen sample cannot be taken as a one-to-one reflection of the local vegetation at a certain point in time[53]. On the other hand, it would be just as improper to extrapolate findings from one pollen site to a large geographical area, in this case for example to the whole of Crete.

Another catch is that different plant species produce very different amounts of pollen, depending on the mode of pollination (self-pollination, entomophily = insect-pollination or anemophily = wind-pollination) on which the species relies, and that therefore the frequency of pollen of a certain species is not directly convertible into frequency of the species as such[54]. Moreover, sedimentation rates can vary greatly from one period to another which renders relative dating of sequences within a core difficult[55], but without secure dating, the information derived from the pollen is not really usable for the purposes of palaeoenvironmental reconstruction. In view of the different specific forms which plant species in Crete can take, it must be pointed out that pollen can, in the best case, prove the presence of a certain species, but there is no way of telling whether it grew within a forest, as a shrub or as a free-standing tree[56]. In a similar vein, pulses are presumed to have been cultivated in great numbers as a food crop, but their pollen are indistin-

[51] Wilkinson – Stevens 2003, 96.

[52] It has been claimed though that most pollen do not travel further than 500 m from their source (Bradley 1999, 362).

[53] Evans – O'Connor 1999, 70–71.

[54] Apple and pear for example do not appear in pollen diagrams because they are entomophilous (Bottema 1994, 54). Vines, allegedly one of the mainstays of Cretan diet and culture since times immemorial, are self-pollinating. A way around this obstacle is the use of correction factors (R-values), but their application is so far not common, maybe because their validity is restricted by geographical differences (Wilkinson – Stevens 2003, 93).

[55] Bottema 1994, 48; Butzer 1996, 144.

[56] Rackham 2001, 14; Rackham 2003, 58.

guishable from wild legumes so that it is never clear whether one is dealing with cultivated species or untouched vegetation[57].

With regard to man-environment interaction, not even precise dates and an exact account of changes in species composition may be enough, since the pollen data do not reveal the reasons for the changes, making it even harder to pin down human impact[58]. Pollen extracted from archaeological sites are said to have the highest potential in this respect[59].

The biggest problem however is none of these often unavoidable methodological shortcomings, but the utterly unnecessary lack of retrieved plant remains from excavations in Crete. Even in recent projects, where archaeobotanical studies are being undertaken, it is always the walls and the pottery that get published first, *e.g.* in the case of Kavousi Vronda (see below, chapter 8). Admittedly, however, conditions are so unfavourable to preservation of plant remains that even in thorough and state-of-the-art excavations only charcoal can be retrieved, as for example in Pseira or in Kommos. Moreover, as regards the specific focus on the upland regions of Crete, these are most often explored by survey rather than by excavation, so that the situation, appalling as it is in general, is once again even worse for such sites[60].

## 2.4 Archaeozoology

Bone assemblages from excavated sites by no means represent a complete picture of what once was there. Many factors can have an impact on the archaeological

[57] Sarpaki 1992, 72.

[58] Allen 2001, 185. Cf. Roberts 1998, 35: “The interpretation of pollen records in terms of past human impact is, if anything, more difficult than it is for climate.” This is because wheat, barley and other relevant cereals are self-pollinated, hence poorly dispersed and therefore weakly represented in the cores; cf. Willerding 1986, 139 Table 1. According to Roberts, only a combination of changes in the overall composition of species and the presence of indicator species can make human disturbance evident. Vegetables may have been important but do not show up in pollen spectra since they tend to be harvested before developing flowers or fruits (Willerding 1986, 141). See also Wilkinson 2003, 28.

[59] Rowe – Kershaw 2008, 434.

[60] Cf. Driessen – Macdonald 1997, 49 Fig. 4.10 and Sarpaki 2012, 36 for an overview of the available evidence. See also Sarpaki 2012, 35–37 with footnote 10; Moody 2012, 233–235.

record, both before and after it is formed[61]. First of all, hunting and culling are mostly selective, so that only certain species and only a certain age or sex group may be present in the material. Secondly, butchering and use may be restricted to certain parts of the carcass, so that the other parts—the bones of the parts with the least nutritional value—are left behind at the butchering location and do not enter the record at a settlement site, where in turn only those with the best meat and marrow are present[62]. The way in which the bones are disposed of after consumption is also important: they have better chances of survival if they are thrown into pits than if they are scattered on an open surface, where they will be exposed to weather, trampling and scavengers. When they become buried, soil pH, pressure and other taphonomic processes may lead to further loss. Finally, there are modern biases: the retrieval rate on an excavation will hardly ever be 100 per cent[63]. Indeed, one of the fundamental problems in studies of past animal populations is that the importance of recovering faunal remains on archaeological excavations has been realized only quite recently. Early excavators may at best have collected conspicuous mammal bones, but smaller elements as well as fish and bird remains were more often than not missed[64]. A proper reconstruction of the fauna, wild and domesticated, exploited at a certain site is therefore impossible in many cases. Molluscs, insects and other valuable environmental proxies can only be obtained from dry or wet sieving or flotation[65], and as with botanical remains, even where archaeozoological study is thorough, it often gets published later than other things. In surface projects, bones are not collected at all because they cannot be dated[66]. Finally, individual archaeozoologists will apply different listing criteria and thereby create different pictures of the fauna at the site under question[67].

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[61] For a more detailed account see Reitz – Wing 2008, especially 117–152.

[62] Evans – O'Connor 1999, 74.

[63] Bartosiewicz 2003, 28.

[64] The situation has not much improved in Greece since, cf. Hodkinson 1988, 67: "The absence of references to faunal evidence in this paper [. . . ] reflects not the historian's blindness to non-documentary evidence but the failure of classical archaeologists, with recent notable exceptions, to engage in the systematic collection of animal remains on ancient Greek sites".

[65] Experiments have shown that sieving doubles retrieval rates even of large bones (see Payne 1972a). Some bones are so small that they will pass through any mesh coarser than 4 mm (Wilkinson – Stevens 2003, 129). For an overview of malacological analysis in Crete see Karali 1999; Karali 2000; Moody 2012, 254. Snails abound and are regularly eaten in Crete today.

[66] Reese 1994, 192. See p. 178 for an excaption.

[67] See Payne 1972b, 80 for an example.

In order to arrive at sensible interpretations, it is important for anyone working with published faunal data to pay attention to actually what has been counted: the Number of Identified Specimens (NISP) in the whole sample, the Minimum Number of Individuals (MNI) of each species, bone weight, or Minimum Anatomical Units (MinAU). Each of these values would have its own implications, but also its own problems. It has to be borne in mind that different animals have different numbers of bones, which renders uncorrected statistics problematic[68]. For example, some species such as sheep have 'lost' some large bones of the skeleton through evolution. They may therefore be underrepresented in NISP counts in comparison with animals which have a greater number of large bones, even more so if the former were slaughtered when very young. In addition, animals with certain very distinctive bones are likely to reach higher percentages, only because these are easier to distinguish. MNI investigation on the other hand is more susceptible to biases through individual methods of different workers. Bone weight is measured to estimate the amount of meat obtained from a species, but this will not contribute to an assessment of other economic uses of animals[69]. However, in most cases the only available numbers—if any—from Cretan sites are percentages, and any attempt at comparison must therefore remain highly tentative (see Tables 13.3 and 13.4)[70]. In ungulates such as sheep and goats, females and males can be distinguished on the basis of the length of metacarpals and metatarsals, but castration of males will often make their bones longer and thinner, which can disturb these relative ratios. Epiphyseal fusion, which is important for determining the age of the animals at death, also often occurs later in castrated males, making ageing less reliable[71]. Teeth are generally to be preferred for age assessment[72]. The sex and slaughter age of domestic animals are important features of assessing economic strategies. Although these parameters are not always reliable,

[68] See Payne 1972b, 68.

[69] Wilkinson – Stevens 2003, 167–171. See also Payne 1972b; Isaakidou 2008, 92. For bone weight see also Davis 1987, 36. For MinAU see Isaakidou 2008, 94–95; Moody 2012, 235.

[70] Cf. J. Moody's collection of available data in Moody 2012, 238. 244.

[71] Davis 1987, 44; Wilkinson – Stevens 2003, 173.

[72] Teeth are also "less subject to differential preservation due to the effects of age and skeletal maturity on bone tissue robusticity [. . . ]. In addition, teeth continue to undergo changes throughout the life of an animal while sequences of epiphyseal fusion are complete in most ungulates by the age of four years". Successful ageing via teeth eruption requires preservation of mandibles; however, a minimum sample of 30 is suggested (Klippel – Snyder 1999, 53. 56).

a specialization in milk is reflected by high rates of male infant bones, the 'Meat Model' applies where a large number of animals of both sexes is slaughtered in their first year (as subadults), whereas optimization of wool yield requires letting the animals live for four years and more[73].

Nonetheless, animal remains are often used as material evidence for the seasonality of sites: many animals give birth to their young at a certain time of year. Assemblages in which only certain ages are present may hence indicate at what season the site was occupied and the animals slaughtered—though this of course does not in itself preclude year-round occupation[74]. Moreover, such patterns can be manipulated (they certainly are today) or change naturally[75]. The season of death can also be inferred from study of growth rings in animal teeth[76]. More reliable evidence for seasonality can come from species (for example migratory birds) which are not available all through the year (this is true for some plant remains, too—though the ones most likely to survive, namely grains and pulses, can be stored for months if not years)[77]. In areas with a constant snow cover in winter, bones from animals which can or cannot tolerate deep snow can also provide clues[78]; although snow cover is nowadays nowhere permanent in Crete, the higher elevations are (and probably in most periods were) cold enough for most of the year to prevent year-round pasturage, thereby strengthening the case of some form of transhumance (see p. 214). But the potential of bones reaches far beyond economy: it has convincingly been argued that faunal remains can also help to elucidate social differences and structure on both intra- and inter-settlement scale: careful evaluation could allow to distinguish between producer and consumer sites and, because of different consumption patterns, between richer

[73] Payne 1973. See Chang – Koster 1994, 108 for criticism and Halstead 2005, 48–49: "almost any set of dental data could be accomodated to seasonal slaughter by assuming the appropriate combination of early or late birth, precocious or tardy tooth eruption, and fast or slow tooth wear".

[74] Legge *et al.* 1991, 49–50; Renfrew – Bahn 2008, 295.

[75] See Milner 2005, 33; Halstead 2005, 39.

[76] Renfrew – Bahn 2008, 298. See Arnold – Greenfield 2004 for an attempt to prove transhumance from animal bones.

[77] Renfrew – Bahn 2008, 295. 306. See also Payne 1972b, 78–79; Davis 1987, 75–90. Such habits may have changed over time however, see Milner 2005, 33.

[78] Renfrew – Bahn 2008, 251.

**Table 2.1:** Information derivable from bones (Bartosiewicz 2003, 27)

| **phenomena observed** | **possible interpretations** |
|---|---|
| species identification | exploited portion of available fauna |
| absolute and relative numbers of bones | proportion between hunting/herding *etc.* |
| frequency of skeletal elements | modes of exploitation |
| butchering and cutmarks | technical level of processing |
| identification of age and sex | animal keeping, "breeding" |
| pathological phenomena | keeping, nutrition, animal diseases |

and poorer households within a settlement[79]. Some other information derivable from bones is summed up in Table 2.1.

What Sebastian Payne has said about bone samples should apply to all archaeology, indeed to all scientific research: "It is important that particular interpretations should not become immovably enshrined in the literature and in archaeological thought. If an alternative hypothesis is advanced, we should try to judge impartially between the two on the basis of the evidence, rather than require that the old interpretation be disproved before we are prepared to consider the new."[80]

Coprolites or pawprints, which are also potential indicators of animals, are so far not known from Crete. Analysis of phosphates in soils in order to locate areas where animals were kept have not been carried out, but stanols in the ancient fields of Pseira indicate the use of animal feces as manure, even though in this case the animal in question seems to have been man[81]. As has been said above, the biggest problem in archaeozoology in Greece is the degree to which it has been and still is underrated and neglected. The lack of adequate faunal studies from sites in Greece has been attributed to the wealth of other artefacts, sources and data, especially for the Classical and later periods, which are often preferred for analysis and publication. Prehistoric sites, because of the lack of written sources,

[79] Fillios 2007, 44–46.
[80] Payne 1972b, 80.
[81] The relatively low quantities of plant-derived sterols rule out cattle, sheep and goat, and evidence for pig husbandry is lacking on Pseira (Bull *et al.* 1999, 71–72; Betancourt 2005, 288).

are said to often fare better in this respect[82]. In Crete however the focus has always been on the prehistoric sites—but the outcome is the same[83]: faunal data are not available because early explorers (and some not so early ones) aimed at the retrieval of handsome pots and objects, not on collecting bags full of scraps of dead animals.

To sum up: for environmental reconstruction of a macroregion to have a chance of reaching a sensible degree, what is "desperately" needed are problem-orientated surveys that address aspects of prehistoric economy in both lowlands and uplands and which include geomorphological analysis of changing climate, vegetation, water and soils. These surveys will have to be coupled with the excavation of key sites from which floral and faunal remains can be collected and studied[84]. It will become clear in the course of the case study chapters that everything said here refers very much to what data *should* be retrieved in the future and not, alas, what data are available for the present study.

## 2.5 Pictorial evidence

Man-environment interactions were frequently depicted in antiquity, sometimes directly, as in hunting scenes or depictions of agricultural activities, sometimes indirectly and leaving (even) more room for interpretation, *e.ġ.* in the case of votive animal figurines. Occurrences of representations of certain plant or animal species have been used as arguments for their existence and/or significance in the respective society. In the same way, certain details of the landscape setting of a pictorial scene are employed to support notions about the appearance of ancient landscapes. However, translating pictures literally into ancient reality disregards not only potential symbolic meanings of iconography, but also—in many cases the more likely alternative—simple carelessness on the part of the executing artist[85], or a combination of the two. For example, the rocky terrain believed to indicate a mountainous setting suits the identification of a building as a 'peak sanctuary' on

[82] Fillios 2007, 79. 82–83.
[83] See Driessen – Macdonald 1997, 50 Fig. 4.11 for an overview of the archaeozoological evidence available.
[84] As concluded by Tartaron 2004, 186–187.
[85] I am not going to join in the debate about artist vs. craftsman in antiquity here.

a Minoan stone vessel (see Fig. 11.4) and its association with *agrimia* (wild goats). But on an ivory pyxis of the same period, a similar terrain is used as the backdrop of a bull-catching scene (see p. 114)—a much less likely scenario in the mountains. Nonetheless, reference will be made to pictorial evidence whenever appropriate, though with all necessary caution.

## 2.6 Written sources

How many times a day do prehistoric archaeologists around the world wish they had some contemporary written explanation of the archaeological evidence they are struggling to interpret? Surely it all would be so much easier if the Minoans had left texts other than only their administrative lists in a script and language that have not been deciphered yet. But, their attractions notwithstanding, ancient texts are not as straightforward as some people would like to believe. Apart from the custom of some present-day scholars to unquestioningly quote other people's translations or, even worse, their citations of translations[86], one of the greatest dangers of ancient texts lies in leading the reader to assume that everything they describe is true. Writers of all times—including the writer of these lines—are heavily influenced by their cultural and social background which may lead them to believe and write down things as facts which are contorted prejudices, personal interests or politics—which may not always be obvious to detect from our own viewpoint, especially in the case of ancient authors, influenced by an intellectual world which we can only reconstruct through their own texts. This of course applies mainly to literary texts and only to a lesser degree to official documents or administrative records such as those laid down in Linear B. However, even these valuable if rather dull documents hold the temptation of thinking that what was not described did not exist. Like in modern writing, all authors or authorities are highly eclectic in what they choose to include or what they consider noteworthy[87]. This is aggravated by the fact that for many authors the initial purpose of writing was not necessarily the exact description and explanation of their life and times—

[86] Cf. Rackham 1990, 36.

[87] An example which is relevant to this study is agriculture (see Cartledge 2002, 20; cf. Osborne 1987, 16–17).

many things would not have required special attention to be understandable to the readers for whom the text was written, and we are at a loss today to try and follow[88]. With respect to Crete, many Greek and Roman authors wrote about distant times and in many cases about places they had never visited[89].

## 2.7 The archaeology of landscapes

*Archaeology is basically about three things: objects, landscapes and what we make of them.*

C. Gamble, Archaeology. The Basics (London 2001) 15

Is this study concerned with landscape archaeology or with environmental archaeology? The most important terms of this study, 'nature', 'environment' and 'landscape', are notoriously difficult to define[90], and any attempt could (and has done) easily fill a book of its own. Broadly speaking, there is nowadays a fundamental divide between positivist and realist on the one side and constructivist perspectives on the other[91]. Realism holds that objective knowledge is possible; positivism asserts that such knowledge must be based on empirical experience. A positivist view, which is a trademark of lots of geography and 'sciencey' subjects,

88 For some useful thoughts on written documents and how they enter the archaeological record see Galloway 2006, 49–51. See also Binford 1983, 20–21; Whitley 2001, 59. For the use of texts and artefacts in Classical Archaeology see Small 1999.

89 In the words of A. T. Grove and O. Rackham: "We are suspicious of authors who wrote about places that they had not been to, or times long past. Some, such as the Roman pseudo-zoologist Aelian, mixed fact and fiction and seemed not to care which was which. Crete was a legendary, little-visited land about which even Plato felt at liberty to write nonsense" (Grove – Rackham 2001, 18).

90 James McGlade suggests that since terms like 'environment' or 'ecosystem' cannot be defined properly, one should speak of 'human ecodynamics' (as opposed to 'human ecology') and socio-natural systems (McGlade 1995, 126). See Redman *et al.* 2004, 3–4 for the characteristics of human ecosystems as opposed to other biological systems. On problems with all these terms see also Olwig 1995, 307–313. For an evaluation of landscape archaeology see Fleming 1996 (with a remark on the relation to environmental archaeology on p.83) and Wilkinson 2003, 3–6. See also Haupt 2012, 12: "Eigentlich sollten wegen der gravierenden politischen und emotionalen Aufladung des Begriffes „Umwelt“ nur solche Forschungen als Umweltarchäologie bezeichnet werden, denen die Trennung zwischen Menschen und ihrer Umgebung sowie die Interaktion beider zugrunde liegen. Landschaftsarchäologie sollte Fragestellungen zum Gesamtsystem nachgehen, bei denen Menschen nur einer von vielen agierenden Teilen sind."

91 See Gailing – Leibenath 2012.

sees ‘landscapes’ as objectively existing parts of the earth’s surface. They are units of physical space: the spatial-relational arrangement of objects independent from social and individual observation, or Karl Popper’s World 1[92]. In the same vein, a positivist researcher would hold that ‘the environment’ is an absolute entity that it is possible to analyze and describe in its totality. In opposition to this, from a social-constructivist perspective, reality is socially constructed. The same piece of land can therefore represent an infinite number of landscapes: it is different for everyone. In the same way, all research is influenced by the social and personal background of the researcher and by fashions and trends in science; there is no absolute truth. Therefore, there can be no such thing as environmental “reconstruction”, there is only our own new *construction* of the past[93]. Landscape is seen as the product of the entanglements of individual perception and social interaction[94].

Landscape is, in common usage, often thought of as equalling nature. Some scholars hold that this would have been true until the 14th century: It is often stated that the concept of landscape, the first reflected viewing of landscape, was initiated by Francesco Petrarca’s description of his climbing Mont Ventoux in France in about 1336[95]. The difference between his musings and everything that

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[92] Popper 1979, 154; Kühne 2008, 40; Kühne 2013, 17. 130. One geographer’s definition of landscape reads as follows: “die stoffliche und energetische Quintessenz aus dem ungeheuer vielfältigen und in allen Dimensionen von Raum und Zeit variierenden Zusammenspiel toter und lebender natürlicher Materie, d. h. die Gesamtheit aller Stoff- und Energieflüsse zwischen allen beteiligten Sphären, den Menschen und seine direkten und indirekten Eingriffe in die natürlichen Kreisläufe eingeschlossen” (Seuffert 2000, 37–38). A much shorter, but equally ecology-orientated definition equates ‘landscape’ with an “area of the earth’s surface with a characteristic arrangement of ecosystems” (Vos – Stortelder 1992, 14). For different usages of the term in geography see Wernli 1958, the contributions to Pfaffen 1973 and Hard 1977. See also Haupt 2012, 13–15.

[93] Kühne 2013, 18–19; Küster 2009, 16. See also MacCormack 1980, 6; Schama 1995, 12; Haupt 2012, 20–21.

[94] Athanassopoulos – Wandsnider 2004, 9; Gailing – Laibenath 2012, 97; Kühne 2008, 31; Kühne 2013, 205–236 and *passim*. Cf. Cosgrove 1998, 14 and Sjögren 2008, 195. McGlade 1995, 113: “we have two polar extremes—landscape (perceived) as a hermeneutic entity versus landscape (real) as physical fact”. He goes on to stress (114) that what we call ‘nature’ is not neutral either, but just as much “a product of social, political, economic and ideological forces within which it is historically situated”. Cf. the ‘inherent’ and the ‘explicit’ approach suggested by Johnston 1998, 57. 61. T. Darvill speaks of landscape as a subject as opposed to landscape as an object (Darvill 1999, 105–106). See also Olwig 1995, 339–340; Layton – Ucko 1999, 2.

[95] For the date see Schröder 2011, 45–46 with further references. For the implications of Petrarca’s letter with regard to the concept of landscape see Ritter 1974; Groh – Groh 1991, 109.

came before, including for example Pliny's description of his rural villa with its setting (Plin. Ep.2,17), is that Petrarca for the first time not only described the elements of the scene he saw, but connected and associated them to what he already knew. This is, it has been argued, the fundamental difference between 'nature' and 'landscape': Nature exists and changes, whether we notice it or not, whereas landscape only comes into being through our own reflection of what we see[96]. In other words, there is no landscape without an observer. Without the observer's view which unites it, it crumbles into an unstructured pile of random elements. 'Nature' should hence denote the real physical world, whereas 'landscape' should be used for the perception of our surroundings (not limited to 'natural' elements, but "[a]lles, was der Mensch in seiner Umgebung wahrnimmt und was er in einen Zusammenhang stellt"[97]). In a 1962 article that is widely cited in landscape theory, especially in Germany, Joachim Ritter names as one of the preconditions for the modern experience of nature the freedom from practical purposes. Only when nature is no longer primarily something that needs to be coaxed into granting the individual his survival, does it become possible to regard it as something aesthetic (see also p. 40)[98]. Although Ritter may be right in stating that people living in daily interaction with the land tend not to indulge in admiring its beauty[99], Ritter's idea of 'landscape' is far too narrow. After all, all humans have a sense of space, and according to Funken and Löw, there is no social space that isn't also constituted by material aspects, and there can be no material space that is not socially interpreted[100]. A socially interpreted space out in the open is a landscape, whether it is deemed beautiful or not.

In a constructivist perspective, nature and landscape are two different terms, but neither of them is real or physical in an absolute sense. Both are constructions of the human mind. Recent approaches in archaeology tend towards such a

[96]Küster 2009, 8–10. 15. This is the same opposition as between material and social space as described by the sociologist Pitrim Alexandrowich Sorokin as early as 1927 (see Funken – Löw 2002, 84–87). Cf. the section on hodological space below. See also Bourdieu 1991.

[97]Küster 2009, 10. See also Ingold 2000, 190–193. 200.

[98]Ritter 1974, 151. 162; Groh – Groh 1991, 93. 97–100. 105. Contra: Hirsch 1995, 13. Cf. Kühne 2008, 31. According to Williams 1972, 153–156, "the most critical question [...] was whether nature included man" and the "abstraction of man" is the basis for all "more rational ideas of nature".

[99]Ritter 1974, 146 with endnote 25.

[100]Funken – Löw 2002, 85.

social-constructivist perspective, succeeding a number of other schools of thought: Landscape archaeology can be argued to have started off with a cultural-historical approach, the foremost example of which, especially to British landscapes, is W. G. Hoskins with his trademark book 'The Making of the English Landscape'[101] (1955). In contrast to his empathic evaluation, processual archaeology from the 1960s onwards demanded that objective, scientific principles were applied in landscape studies—see for example the works of Karl Butzer or Lewis Binford. This model-heavy approach however bore the danger of ecological determinism[102]. Moreover, even though man is seen as inseparable from the ecosystem[103] in which he lives, interaction is assumed to take place on a purely physical level. Focus is often on the environment as an economic territory. Social and cognitive aspects are not explored. Such criticism resulted in numerous new approaches of post-processual archaeology. To a certain extent, the choice of approach is also dependent (because of tradition, not of necessity) on the geographical area of research: It has been noted that landscape archaeology in the Mediterranean tends to use surveys as a means of reconstructing a "landscape of activity" for a specified period in (pre)history. In contrast, in Britain and northern Europe the idea of experience and (collective and individual) perception has a much stronger tradition[104]. One of the most influential and most debated post-processual approaches in landscape archaeology is the cognitive dimension added by Christopher Tilley, emphasizing the phenomenology and subjective sensual perception in and of a landscape. Some of the fundamentals of the phenomenological approach have been described as follows: "what we are effectively doing is entering into the same set of material relationships in which people found themselves in the past, in order to produce our own interpretation. [...] we certainly cannot get inside the heads of past

[101] I suppose it must be this kind of landscape archaeology which J. Rossignol characterized as having an "explicitly historical emphasis, method and interpretation" and as not incorporating ecological or geological system variables (Rossignol 1992, 4). For a history of landscape archaeology see also Turner 2013.

[102] Butzer 1982 (see for example p.31 Fig. 2.6); Binford 1983, 203: a system will retain its stability until human impact causes change and forces man to adjust.

[103] This term was first introduced by A. G. Tansley to mean "not only the organism-complex [in a given region], but also the whole complex of physical factors in the widest sense" (Tansley 1935, 299).

[104] Fitzjohn 2007b, 145. An example for a more perception-focussed study of a Mediterranean landscape (in Cyprus) is Gibson 2007. See also Bek 2007, 203–204.

people through an act of empathy. But we can put ourselves inside a set of material circumstances which were integral to a meaningful world in the past. [...] Our engagement with the material traces of the past does not give us access to past experiences, but it provides a basis for understanding how far they may have been unlike our own"[105]. Although many doubts can be raised about some of these ideas, it is unquestionable that when it comes to understanding a site in its setting, "[t]here is no substitute for personal experience [...]. To understand landscapes phenomenologically requires the art of walking in and through them, to touch and be touched by them. An experience of landscape mediated by trains or cars or airplanes is always partial or distanciated"[106].

The phenomenological approach hence does not involve landscape reconstruction[107] so much as reconstruction of human cognitive interaction. The obvious problem with this is that the landscape may have (or, some would say, must have) changed and with it all potential varieties of experience. Especially important is the possible variation in tree cover on which visibility often depends[108], but obviously all landscape studies, phenomenological or other, are hampered by this[109]. Moreover, landscapes are always palimpsests of the influence and ideas of many successive individuals and groups of people. Phenomenological studies are also concerned with the way in which social and individual memory are intertwined with

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[105] Thomas 2001, 180–181. It has been argued that it is very hard if not impossible to try and perceive nature in an un-western way, an example being contrary notions of 'wild' (Devall 1980, 305). Cf. Kühne 2008, 31, who compares the way a Christian and a Muslim would view a wine-growing area. See also Haupt 2012, 14–15. For an attempt at reconstructing the way the ancient Greeks and Romans perceived landscapes and space see also Bek 2007; for implications for Minoan art see Herva 2006.

[106] Tilley 2008, 271–272. Cf. Forbes 2007, 46. If it is true that "[t]o be a good phenomenologist is to try to develop an intimacy of contact with the landscape akin to that between lovers" (Tilley 2008, 275), I strongly recommend traversing Crete on foot, since this easily allows one to continuously get into whole-body contact with rocks, plants and other essentials of the landscape.

[107] "[W]e only need to look at the *de facto* absence of the use of palaeoenvironmental evidence in much phenomenological writing in archaeology" (Walsh 2008, 547–548).

[108] This also means that the clearing of forests for fields in the Neolithic in many regions must have utterly changed perception of the landscape as a whole, but also of contours and shapes (Tilley 2007, 273). See also Palang *et al.* 2007b, 10: both visibility and accessibility can change with the seasons.

[109] "Without some idea of how much of the landscape has been lost as a result of taphonomic processes, we cannot even start to understand the landscape that survives" (Wilkinson 2003, 219).

landscapes[110]. The element of subjectivity is accordingly undeniably large[111], but in contrast to other approaches, there is no attempt to generalize; all phenomenological studies are quite particularistic[112]. Moreover, S. Wallace's study of the settled landscape around Karphi in Crete has shown that "[p]henomenological explorations need not involve endless thick description; extreme subjectivity; superficial, overgeneralizing, or functionalist explanation; disregard for time depth; or a lack of attention to the most prosaic, everyday human activities"[113]. Besides its interpretative value, the great advantages of phenomenological landscape archaeology are that it is non-destructive, low budget and does not require permission from government bodies, so that everyone can engage in it. New technologies can to some extent counterbalance subjective interpretations: computer modelling can, for example, help to overcome the problem of changing visibility ranges in respect to different vegetation. Unfortunately, with respect to Crete little use has been made of these techniques so far: "The integration of the phenomenology of landscape with GIS has led to profound insights into how ancient peoples configured the sacred within their surroundings. Aegean archaeologists have yet to pursue these insights in any serious way"[114].

[110] "[E]ach generation inherits a landscape, much as an individual or a family might inherit a house; each generation uses that property, changing it, adapting it to new needs, new demands, so passing it through a filter of use. Thus, the inherited landscape, the inherited house, will contain a mixture of features, some of them relatively old, some relatively new, and by adding some completely new elements and changing or wholly destroying inherited elements, each generation bequeaths the present to the future" (Roberts 1987, 80–81). Cf. the works of S. Schama (1995) and S. Alcock (2002). For an introduction to landscapes as heritage see Muir 1999, 37–44. Cf. also Wilkinson 2003, 7; Tilley 1994, 27: "Movement in the world always involves a loss of place, but the gaining of a fragment of time". It can be criticized that the phenomenological approach to issues such as memory, power and identity is essentially derived from existential philosophy and that it is far from certain "whether most peoples around the world both now and in the past have thought like existentialist philosophers" (Forbes 2007, 18. 21).

[111] Cf. Muir 1999, 115–123. Interestingly, landscape taste, *i. e.* what kind of landscape a person considers beautiful or pleasant, is largely culturally determined (Muir 1999, 194).

[112] Tilley 2008, 273. See also Sjögren 2008, 196.

[113] Wallace 2007, 267. Cf. below, footnote 140.

[114] Peatfield 2009, 251. Cf. Peatfield 2007, 298. See however the work of Soetens *et al.* 2002, Soetens *et al.* 2003 and Soetens *et al.* 2006. Predictive modelling of the modern vegetation of the Lefka Ori has been attempted by Vogiatzakis – Griffiths 2006.

Although all these approaches have advantages, none of them can, by itself, serve as a *modus operandi* for the present study[115]. For as much as I am in favour of a critical assessment of the respective background of a researcher, in order to move forward at all in what is anyway a highly relativistic field with little or no certainties, I agree whole-heartedly with Grove and Rackham, who have lambasted the phenomenological approach for paying too little attention to reconstruction of the physical landscape: "There is little point in studying them without first ascertaining what it is that people are attitudinizing about"[116]. Maybe even more fundamentally, John Bintliff criticized that if all space and landscape is socially constructed by human intellect, "we now realize that this also leaves the inhabitants of the pre-human Earth in a sorry state of not having any space at all to live in"[117]. The same is true for elements of nature: even though it may be impossible for a human being to perceive and describe their totality, it is difficult to sustain that everything that this perception or description misses does not exist. Likewise, even though differences in perception can be huge, it cannot be denied that there really *are* differences in the existing landscapes: "Only a very determined epistemological sceptic will refuse to accept that Holland really is flatter than Switzerland."[118] I therefore trust that, all relativity notwithstanding, readers will agree that some sort of definition of certain terms has to be used for the present study, even if, as with all definitions and despite the implications of the term, they will not be *definite*.

'Nature' is used in everyday language in a number of disparate meanings: for the pristine state of the world before humans; for the world outside the city limits; for plants and animals as opposed to manufactured objects; for the essence of a person's character; for anything, material or behavioural, that someone wishes to prove to be morally right[119]. Paul W. Taylor used the term 'natural' for ecosystems in which "the biological and environmental factors determining the structure of relationships holding among their constituent species-populations take place

[115]See also Walsh 2008, 547–548, who laments the split in archaeology between environmental, 'scientific' writing on the one side which does not take cultural factors into account, and purely phenomenological approaches on the other side, which does not consider 'hard' facts as relevant.
[116]Grove – Rackham 2001, 12
[117]Bintliff 2009, 27.
[118]Buxton 1994, 81.
[119]Cf. Williams 1972, 151. 156.

without human intervention"[120]. Taylor thereby separates man and nature *conceptually* but not *physically*, that is to say, he acknowledges the fact that 'nature' is a concept devised by the human mind, but he views man as a part of nature and denies his superiority with regard to other species.

'Nature' was and still is often contrasted with 'culture'. The relationship between nature and culture was explored in the 1930s by the Frankfurter Schule of philosophy: according to M. Horkheimer and T. W. Adorno, by becoming more and more independent from nature, man achieves supremacy over nature—but also grows more and more estranged from it. According to O. Kühne, landscape can be seen as a manifestation of this supremacy[121]. In a similar vein, J. Ritter stated that aesthetic enjoyment of nature is preconditioned by freedom from and social dominance over nature[122]. Social anthropologist Claude Lévi-Strauss postulated a binary structuralism as the basis of human existence and experience and 'nature' and 'culture' as one such pair of contrasting concepts[123]. However, all such attempts to define nature by contrasting it with a supposed opposite have now been said to have largely failed[124]: Although the terms 'humans' and 'nature' are often used as opposites, it is difficult to uphold that humans are not natural. Everything that humans make is hence natural as well, even nuclear power plants. In a constructivist perspective it must therefore follow that nature comprises *everything*—of which it is impossible to have a notion. If it is not nature, but a cultural construction of 'nature' that we are dealing with, and one follows this approach to the end, the result is that it is impossible to say what is nature because everything is culture[125]. What is more, "[w]e can make no distinction between the 'reality' of nature and its cultural representation that is not itself conceptual, but this does not justify the conclusion that there is no ontological distinction between

[120] Taylor 2011, 4.
[121] Horkheimer – Adorno 1986, 12; Kühne 2013, 167–168.
[122] Ritter 1974, 162.
[123] Lévi-Strauss1962, 152–155. For criticism see MacCormack 1980, who also states that Lévi-Strauss later modified his views.
[124] Böhme 2010, 435–436.
[125] Böhme 2010, 435. 437. Cf. Darvill 1999, 107: "Taken to its logical extreme, there can by definition be no such thing as a 'natural landscape'; the very concept of what is 'natural' in contradistinction to what is 'not natural' is a cultural construct susceptible to redefinition at any time. As soon as something is categorised as a natural landscape, it ceases to be so because, at that moment, it has been brought into the realm of the social." See also Ingold 2000, 40–42.

the ideas we have of nature and that which the ideas are about: [...] since nature is only signified in human discourse, inverted commas 'nature' *is* nature, and we should therefore remove the inverted commas"[126].

Attempts to distinguish between 'environment' (or 'nature') and 'landscape' in terms of pristine vs. modified[127] likewise fail; it has frequently been pointed out that there is no such thing as pristine, untouched nature[128]. As we have seen, there are serious problems with defining the environment as the physical reality and contrast it with landscape as the perception of human beings. Therefore, in order to acknowledge the constructivist viewpoint that objective knowledge about the world is not possible and still not lose the basis of an attempt to study man-environment relations in the past, it is necessary to define 'environment' as follows:

> The term **'environment'** is used here to describe the 'totality' of the world that surrounds a hypothetical human being at a certain point in time, including elements largely brought about by human beings (*e. g.* built structures) and other humans. The fact that this totality can never be an absolute total but will always be socially constructed by the respective researcher is fully acknowledged here.

There is also the problem that "to speak of man 'intervening' in natural processes is to suppose that he might find it possible not to do so, or decide not to do so. Nature has to be thought of [...] as separate from man, before any question of intervention or command, and the methods of ethics either, can arise"[129]. Although I am aware of the problems of such usage and indeed I insist that humans are part of nature,

> the term **'nature'** is used here to signify the 'totality' elements on the surface of the earth that are not largely brought about by human beings (*i. e.* stones, primeval forest, the sea, weather, wind *et cetera*), no matter whether they are part of a human being's environment or not and independent of the perception by human beings.

[126]Soper 1995, 151.
[127]Terrell – Hart 2008, 328. McGlade calls the classification into 'human' and 'environment' "a false dichotomy" since the two are reciprocal and coevolutinary (McGlade 1995, 115). See also Jamieson 2008, 162–168 for some thoughts.
[128]See for example Williams 1972, 156–157. See also Taylor 2011, 4–5.
[129]Williams 1972, 154)

As for landscape, the difficulties of definition are so large that a recent publication has called for abandoning any attempt[130]. Nonetheless, for the purposes of this study,

> the term **'landscape'** is defined as the perception or description of a regional division of nature by a human being, be it people of the past or a modern researcher, including myself. This entails that "the 'natural landscape' has been reorganized either consciously or subconsciously for a variety of religious, economic, social, political, environmental, or symbolic purposes"[131]. This reorganization can be physical or purely in the mind.

The scale of such a unit can vary enormously; its boundaries are a cognitive construct and mostly arbitrary (see below, section 2.9).

### Landscape archaeology fieldwork: surveys

In much the same way in which humans must be perceived as a part of the environment, as only one member of the great community of nature, influencing and interacting with many other constituents, sites must be seen as such components of the landscape. An important advance through landscape studies is that whereas in the past, excavation projects were largely or even purely focussed on one site, the increasingly frequent implementation of surface surveys (fieldwalking) has made it possible to sample a whole landscape. This led to the realization that knowing where sites *were* had an equal significance to knowing where they were *not*[132]. Literature on the subject, theoretical as well as practical, is vast, and it is impossible here to recount the complete development, plus all problems and advantages of this

[130] Gailing – Leibenath 2012, 95. For a discussion of the various definitions of landscape and their evolution over time see Cosgrove 1998, 9. 13; Knapp – Ashmore 1999, 1–10; Muir 1999, xv. 2–12. 215–221; Thompson *et al.* 2013, 1–2; Antrop 2013. For the history of the German term 'Landschaft' see Müller 1977; Kühne 2008, 20–23. For difficulties in international landscape, not least because of the different usages of the respective terms, see Howard 2012, 63–67.

[131] Wilkinson 2003, 3–4. "Landscapes are culture before they are nature; constructs of the imagination projected onto wood and water and rock" (Schama 1995, 61). My definition is fairly similar to that used in the European Landscape Convention by the Council of Europe: "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (<`http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm`> (23/4/2013).

[132] Mee – Forbes 1997, 3.

fieldwork strategy[133]. But just as with all other kinds of sources, it is necessary to subject survey results to some sort of critical evaluation[134]. For example, attractive statements such as "there was an increase in sites in period B as compared to the preceding period A" must be treated with caution unless research strategies are made explicit: the term 'site' needs to be defined (how many sherds make a site?), the intensity of survey plays a vital role, as does the size and representativeness of the sample; in addition, unless sites are securely dated, no comparison between periods is tolerable[135]. However, it is clear that like all other things in life, survey practice can present difficulties that have not been anticipated in research planning. An example for such an experience is the Methana survey project of Christopher Mee and Hamish Forbes, which had to cope with surprisingly spiny vegetation: "Having accepted that strict adherence to the finer tenets of field survey theory as discussed in the literature at that time might lead to sudden death, or at least serious loss of blood, we were able to devise a system which would leave both the main points of the theory, and the survey crew, intact."[136]

Problems in survey data include detection probabilities (visibility, intensity, differential preservation), the reliability of crew observations, biases in the characterization of finds and variations in collection methods[137]. An awareness of these issues is not only important for assessing the value of any single survey, but also for the comparison and combination of the results from different surveys, for example to compare settlement patterns in individual regions. As the case studies will make clear, dating is often one of the most severe problems, since the majority of potsherds found are coarse ware, which by its very nature is not chronologically sensitive.

Having said all this, it is beyond doubt that surface surveys are useful to establish where people were, and thereby to define the geographical characteristics

[133] See for example Banning 2002.
[134] See Banning 2002, 217–228.
[135] Alcock – Cherry 2004, 5.
[136] Mee – Forbes 1997, 3–4.
[137] Banning 2002, 217–228. For example, a prevalence of pottery classed as tableware at certain sites in Lakonia led W. Cavanagh and C. Mee to state: "Whilst it is tempting to conclude that the EBA inhabitants of Lakonia were more provident than their Mycenaean successors, and that the collapse of Mycenaean civilisation was due to the fact that they were permanently drunk, the more plausible explanation is that sherds of goblets and *kylikes* are more easily recognised in surface assemblages than their cooking and storage counterparts" (Cavanagh – Mee 2007, 15).

of the locations chosen by them, and for most mountain regions in Crete, this remains the only mode of systematic exploration applied (if any at all). Unfortunately, most surface surveys will only record the density of potsherds, and just like stone walls in excavations, which are often the first (or only) thing to be published, in most cases they will not tell us much about the impact of people on their environment. They cannot reveal the permanence or seasonality of a site nor the species of plants and animals exploited by people, which I consider to be among the most interesting questions to be asked[138].

Much could be gained however if all surveys were conducted and published as thoroughly as the Sphakia Survey, with all sites found in the survey recorded, described and illustrated in a publicly accessible database[139], with elevations and fabric types, which enables everyone to ask their own questions and find at least numerical answers, rather than having to rely not only on the fieldwalkers' eyesight (something that cannot be helped), but also on their concluding interpretation of the results, the basis for which is in the best of cases summed up in a couple of sentences, after which one or two particularly prominent sites are picked out and the rest forgotten, as in the case of the Ziros survey (see below, chapter 9).

The sites themselves should be examined with respect to geographical features such as topography and slope, water, orientation, exposure and sun. Whereas traditionally a site was seen at best in its landscape context, with the landscape as a backdrop to it or sometimes even as a cultural determinant, nowadays sites are perceived as just one integrated part of a landscape, the latter having a fundamental impact on the everyday experience of the people inhabiting it. It has been stressed that it is this everyday experience on which archaeology should focus if it is to achieve more than simply an assessment of the location of settlements in a geographical region[140].

The scantness of definite evidence from antiquity on the one hand and the abundance of what seem to be 'traditional' patterns of rural life in Crete have

[138] Even the strategy described by Wiseman – Zachos 2003b, 9 may not be sufficient. Cf. also Roberts 1987, 86; Chaniotis 1991, 93; Maise 1998, 217 (faunal and botanical data are much more meaningful for climatic influences than settlement patterns); Cartledge 2002, 21; Tartaron 2003, 26; Cavanagh – Mee 2007. For a seemingly slightly more positive view see Alcock 1999, 179.
[139] Nixon *et al.* 2000.
[140] Fitzjohn 2007b, 143. 146. Cf. Tilley 1994, 27; Wallace 2007, 267.

made ethnographic analogies popular; the most ambitious projects can be labelled ‘ethnoarchaeology’. Ethnoarchaeology is “neither a theory nor a method, but a research strategy embodying a range of approaches to understanding the relationships of material culture to culture as a whole, both in the living context, and as it enters the archaeological record, and to exploiting such understandings in order to inform archaeological concepts and to improve interpretation”[141]. Like environmental studies and all of archaeology, ethnoarchaeology relies on the principle of uniformitarianism: hypothetical analogies are possible because people of the past are assumed to be not fundamentally different from people today[142]. Therefore, analysis of present-day behaviour (preferably in suitable, *i. e.* comparable social and environmental settings) is believed to allow drawing conclusions about the way of life of a particular group in the past. The value of ethnoarchaeology can hardly be doubted, since it does provide clues to the many possible ways in which people may interact with their environment (and with each other). But there is a danger in such studies, too, in that they can make it difficult to imagine that behaviour may have been different in the past, or block the mind to think of other possibilities: the behaviour of past people may not follow patterns that we today would deem reasonable, and the concept of uniformitarianism is hence debatable[143].

As always in archaeology, I strongly believe in the indispensability of an integrated approach which makes use of both scientific environmental archaeology and of phenomenology, of textual sources and of aerial photographs, of survey and of excavation[144].

[141] David – Kramer 2001, 2; cf. their comparative table of definitions by other authors on p. 12.
[142] See Hodder 1982, 9; Renfrew – Bahn 2008, 26; Albarella 2011, 1–2.
[143] Prof. Dr Thomas Meier (Heidelberg), *pers. comm.* 2012. Another source of error lies in the subject of study itself: “there is the tendency of Greek peasants to tell “outsiders” exactly what they want to hear” (Damer 1988, 292). For a critical account of the benefits and dangers of ethnoarchaeology see Renfrew – Bahn 2008, 190–192. See also Eggert 2001, 338–352; Albarella 2011.
[144] Cf. Wilkinson 2003, 10: “Ideally, landscape studies should therefore involve field mapping of archaeological sites and off-site features, scientific analysis of soil and environmental data, the employment of a linguist or ethnographer, a sense of phenomenological issues, and epigraphy.”

## 2.8 Sacred and symbolic landscapes

H. Cancik's classic definition of a sacred landscape reads as follows: "sacred landscape is a constellation of natural phenomena constituted as a meaningful system by means of artificial and religious signs, by telling names or etiological stories fixed to certain places, and by rituals which actualize the space"[145]. Although this could certainly be much debated, it is useful enough as a definition in the present context. Interestingly, the 'Handbook of Landscape Archaeology' (David – Thomas 2008) does not incorporate a chapter on sacred landscapes, and references to the question of sacredness of landscapes are very sparse. This is surprising since even if it can be disputed whether a landscape as a whole should or can be designated as 'sacred', it is a commonly held opinion that "all cultural landscapes contain spiritual presences"[146]. Some scholars find this still too restrictive: "While spiritual landscapes are undeniably symbolic, not all symbolic landscapes are spiritual"[147]. It seems to me however that everyone should be able to agree that "all landscapes are symbolic"[148], and a special stress should be placed on communal memory[149].

Such associations of past people may not always be easy to detect in the field. It has been noted that archaeologists seem to be reluctant to identify religious sites in the landscape during survey, possibly because in earlier studies, 'suspicious' places such as mountain tops were sometimes too readily classified as cultic locations[150]. However, comparative investigations have shown that there *are* certain natural features which are frequently considered as sacred places all over the world, namely those that "invoke [. . . ] feelings of awe, power, majestic beauty, respect, enrichment". These are: "1) places 'where the results of great acts of natural transformation can best be seen, such as mountain ranges, volcanoes, steep valleys or gorges', 2) points of relatively abrupt transition in geology, hydrology, vegetation, or some combination of these; 3) unusual elements that 'one comes upon suddenly'; and 4) vantage points with dramatic views. These same kinds

[145] Cancik 1986, 260. For a concise introduction to the topic see also Panagiotopoulos 2008, 118–119.
[146] David *et al.* 2008, 158. Cf. Wilkinson 2003, 219.
[147] Crumley 1999, 272. Cf. Ashmore – Knapp 1999, 12.
[148] Cosgrove 1989, 125. Cf. Muir 1999, 212–241.
[149] Crumley 1999, 271. See also above, footnote 110
[150] Alcock 1996, 252. An example is Krämer 1966.

of points can suggest junctions between mundane and supernatural realms, often identified as an *axis mundi*, or the center of the world"[151]. Caves, mountain tops and water features crop up most often as places with a cultic significance[152].

Nevertheless, humanly modified nature can be regarded as sacred, too, as exemplified by Chinese gardens[153]. According to P. Fickeler, sacred landscape features are often connected to each other, for example a sacred area and a sacred water, thereby forming "kultreligiös bedingte Naturschutzgebiete"[154]. An example of a sacred landscape, though not a 'religious nature reserve' as described by Fickeler, is the 'heartland' of the Inca in Peru. The Cuzco Basin with the 15th century AD Inca capital of the same name, at 2800–3200 m altitude in the Andes, was regarded as a Sacred Valley and formed the ideational core of the Inca empire. The surroundings of the city were tied together by a system of 328 shrines situated along 42 lines (*ceques*). These shrines were situated at conspicuous natural features such as hills, caves, rock outcrops or springs[155]. This structured landscape was not purely sacred or ritual though; both the valley bottom and the surrounding slopes were naturally used for agriculture or, especially the higher ranges up to 4700 m, as pasture[156]. A similar symbolic integration of cities into what was in parts a sacred landscape was achieved by the Maya[157]. A network of mountain sanctuaries existed in the First Palatial Period in Crete; the visual connections would have created a sacred landscape for worshippers at these shrines (see below, chapter 11.1). It should be clear in general that the presence of a sacred monument

[151] Ashmore 2008, 168, citing Taçon 1999, 36–37. For just two examples see Messerschmidt 1989; Soetens 2009, 262.

[152] For example in the perception of the ancient Greeks, Romans, the Hittites, the Aztecs and the Inca. Cf. Bradley 2000, 22 and see section 4.4.

[153] Shaw 1993, 662 (with references).

[154] Fickeler 1975, 93.

[155] Bauer 1998, 49–134. Radial lines which may be connected to the Inca Ceque system can today still be noticed in the landscape. In the arid highlands of Bolivia and Chile, they lead from small village churches to isolated shrines and cairns (Bauer 1998, 150–154). Cf. Sallnow's remark about the present-day (Christian) Andean population: "The Andean landscape is imbued with sacredness. Human destinies are in part determined by chthonian powers, in the spirits of mountains, rocks, springs, rivers, and other topographic features" (Sallnow 1991, 141). Cf. Messerschmidt 1989.

[156] Covey 2006, 38 (with Table 3.1). 39–46. Cf. restrictions to woodcutting, agriculture *etc.* in and around sanctuaries and on land belonging to the sanctuary in ancient Greece (Dillon 1997, 115–122; Horster 2004, 92–138; Howe 2008, 88–93). See also McInerney 2010, 165–166.

[157] De la Garza 2002, 172.

or mountain does not necessarily mean that the whole landscape was given over to ritual[158].

## 2.9 How to define a region?

Where does one landscape end and the next one begin? The word 'landscape' seems to me to imply also, besides what has been said so far, a certain limitedness; a landscape does not go on endlessly in all directions, but is delimited in some sense from its surroundings[159]. The same applies to a 'region', although a region can contain several landscapes, whereas the other way round seems like a less sensible notion[160]. In both cases, the criteria by which such decisions are made can be quite arbitrary, for different reasons. First of all, all such divisions are socially constructed. "Landscapes do not have defined physical limits either in time or space, except where imposed by analytical procedures and intellectual traditions"[161]. Archaeological fieldwork projects are inevitably restricted to a certain region, larger or smaller, but always defined by the scholars concerned with the study. Limitations in money and therefore in time and publishing space leave no other choice, but it should also be said that at a certain point, the mass of data would become very inconvenient to handle for both the researcher and the public (*i. e.* other researchers)[162]. Although it is—in the present study, too—impossible therefore to dispose of this *modus operandi*, it should always be made clear that it is an artificial convention and not something that is necessarily inherent in the environment, let alone congruent with the perception of past people. After all, "der Natur gegenüber ist jede Grenzsetzung Willkür"[163]. Human beings of course tend to divide the world into portions of some kind, but this is, according to G. Simmel, not something that is dictated by spatial features: "Die Grenze ist nicht eine räumliche Tatsache mit soziologischen Wirkungen, sondern eine soziologische

[158] Wilkinson 2003, 207.
[159] See also above, footnote 130.
[160] Cf. Walsh 1999, 5. For the scale of landscapes see also Howard 2012, 49–60; Kühne 2008, 87–88.
[161] Darvill 2008, 69.
[162] The limitations of Aegean-wide synopses and the pitfalls of looking at the whole island have been pointed out by Wallace 2010, 8–9. See also Haupt 2012, 14.
[163] Simmel 1968, 465.

Tatsache, die sich räumlich formt"[164]. We will come back to this idea later in the section on mountains as (potential) boundaries.

## 2.10 Mind the map: the concept of hodological space

Modern topographic maps are wrong. They are wrong in many ways, the perhaps least significant (though potentially most annoying) of which is the way in which they indicate the presence of tracks and roads where there are none, as anyone who has ever tried to hike in Crete will be very aware. This flaw is of minor importance here, entertaining and time-consuming as it is; it should also be clear that in most cases a modern map will be misleading as far as antiquity is concerned since landscapes are subject to change[165]. What is of more consequence is that maps "are as notable for what they omit as for what they depict"[166]. Modern maps are drawn according to western conventions about the representation of mathematical space. They are a far cry from the *Lebenswelt* of ancient individuals, and do not even approximate the experience of terrain: two places, sites, villages *et cetera* may be very close to each other on a map. But in reality, there may not be a connecting path or route between them, they could be on either side of a mountain[167], or one could be in a valley and the other on a peak, or there could be a hostile village between them that prevents the use of the shortest route[168]. These are

[164] Simmel 1968, 467. Cf. Simmel 1968, 460: "Ein geographischer Umfang von soundso vielen Quadratmeilen bildet nicht ein großes Reich, sondern das tun die psychologischen Kräfte, die die Bewohner eines solchen Gebietes von einem herrschenden Mittelpunkt her politisch zusammenhalten."

[165] Rapp – Hill 1998, 180. 193. Cf. also Pendlebury 1939, 7. 9.

[166] Thomas 2001, 169–170. Cf. Harley 1996, 387. On alternative approaches to mapping see Bender 1999; Byrne 2008.

[167] The hodological distance between valleys in the high mountains is explained by Bollnow 1980, 200–201. For an example from Crete see Wallace 2010, 142 and Fielding 1953, 187.

[168] Cf. least-cost analysis of likely routes, *e.g.* Siart 2011, 110–111. This is also why abstract formulae such as simple gravity models do not work. These are based on the premise that the intensity of interaction between two settlements is directly proportional to the numbers of people living in them and inversely proportional to the intervening distance. The gravity equation used is

$$I = P_1 \times P_2/R,$$

where $I$ = Interaction; $P_1$ & $P_2$ = populations of settlements, $R$ = distance between them. See Butzer 1982, 215–216 and cf. Forbes 2007, 186: "These theoretical models are most convincing, but examples of the possible relationships, but they all illustrate the concept of *hodological space*. This phrase was coined by German psychologist Kurt Lewin in 1934 to describe the relativity of space, pointing out that human perception of space and distance is dependent on topographical, emotional and social factors[169]. Moreover, for a child or an elderly person, for someone who is tired, ill or has a lot of baggage, a certain distance feels a lot longer or more arduous than for a vigorous and unencumbered individual. To put it in the words of Hamish Forbes, bearing implications for methods such as site exploitation territory or surface survey: "A laden pack animal travels at a considerably slower rate on steep paths than the average undergraduate or postgraduate student wearing high-tech footwear, often employed to monitor such factors in field-study programmes"[170].

Bollnow gives a very vivid example to illustrate Lewin's idea: the rooms on either side of a wall in a house may be only a few inches apart on a plan—but if they belong to two separate flats, they are likely to be a lot more distant from each other: in terms of space that in reality has to be traversed to get there, but also in social terms, since one cannot simply enter someone else's flat. For the people living in either of these rooms, therefore, the mathematically or geometrically very close space is very distant[171]. N.B. also that for going from A to B a different route might be preferred than for going from B to A[172]. A similar concept was explored with the 'mental maps' by Kevin Lynch in the 1960s[173].

Traversing the Cretan mountains on foot will also raise an awareness of the effectiveness of built paths and roads. We are today very much used to going everywhere quickly and easily in a car, which also delivers us from the pain of carrying our belongings on our backs when we move house. It is easy to forget that the first people ever to settle, for example, the Lasithi plain would have had

however, when applied to flat sheets of paper, or at least relatively flat landscapes." For a different approach see Bevan – Wilson 2013.

[169] Lewin 1934. On the concept of hodological space see also Bollnow 1980, 195–198. 203 ("Der hodologische Raum beschreibt das System der Wege, auf denen ich einzelne Stellen im Raum erreichen kann"). L. Sjögren advances exactly the same idea but does not mention Lewin (Sjögren 2008, 126–127).

[170] Forbes 2007, 186. I can think of several simple, low-budget ways of easing this methodological problem. See also Peatfield 1983, 275; Meißner 1996, 364–365.

[171] Bollnow 1980, 191–192.

[172] Bevan 2010, 30.

[173] Lynch 1960; Johnston 1998, 58–59.

to carry everything they wanted to take with them or could not make from scratch there and that instead of a tarmac road, there were trees or spiky shrubs that scratched their legs and faces as they struggled into the more or less unknown[174]. Pack animals may have been an option but cannot simply be assumed, and they too would not have been particularly pleased to tread such adverse ground. (The construction of *kalderimia*, cobbled mule tracks, eased these problems considerably. Their age is not known but similar, if not the same, roads have been suggested to go back to Minoan times[175].)

When it is criticized that maps do not portray the soul and atmosphere of a landscape[176], it is easy to counter that such things must be left out because they are bound to be highly subjective. But it is naïve to think that maps are neutral and objective: they are dehumanized social constructs, representing not the world as it is, but the prejudiced agency of the mapmaker; they are an instrument of power[177].

Archaeological maps, aiming at visualizing chronological distribution, are highly misleading in other respects, too. In addition to the problem of depending on the archaeologist's agency, they reduce complex stratigraphies and site-inherent chronologies to dots suggesting contemporaneity, when in reality even the shortest-lived Bronze Age pottery style in Crete, LM IIIA1, signifies about 40 years or two generations (EM II on the other hand covers almost 500 years)[178].

[174] Cf. Bollnow 1980, 97: "Überall, wo sich Menschen im Gelände bewegen, bilden sich aus Gewohnheit bestimmte Wege, und diese ausgetretenen Wege erweisen sich als sehr viel bequemere Verbindungsmittel als die ungebahnten Flächen dazwischen." Cf. Palyvou 2009, 80.
[175] Pendlebury 1939, 365; Haggis 1993a, 144; Beckmann 2012, 195.
[176] Michaels 2003, 14.
[177] Harley 1996; Thomas 2001, 169; Fitzjohn 2007b, 145. See also Löw *et al.* 2008, 67–71. Cf. above, p. 34.
[178] Cf. Whitelaw 2000, 150.

## 2.11 Thoughts on seasonality

> *All rural communities might experience seasonality but few go to such lengths to cope with its challenges as mountain communities.*
>
> Dodgshon – Olsson 2007, 86

Seasonality is a big issue in the Cretan economy today—(beach) tourism comes to mind, but for archaeology, another sector is more interesting. For the past few centuries and still today, shepherds graze their flocks on upland pastures in the summer and move with them to the coastal plains in the winter. The male members of sheep-owning families used to take it in turns to stay with the animals in the sometimes remote mountain areas, in the round dry-stone huts called *mitata* (see Fig. 10.1), while the women remained in the village and looked after the crops. In other regions, the whole family would move to a summer habitation in a mountain plain, where the sheep and goats could be grazed on the surrounding slopes and the even arable land could be cultivated. This system is often seen as the obvious adaptation to the landscape and climate of Crete, and it is hence generally believed to have been in existence at least since the Bronze Age, neither of which is true beyond doubt[179].

In this context it is interesting to note that "arguably, the seasonality of life matters more for mountain communities simply because the physical and biological underpinnings of their seasonality are drawn out on an extended scale. The topographic character of mountain areas, together with the extended climatic extremes and variability that goes with such topography, means that large areas of the land and potential resources available to mountain communities are set at a distance, are not easily accessible, and have a foreshortened season of output. Further, such regions are subject to higher risks of crop failure and stock loss, or have large areas of unproductive land"[180].

For many Cretan mountain sites from antiquity, seasonal occupation has been suggested. In no case however does this suggestion rest on any evidence other than the topographical situation (and, quite often, the present climatic conditions

[179] See the chapter on transhumance, p. 376. It is rather shocking that Chaniotis 1996b, 257 claims that there is archaeological proof for seasonality with a reference to Watrous 1977.

[180] Dodgshon – Olsson 2007, 86.

in these areas)[181]. Thorough investigation could help to produce more reliable results; a couple of methods have already been referred to in this chapter. Most of them relate to faunal evidence from excavation, but site catchment analysis can also provide clues[182]. None of these methods offers conclusive results however[183]. Information about diet from isotopes in human skeletons can be compared with food remains from the site in question and if found to be at variance can be used to argue in favour of seasonal occupation[184], but this method has hardly been applied to samples from Crete[185].

In periods with winters as cold or colder than today, seasonality of use and inhabitation of many mountain areas would have been a question simply of accessibility. In some cases, this would have concerned the use of elevated cult places (peak sanctuaries), too. The presence or absence of hearths is not enough to postulate winter or summer inhabitation[186], since fireplaces are needed at all times of the year for cooking, and portable braziers or basins would not leave a trace unless left behind. Sturdiness of architecture and the presence of cemeteries are also sometimes taken to indicate permanent occupation, but seasonality cannot be postulated from the absence of these features alone.

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[181] As lamented also by Moody 1990, 56. Cf. for example Pendlebury *et al.* 1940b, 139; Watrous 1974, 301; Whitley 2006, 604. See also Wallace 2003, 602.

[182] Site catchment analysis for seasonality: Borrello 1984.

[183] For a whole array of (scientific) techniques to explore seasonality see the contributions in Rocek – Bar-Yosef 1998. See also Payne 1972b, 78–79; Perlès 2001, 153; Renfrew – Bahn 2008, 306; Tomkins 2009, 134. Arnold – Greenfield 2004 set out to prove the existence of seasonal sites in the Balkans in prehistory and admitted failure. Milner 2005 critically assesses some of the problems.

[184] As in a cave site in Croatia where fish remains were found but a fishy diet did not show up in the skeletal isotopes, leading to the conclusion that part of the year was spent in an area without access to marine resources (Dr Emma Lightfoot, McDonald Institute of Archaeological Research Cambridge, *pers. comm.* 2010).

[185] The exception are two skeletons from LNL I layers at the cave of Gerani. A low $\delta^{13}$C value indicated a low significance of marine foods, whereas the high $\delta^{15}$N value resulted from "fair amounts" of animal protein. It is interesting to compare this to the results of residue analysis from the same location (Tzedakis – Martlew 1999, 80. 216–217; Craig 2008; Richards – Hedges 2008, 224).

[186] Cf. Perna 2005, 157–158 with footnote 16.

## 2.12 Conclusions

The array of available methodology for the reconstruction of man-environment interactions seems promisingly extensive and broad and allows all types of evidence and researchers to contribute. Many methods for data retrieval such as palaeoclimatology or palynology require specialist scientific sampling and laboratory analysis. But the study of archaeological landscapes can combine the results of such analyses with geographical methods such as GIS, and also with more or less intense field walking, written sources and even pictorial evidence. The biggest problem in trying to reconstruct man-environment interactions in ancient Crete is the general dearth of published data. Further complications are caused by the flaws inherent to each of these methods, often also by a lack of correlation, *i. e.* contradiction of results from different methods. To undertake a project such as the one presented here must hence, after all the obstacles described, seem like a rather hopeless task. However, there may nonetheless be some use in this undertaking, given that the problems involved are acknowledged and made clear[187]. As Kent Flannery has put it (relating to site exploitation territory): “How justifiable is it to reason, from a land-use map of the 1970s, back to the environment of 10,000 or even 1000 years ago? Might not the proportions of the various zones have been very different? As we see it, this is a question that will always be with us, not merely in site catchment analysis but in all phases of archaeology. One has two choices: He can throw up his hands in defeat, or he can reconstruct the prehistoric environment to the best of his ability and plunge ahead. Vita-Finzi and Higgs have plunged ahead, and we will follow their example”[188].

[187] “We are under no illusions about the imprecision and uncertainty of the record we have been able to compile. On the other hand, we believe that the archaeological, historical, ethnographic, and environmental evidence need to be related to each other and that we should attempt reconstructions and interpretations, with all due caution and with the expectation of welcome correction and amplification” (Jameson *et al.* 1994, 10).

[188] Flannery 1976, 94–95.

# Chapter 3

# The Cretan Environment

## 3.1 Geology

For several reasons, geology is a key determinant in the relationship between man and the environment. Whole regions and their relief have been and still are shaped by geological activities such as tectonics and erosion. Rocks, minerals and ores are quarried and mined to be used as building materials, for crafts and other purposes. Geological features determine the occurrence of springs, vital to any human existence. Soils, which develop from rocks, are one of the decisive factors for both vegetation and potential land use. Agriculture, on which human life has largely depended since the Neolithic, needs fertile ground, but not every mother rock produces soils with sufficient agricultural potential. Geology, although far from being the only or solely important determinant, is hence at the very heart of the question why people settled where they did[1] and to what kind of environment they had to adapt. While the detailed relation between geology and people will be examined in the context of the case studies, a broad overview is presented here to provide a basis for everything that follows.

The position of Crete in the Aegean marks the point where the Eurasian and the African tectonic plates meet and the latter is submerged below the former. The pressures between these two units have generated the Hellenic Island Arc, which

[1] An attempt to show this for Neolithic Crete has been made by T. Strasser (1992); see however p. 427 footnote 12.

is really the uplifted edge of the Eurasian plate. This string of islands is convex to the South and runs from Kythera south of the Peloponnese via Antikythera, Crete, Kasos and Karpathos to Rhodes in the East. The Hellenic Trench, to the South of Crete, and the arc of volcanic islands featuring Thera/Santorini, also follow this contour.

The Hellenic Island Arc is part of a larger geological structure called the Hellenides, a mountain range that comprises the Pindos mountains of the Greek mainland and the Taurus mountains of Asia Minor. The Hellenides were formed in the Jurassic and Tertiary during the *Alpine orogeny*, a phase of mountain building lasting from the Cretaceous to the Miocene and named after the emergence of the Alps. In this process the plate was pressed against an older massif which resisted the pressure so that the plate was folded into mountains. However, after the Alpine orogeny, 'Crete' was still connected to 'Europe' as part of a bigger southern Aegean landmass. For several million years afterwards, in the Neogene, most of Crete lay under water and soft *Neogene rocks* such as chalks and marls were formed. The latter weather[2] to very fertile light brown *rendzina* soils which in Crete were the earliest soils to be cultivated and are still tilled today[3]. Calcareous silts from this period were frequently used for pottery in Minoan times[4]; however, they are present mainly in the lowlands (see Fig. 3.1). Where petrographic analysis of the pottery has been carried out, it has shown that the clay used was from a local source[5]. In the so-called Messinian Salinity Crisis of the Pliocene, when the Strait of Gibraltar was blocked through tectonic uplifting above sea level and the Mediterranean almost dried up[6], gypsum was formed, whose Cretan deposits were exploited, particularly by the Minoans, for building material. After renewed flooding, tectonic movements eventually led to the uplifting of Crete in the Late Pliocene. However, only in the Pleistocene did it take its present shape, when the sediments from the palaeo-Mediterranean filled the existing *grabens* (tectonic

[2]"Weathering is the alteration and reduction of rock into finer particles. It involves both physical and chemical processes and is usually antecedent to erosion and soil development" (Price 1981, 172).
[3]Nevros – Zvorykin 1939, 258; Higgins – Higgins 1996, 199. See also Rackham – Moody 1996, 30.
[4]Hein *et al.* 2004, 358.
[5]See p. 168. 254. 284 footnote 83. 312.
[6]Grove – Rackham 2001, 41.

valleys), thereby building about one third of the island's surface[7]. These plate tectonic dynamics also led to the difference in character and hence in usability of the north and south coast of Crete: the south coast is characterized by sudden and steep precipices, in places rising up to 1000 metres straight from sea level. In contrast to this, the northern section slopes more gently down to the sea, enabling settlement in the coastal plains[8].

The island is made up of a core (the *autochthon*) and an overlying pile of different flat pre-Neogene rock units called *nappes* that have been moved from their original position by the tectonic activities during the Alpine orogeny (hence called *allochthonous*) and that have come to lie on top of each other; above them lies the group of rocks formed from Neogene sea sediments. The Cretan stack of nappes with its underlying autochthon is six kilometers thick and in some places comprises five levels (see Fig. 3.1): The lowermost level is the autochthonous rock core that was not moved far during the process of Alpine orogeny. It consists of a 1500 m thick block of the *Plattenkalk series*, *i. e.* a chronostratigraphical unit of dark grey hard limestones (carbonate rocks) with bands of chert, which were formed in the Jurassic and early Tertiary or Triassic to Oligocene[9]. This series can be found all over Crete where it makes up large parts of Psiloritis, the Lefka Ori, and Dikti. It bears almost no fossils and can be followed to the Taygetos and the Parnon mountains on the Peloponnese as well as to Rhodes. The hard grey limestone is today called *sideropetra*. As the German name of the series implies, it breaks naturally into blocks with very straight edges and was widely used for building purposes.

In many areas the Plattenkalk is flanked by an overlying nappe of the Phyllite-Quarzite series, created in Permian to Triassic times. The two components can be distinguished by their texture: the quartzites have a blocky structure, whereas the phyllites break into plates; their colour is often brown or greenish[10] and they erode into arable soil. Only in western Crete, including the Lefka Ori, the 800 m thick *Trypali nappe* of late Triassic to early Jurassic limestones and dolomites is stuck between the Plattenkalk and the Phyllite-Quartzite.

[7] Gifford 1992, 20; Morris 2002, 11; Fassoulas 2004, 34.
[8] Siart 2011, 11.
[9] Jurassic and early Tertiary: Gifford 1992, 17. Triassic to Oligocene: Higgins – Higgins 1996, 197.
[10] Rackham – Moody 1996, 15.


**Figure 3.1:** The geological composition of Crete (from Seidel – Wachendorf 1986 Fig. 33)

Above the Phyllite-Quartzite lies the so-called *Tripolitza series*. Its steep peaks consist of Jurassic to Eocene limestones and dolomites which are up to 1000 m thick[11]. Two characteristics of the dark grey limestones are their heavy *karstification* (dissolution by rainwater; does not affect the Plattenkalk) and their many *aquifers* (a permeable layer in which groundwater can flow; if there is also a natural *barrier*, the water rises as a spring[12]). Dolomites were used as building material in all periods. In some regions, for example along the Asterousia Mountains, Eocene *flysch*, up to 200 m thick, makes up the uppermost layer of this nappe[13]. Flysch weathers into *rendzina*, one of the soils with the highest agricultural potential in the Mediterranean[14].

The *Pindos* nappe above the Tripolitza unit does not form a continuous sheet. Its disjunct massifs are made of limestones, schists and other rocks of *pelagic* origin (sediments deposited on the sea bed) from Triassic to middle Eocene time[15].

The *composite nappe* above this is a heterogeneous mixture with a maximum thickness of 300 m. The most characteristic component are remains of former oceanic floor (of the African plate) that have not gone down into the subduction zone (below the Eurasian plate) but instead have been thrust up; these are called *ophiolites*[16]. They were formed in the Jurassic and occur only in central Crete, especially in the north and south-west Psiloritis. The block structure of the island brings about differential earthquake magnitudes[17], which is an important point when analyzing potential impact of a particular event on an island-wide scale.

The only island-wide survey of soils is 1936/37's mapping by K. Nevros and I. Zvorykin[18] (see Fig. 3.2). Pedological studies undertaken in the course of excavation projects such as in the Kavousi region or at Karphi[19] show that the map cannot attempt to reflect the micro-regional soil type distribution necessary for the

[11] Seidel – Wachendorf 1986, 64–65.
[12] Rackham – Moody 1996, 42.
[13] Gifford 1992, 19; Higgins – Higgins 1996, 197; Seidel – Wachendorf 1986, 64–65.
[14] Higgins – Higgins 1996, 10.
[15] Hempel 1991, 14; Gifford 1992, 19.
[16] Higgins – Higgins 1996, 197; Seidel – Wachendorf 1986, 69.
[17] Pichler – Schiering 1977, 821 Fig. 2.
[18] Nevros – Zvorykin 1939.
[19] Morris 2002.

present study[20], but it is nonetheless undoubtedly very useful for this introductory chapter and beyond.

Besides the rendzina mentioned above, *terra rossa* is a type of soil that can be found not only in Crete, but all through the Mediterranean, produced by the weathering of pure limestones. It has been suggested that this would have happened in a period with a wetter climate than nowadays[21]. *Terra rossa* is generally regarded as one of the agriculturally most potent soils of the Mediterranean, despite its being very clayey and, due to the high content of iron oxides from which its red colour results, having a low water retention capacity[22].

An experimental project has shown that ample clay resources exist from which Bronze Age cooking pots could have been made. Why such utility coarse ware vessels were seemingly imported to Crete in Roman times remains unknown[23].

## 3.2 Climate

### 3.2.1 Now

In 1817, Franz Wilhelm Sieber travelled the Aegean and noted: "Durch ihre statistisch merkwürdige Lage zwischen drei Welttheilen [...] besitzt [Kreta] alle klimatischen Vorzüge derselben, ohne einer ihrer Unannehmlichkeiten unterworfen zu seyn"[24]. The climatic advantages Sieber mentions must mean the long, warm, dry summers and mild and rainy winters typical for the Mediterranean[25]. However, patterns of temperature, precipitation and winds differ regionally, on Crete as elsewhere. As a rule of thumb, the west of Crete receives more precipitation than the east—though even this holds good only for the northern part of the island[26]—and the north more than the south. Inlands and higher altitudes are

[20] The authors knew of this deficiency (Nevros – Zvorykin 1939, 255).
[21] Morris 2002, 73 (with further references).
[22] Cornwall 1958, 99–100; Higgins – Higgins 1996, 9; Morris 2002, 76.
[23] Moody *et al.* 2012.
[24] Sieber 1823, 3.
[25] The Mediterranean is just one of five regions in the world with this mediterranean-type climate, characterized by summer drought, winter rain of cyclonic origin and a mean average temperature of 15 °C (see Table 3.1). The others are southern California, central Chile, South and Western Australia and the Cape Region of South Africa (Roberts *et al.* 2001, 631).
[26] Hempel 1991, 24–25.

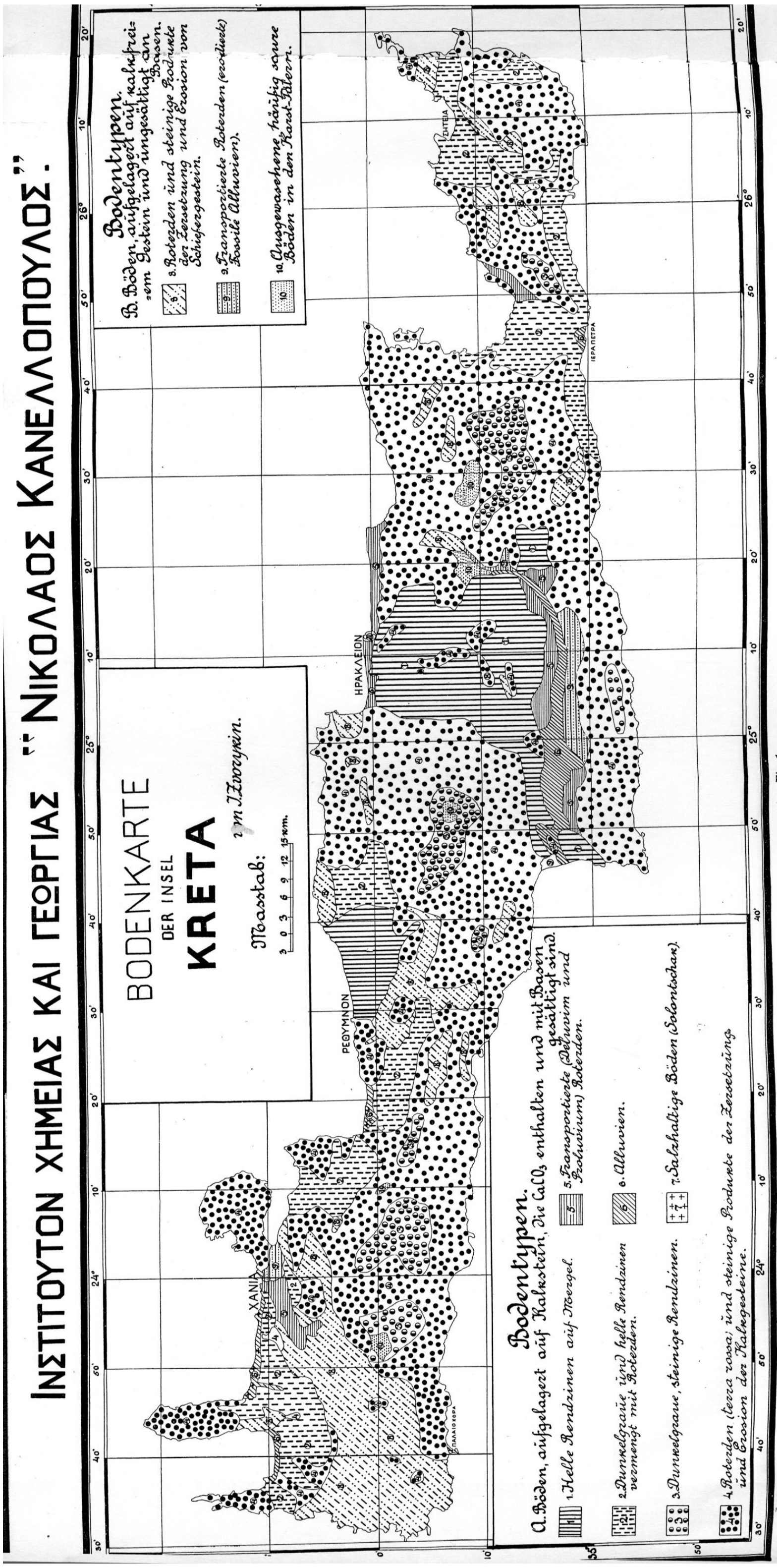


**Figure 3.2:** Soil map of Crete (from Nevros – Zvorykin 1939 Fig. 1)

**Table 3.1:** Meteorological data from present-day Crete (after Rackham – Moody 1996, 34)

| **Location** | **Altitude of station (m ASL)** | **Mean annual temperature ( °C)** | **Mean annual precipitation (mm)** |
|---|---|---|---|
| **Chania** | 50 | 18.9 | 657 |
| **Rethymno** | 7 | 19.6 | 646 |
| **Anogia** | 740 | 16.0 | 1134 |
| **Gortyn** | 180 | 19.0 | 364 |
| **Iraklio** | 40 | 19.0 | 492 |
| **Tzermiado** | 840 | 13.1 | 1236 |
| **Ierapetra** | 20 | 20.0 | 432 |
| **Sitia** | 30 | 19.4 | 505 |

moister than coasts and lowlands. Moreover, periods of rain are more prolonged in the mountains. The Lefka Ori are in fact the area with the highest rate of precipitation of all Crete; however, the absolute figure of 2000 mm precipitation at their top can only be guessed since measurements are lacking. In contrast, the south-eastern coast of Crete receives less than 300 mm per year[27].

Snow occurs (rarely) even in coastal areas but hardly ever settles[28]. This is different for higher elevations since average temperatures fall at least by 6 °C for every 1000 m. In Anogia, at about 800 m up the north flank of the Psiloritis, the average number of days with snowfall is 14; though only on 5.6 days is there a veritable blanket of snow. Altitudes above 1400 m are covered in 2–4 m of snow at least until May[29]. If the mountains were 200 m higher, there might be permanent snow[30]; but as it is, "von 'ewigem Schnee' auf dem kretischen Ida zu reden, ist nur schriftstellernden Damen aus hoher Familie erlaubt"[31].

For meteorologists, the year begins in September and this makes good sense in the Aegean and Crete. Here, the spell of summer drought is usually broken by the

[27]Hempel 1991, 24–27. 34; Rackham – Moody 1996, 34–35.

[28]Rackham – Moody 1996, 37; Grove – Rackham 2001, 29.

[29]Hempel 1991, 34–35; Rackham – Moody 1996, 37. Cf. also Od. 19,338–339: *ὅτε πρῶτον Κρήτης ὄρεα νιφόεντα νοσφισάμην* ("Since first I left the snowy hills of Crete"...; translation cited after Rackham – Moody 1996, 33).

[30]Rackham – Moody 1996, 190.

[31]Neumann – Partsch 1885, 62. It is not for me to judge here whether this puts Nanno Marinatos in the wrong (cf. Marinatos 1993, 115).

first rains in October. There is a reduction of rainfall in November, but December and especially January are the months with the highest amount of precipitation, *i. e.* rain in the lowlands, snow in the mountains[32]. Much of the rain comes in heavy storms. Typically in Crete and the southern Mediterranean, there is a gradual decline after the peak until April or May when precipitation stops altogether, combined with a marked sudden drop in clouds[33]. Also in April or May, the island experiences a sudden, stormy squall of warmth, the *Notos*[34]. In summer the majority of winds blows from the north and north-west. These continuous northerly or north-westerly winds were called *ἐτησίαι* in antiquity, whereas today a word of Turkish origin, *μελτέμι* (Meltemi) is used. They arise from the Asian monsoon[35] system but lose their humidity on their way from the Indian Ocean so that they reach Crete as very dry winds[36]. They can warm up and dry further on their way across the island, making the south of Crete on average 2 °C warmer than the north during this season[37]. Hot, dry southerly wind, the Scirocco (*σιρόκος* in modern Greek), occurs mostly in spring and autumn. Especially in spring it carries red dust from the Sahara which colours the sky and eventually, when deposited, the snow on the mountains with a reddish brown; it is hence known as *κοκκινοβροχή* (red rain).

Because the sea does not warm up as much as the land, the hot air over the land rises and thereby increases the sea breeze. This is why the hottest hours of the day are also those with the most wind close to the coast. Some people think that this is one of the reasons why the coast was and is a preferred settlement location in the warm regions of the world such as eastern Crete[38]. However, the case studies presented here will show that the uplands may have offered other advantages and were settled from early on, too.

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[32] Lienau 1989, 272. Rain falling during the cool season can be absorbed and stored whereas it would be lost to evaporation in the summer (Shiel 1999, 69).
[33] Hempel 1991, 37.
[34] Hempel 1991, 36–37; Hempel 1997, 19–20. 23–25.
[35] The word 'monsoon' is derived from the Arab '*mausim*', meaning 'season'. It denotes a rather steady air current that changes its direction twice a year, flowing from land to sea in winter and from sea to land in summer.
[36] Tollner 1981, 58.
[37] Hempel 1991, 28.
[38] Betancourt 2006, 20.

### 3.2.2 Then

> *Most commentators assume that changes in vegetation before the Neolithic are due to climate whereas, after the Neolithic, climate stops operating and changes must be due to human activity.*
>
> Grove – Rackham 2001, 162

It has often been postulated that the climate of the Aegean in historical times was basically very much the same as today[39], and this notion has been transferred to the Bronze Age, too[40]. However, detailed research using the methods described above (section 2.1) has produced evidence for a different scenario, and it will become clear in the following that the Mediterranean, influenced by two different climate systems, is remarkably susceptible to short-term climate change (and will therefore be especially affected by present and future climate change)[41]. Uncertainties remain nonetheless, since the data are not seldom contradictory. These uncertainties notwithstanding, it seems to me important to note that there is more potential in re-evaluating archaeological and historical records in the view of climatic data than there is in deriving information about climate from archaeological remains[42], although the problems of absolute dating in Aegean archaeology complicate things further.

Opinions as to a possible glaciation of parts of Psiloritis during the last Ice Age, 18,000 years ago in the Upper Pleistocene, vary[43]. Recent findings from the south coast of Crete show that, contrary to what has long been assumed, humans were present on the island for at least temporary habitation in the Palaeolithic[44]. If the mountains were glaciated, this may have limited the radius of activity of these first Cretans to the lower regions.

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[39] Philippson 1948, 159; Vita-Finzi 1969, 113; Bintliff 1982, 152.

[40] Hood 1971, 19; Davaras 1976, 52–53; Palyvou 2009, 71.

[41] Dormoy *et al.* 2009, 615. See also Tzedakis 2007, 2057. For a short overview over results of climatic research in the Mediterranean see Hempel 1999, 264–266.

[42] "In most cases, it is likely that better knowledge of the climatic record will lead to a fresh understanding of human history rather than that the latter can contribute firm data on past climate" (Lamb 1977, 244).

[43] See Siart 2011, 13 for a summary and Nixon *et al.* 1990, 216 for why the Lefka Ori were not glaciated.

[44] Mortensen 2008; Kopaka – Matzanas 2009; Strasser *et al.* 2010, 164.

Between ca. 9500 and 7500 BP, the Holocene optimum prevailed in the Mediterranean: temperatures were high, there was no frost, and it was moister throughout the year than today, although it is not clear yet how much precipitation there was in the summers[45]. However, just before or around the time of the arrival of the Neolithic in Crete, the sudden climate change known as the 8.2 cal ka Event caused an abrupt drop in temperatures, although indications are lacking as to whether summers in the Aegean were wet or dry[46]. The event has been connected to settlement abandonments and a change in economy to sheep pastoralism in the Near East[47], but the data available for Crete are too scant to allow similar conclusions to be drawn.

Nonetheless, it is certain that by the time of the arrival of agriculture on the island in the Neolithic, the pollen record from the Akrotiri peninsula of northwestern Crete included species that today are confined to Central Europe such as hazel, hornbeam and basswood (see p. 101 and Fig. 3.13). This indicates that the climate encountered by the first farmers was probably much less arid than today and rainfall was not as seasonally restricted as at present[48]. Temperatures may have been 5 °C cooler than today[49], although results from a combination of methods indicate that summers were getting warmer between 7500 and 4000 years ago. There were also during the Neolithic quite a number of short-term cool and dry events in the Aegean: ca. 5300 BC, 4400 BC, 4000–3500 BC and 3900–2200 BC. During these phases, winter and summer temperatures would have fallen by ca. 2 °C, and precipitation would have decreased, too[50]. An arid phase between circa 3100–2900 BC, at the Neolithic/Bronze Age transition, has been detected in the oxygen isotopes of Aegean foraminifera[51] (see Fig. 3.3).

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[45] Rossignol-Strick 1999, 515; Dormoy *et al.* 2009, 624.

[46] Dormoy *et al.* 2009, 626.

[47] Weiss 2000, 91; Rowland 2008, 388–389.

[48] Moody *et al.* 1996, 289; Allen 2003, 368; Betancourt 2006, 21. A wetter climate in the Final Neolithic is denied by Rossignol – Pastouret 1971, 227. Bottema – Sarpaki 2003, 743 doubt that the pollen originate from Crete; see however Moody 2005b, 461; Moody 2012, 258. For early Holocene climate in Greece see also Cheddadi *et al.* 1991.

[49] Moody 1987, 286.

[50] Dormoy *et al.* 2009, 625–626. These events "appear to be the most recent manifestation of a pervasive millennial-scale climate cycle operating independently of the glacial-interglacial climate state". For a 4200 BP minimum rainfall event cf. Bar-Matthews *et al.* 2003, 3196.

[51] Moody 2009b, 243–244 (with references).

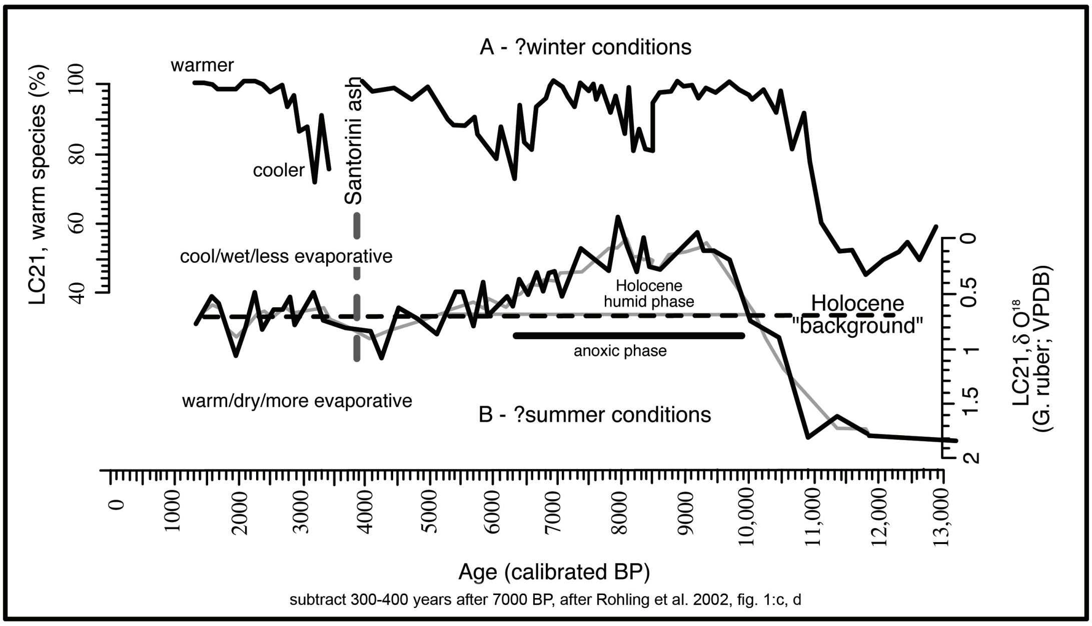


**Figure 3.3:** Climate reconstruction according to warm water foraminifera from deep-sea core LC21 (from Moody 2009b, 243 Fig. 20.2 [corrected by J. Moody]. Reproduction courtesy of the Trustees of the American School of Classical Studies at Athens.)

Using a wide range of data, J. Moody has drawn up an overview of climatic conditions in the Bronze Age Aegean. The change away from the more temperate climate of the early and mid-Holocene towards truly Mediterranean conditions began only in the Early Bronze Age. It might have been completed by the end of the Bronze Age[52]. Glacial advances in other regions of the world are paralleled in Crete by rising numbers of trees nowadays found only in temperate climate, hinting at wetter conditions that appear to have prevailed through the Bronze Age. However, precipitation seems not to have been spread evenly throughout the year(s), but rather to have come in spells, and then very heavily[53].

Evidence for a change in climate towards drier conditions in the Early Bronze Age has been found in the Near East, and the events in mainland Greece at this time (EH II) have been linked to this. In Crete, however, no signs of external

[52]Moody *et al.* 1990, 25. See also Rackham 2003, 34. 59–60. Broodbank 2008, 284 writes: "And one does not need to be some monster of environmental determinism to add that the increase in aridity and unpredictability are surely implicated in the dramatic shifts in settlement patterns on Crete in the fourth millennium BC". See also Tzedakis 2007, 2059–2061 for doubts though.

[53]Moody 2004, 251–252.

stress can be detected for this period and it seems on the contrary that between ca. 2700 and 2200 BC, summers were less evaporative than before[54].

Very dry conditions are believed to have prevailed between ca. 2200 and 2000 BC (EM III to MM IA/B), especially in East Crete[55]. During this time, "intense episodic summer rain" may have been responsible for flood horizons found in Crete which have been dated to MM[56]. Nucleation at Phaistos has been related to the abandonment of sedentary cultivation, the adoption of pastoralism, urbanization and the desertion of the countryside and put down to climatic change[57].

J. Moody has suggested that the Middle and Late Minoan periods (MM I to LM III; 2000–1250 BC) witnessed a climatic phase comparable to the Medieval Little Ice Age, characterized by large-scale floods which would have severely disturbed agricultural activities[58]. Pine wood from LM I layers on Pseira has been interpreted to testify to more rainfall than today, since it is generally too dry for pines to grow in this part of Crete now. However, this would have to be a very locally restricted finding as a distribution map of the species does show long established stands on either side of the isthmus[59]. According to P. Warren, the fact that Minoan representations of the Cretan palm (*Phoenix theophrasti*) depict the plant just like what it looks like today, namely with small or no fruits, is evidence for similar climatic conditions: "If the Bronze Age climate had been significantly hotter, they are likely to have been depicted with abundant fruit; if significantly cooler, perhaps not depicted, since they would not have grown at all"[60].

[54] Effects of climate change around 2200 BC in the Near East: Rosen 1995; Hole 1997; Rosen 1997; Weiss 1997; Wilkinson 1997. See also Bintliff 2002, 421–422 (with reference to Wilkinson 1994) and Thompson 2007, 164–172. (Denied, however, by Butzer 1997, 255; Bottema 1997, 513.) No effect on Crete: Manning 1997, 164. Cretan summer evaporation lower than before: Moody 2009b, 244.

[55] Weiss 2000, 90; Moody 2009b, 245–246. Cf. Cullen *et al.* 2000 and deMenocal 2001 for the impact of climate on the collapse of the Akkadian empire at this time.

[56] Moody 2009b, 245.

[57] Weiss 2000, 89–90.

[58] Moody 2000, 58–59; Moody 2009a, 19; Moody 2009b, 246. J. Moody even proposed that the extensive storage facilities of Late Minoan 'palaces' and 'villas' were constructed to counteract crop failures caused by this climate fluctuation.

[59] The argument for climate change has been put forward by Betancourt 2006, 21. Cf. the distribution map in Rackham – Moody 1996, 62 Fig. 6.8b.

[60] Warren 2008, 18.

J. Moody further concluded that in the period between 1800 and 1300 BC, winters were as warm or warmer than today, but getting colder with time, whereas summers were cooler, but warming. In the centuries following the Theran eruption until around 1400/1300 BC, winters were markedly cooler and wetter than before—allegedly as a consequence of the event[61]. However, seeing as elsewhere it has been shown that on a global scale, the effect of even the greatest volcanic eruptions will fade away after seven years, a century-long influence of the event seems improbable[62]. Moreover, other researchers have found evidence for a temperature drop of 2–3 °C in the south-eastern Aegean that would have lasted from 1500 to 500 BC and would have been combined with a shift to aridity[63] and cannot be related to the Thera eruption. This shift could help to support one hypothesis about a period that has been subject to much debate. In a lecture given in 1965, Rhys Carpenter suggested that the downfall of Mycenaean civilization was caused by a change in climate. He claims that between about 1200 and 850 BC, a devastating drought caused severe famine in Greece; he imagines the end as a "diaspora", a dispersal of people. The famine is postulated for Crete, too, supported by a citation from Herodotus. Carpenter thinks that the emergence of Greek Archaic and Classical culture became possible only because of a shift to colder and wetter climate in the 9th century BC[64]. His theory was supported by a study which confirmed that meteorological patterns like those hypothetically pictured for the Late Bronze Age did occur in AD 1954/55. R. A. Bryson, H. H. Lamb and D. L. Donley therefore concluded that, given the lack of any other convincing scenario, Carpenter's drought theory was indeed plausible, even though more research and data were needed. Other scholars agreed that although the evidence was not conclusive, drought might have been at least a contributing factor to the end of

[61] Moody 2005b, 455–461; Moody 2009b, 244. 247.

[62] Moreover, the volcanic event with the greatest effect on climate within the last 5,000 years seems to have been a series of eruptions between 1459 and 1442 BC (Maise 1998, 230). It is interesting to note here that, at least on a global level, it is not the ash that causes the greatest climatic disruptions, but the sulphuric acid that is being released into the stratosphere (if the eruption column reaches up that far) and leads to a 'negative' or inverse greenhouse effect through increased reflection of sunlight (Maise 1998, 207–208). Cf. also Rohling *et al.* 2009, 5.

[63] Rohling *et al.* 2009, 2. 5; Moody 2009a, 19.

[64] Carpenter 1966, 18. 59 (with reference to Hdt. 7,171; see also Grove – Rackham 2001, 141). 74.

Mycenaean civilization[65]. Carpenter's view has been challenged on the grounds that no reliable scientific evidence for the reconstruction of climate was available. Others have stressed archaeological arguments such as the plentiful rations listed in the Linear B records from the palace at Pylos and the fact that pithoi in the burnt palaces were not emptied, which would be strange had there been famine following severe drought[66]. Moreover, the earlier view of the destruction of the mainland palaces as representing the end of all Mycenaean culture has been revised in the last decades, and it is now recognized that disruption may not have been as severe as once thought[67]. In addition to the evidence for a climate shift between 1500 and 500 BC mentioned above, recent studies have thrown new light on this issue. J. Moody has compiled evidence for climate and climatic change in the Late Bronze Age III period of the Aegean, arguing that even though data from the Aegean itself are hard to come by, those available from other places can serve the purpose since climate depends on large-scale systems[68]. One of these systems is sunspot activity which is known to vary cyclically. Periods of maxima in sunspot activity coincide with times of high amounts of solar energy reaching the Earth (high total solar irradiance). High solar irradiance in turn means higher global temperatures. Moreover, increased solar activity seems to reduce the formation of cosmogenic nuclides such as radioactive carbon ($^{14}$C). Therefore, the amount of $^{14}$C in the atmosphere and accordingly in organisms (for example in marine sediments) from a particular period of time can be used as a proxy indicator of solar activity and global temperature (see Fig. 3.4). It has to be (and has been) acknowledged, however, that precise dates for climatic anomalies cannot yet be given, though this may change soon: "Happily, the data are now available to resolve many of these issues; someone just has to do it"[69].

[65] Bryson *et al.* 1974, 49–50; Lamb 1977, 420–422; McGhee 1981, 169; Weiss 1982; Harding 1982, 5; Fagan 2004, 182–185 (he explicitly mentions Crete, too).

[66] Wright 1968, 126; Drews 1993, 81–84.

[67] Snodgrass 1975, 213; Prof.Dr Joseph Maran, Institut für Ur- und Frühgeschichte Heidelberg, *pers. comm.* 2006. See also Zangger 1998, 234–235.

[68] It must be noted though that the application of such large-scale reconstructions has to be viewed with suspicion (Dincauze 2000, 185–186). See also Maise 1998, 202–209.

[69] Moody 2005a, 131. Analysis of isotopes from stalagmites could potentially help to gain more locally specific data for Crete, cf. Vollweiler *et al.* 2006; Mangini 2007.

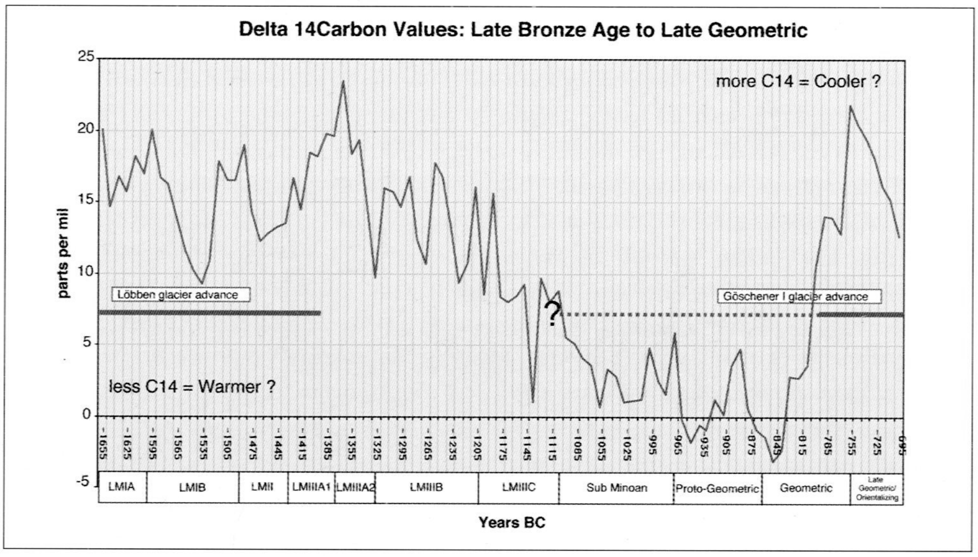


**Figure 3.4:** Wiggle diagram of atmospheric carbon-14 levels (from Moody 2005b, 460 Fig. 10. Reproduced by permission of the Scuola Archeologica Italiana di Atene.)

On these grounds, a sharp decline in atmospheric $^{14}$C levels from around 1325 BC to 820 BC can be taken to correspond to an increasingly warmer and drier climate (though this does contradict the cold phase postulated for 1500–500 BC). For about 100 years (1300–1200 BC) Aegean climate turned to hot and dry. Summer and winter temperatures were probably increasing and surpassing those of today. For the time around 1200 BC, the Aegean and the Levant have produced diverging climatological evidence: both seem to have been dry, but the Aegean would have been cold whereas the latter seems to have experienced a warm period. According to Moody, this discrepancy may be due to problems in dating or it might represent a time lag in climate change. At any rate, from ca. 1150 to 900 BC, the whole of the Aegean was seemingly hot and dry, with a possible extreme around 1050 BC. It was generally warmer than today and there was less precipitation[70]. Another study based on analysis of El Niño patterns suggests a dry phase

[70]Moody 2005b, 453–465. Cf. Maise 1998, 231; Schilman *et al.* 2001, 165; Moody 2005a, 130. See however also Wallace 2012, 76. Moody cites the LH IIIB incorporation of water sources into the fortified area at a number of Mycenaean palaces as further evidence: "Although this may simply be a precaution against siege, it could also be interpreted as the protection of an increasingly rare resource" (Moody 2005a, 130).

between 1450 and 1200 BC[71]. J. Moody sums up that climate between 1350 and 900 BC was very unstable and extreme meteorological events such as floods and droughts probably occurred with a higher frequency. Moreover, she believes that cropping cycles would have been disturbed more often than before. This would have resulted in repeated crop failure and adaptations in animal stock as well as in architecture[72]. It has to be pointed out that political and social disruptions such as those which seem to have occurred at the Bronze Age/Iron Age transition would have led to interruptions of the agricultural schedule, too, because people would not have had the time or security to pursue their tasks, or because fields—like houses—could have been set on fire by the hostile forces[73]. Whether the global climatic phenomena described above can account for all disruptions in many regions of the Aegean around 1200 BC however cannot be determined[74]. But at least it can be confirmed that Crete experienced these climatic conditions, too: flood horizons are more typical in arid than in wet conditions. The fact that layers of sediments have been found on Crete that were deposited by floods and are datable to LM III therefore points to greater aridity in this period[75]. B. L. Drake provides further support for a climatic "gear shift" at the end of the Bronze Age: according to him, a decline in Mediterranean Sea surface temperatures before 1250–1197 BC had a

[71] Tsonis *et al.* 2010.

[72] Moody 2005b, 443–447. 465; Moody 2009a, 19. Cf. the explanation offered by Bottema – Sarpaki 2003, 747 for the decrease of olive pollen for this period. M. Andreadaki Vlazaki has proposed that cemeteries could provide evidence for miscarriage and high infant mortality caused by drought, but so far no burial sites have been examined in this context (Andreadaki Vlazaki 1991, 421 with footnote 57). G. Kordatzaki has even linked a change perceptible in the pottery to climate change: "It seems that, during the post-palatial period, the potters used temper from alluvial sediments that had been deposited after strong fluvial events. [. . . ] We could suggest that these fluvial events causing damages in the lowlands in some parts of the island, might have exercised, among other factors, a pressure to the populations, leading to the movement of the people in higher altitudes" (Kordatzaki 2010, 472). See also Issar 1998, 122–123. For flat roofs in Crete see also Rackham – Moody 1996, 167.

[73] Cf. Halstead 1990c, 148; Chaniotis 1996b, 256–257.

[74] Oliver Rackham does not believe climate could have played an important role in this: "Attempts to show that Mediterranean cultures flourished or declined for environmental or ecological reasons have produced meagre results. Whatever caused the collapse of Bronze Age Crete, or the decline and fall of the Roman Empire, it was not sudden drought or running out of trees, and was probably not plague. How much influence malaria had is an open question" (Rackham 2003, 57).

[75] Moody 2005b, 464. Graeme Barker has warned that within the Mediterranean climate framework it is difficult to distinguish if a flood horizon has been brought about by climate change towards increased precipitation or by a single catastrophic event (Barker 2005, 58–59).

long-lasting impact on societies around the Mediterranean[76]. Moody acknowledges however that even though climate change and drought should be considered as key factors in the changes taking place towards the end of the Bronze Age in Greece, "the reality is actually much more complex than that proposed by Bryson *et al.*"[77]. Nonetheless, a valid case can be made for climate as one triggering factor of the upheaval in the Mediterranean at that time.

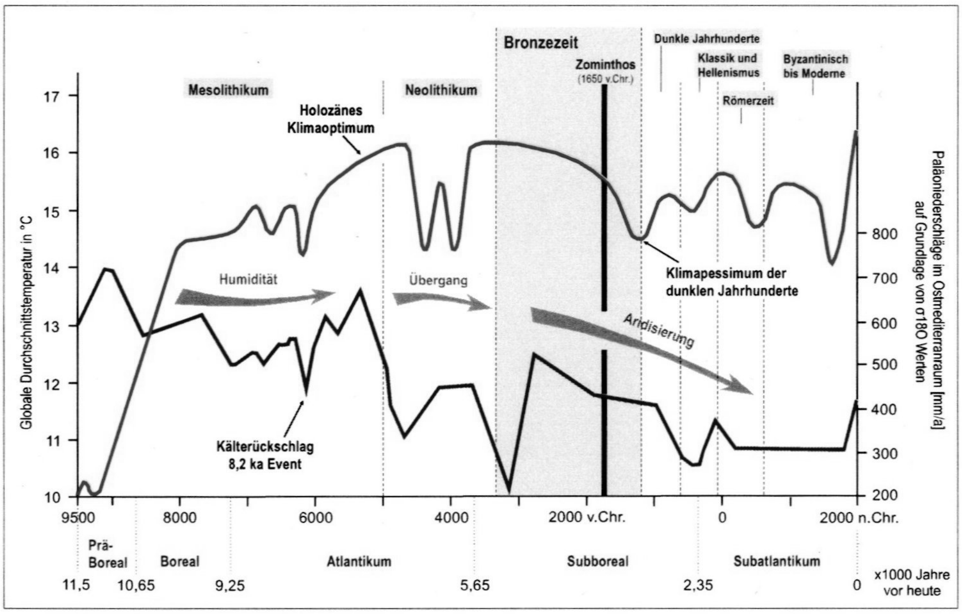


**Figure 3.5:** Climate diagram, combining different proxies (from Siart 2010 Fig. 44)

After ca. 1050 BC, a distinct change let temperatures drop and rainfall increase, but within the timespan of 900–450 BC, while especially winters still were very cold, it became increasingly dry again[78]. A sort of climate 'crash' is reported for around 800 BC, and temperatures would have been lowest between 775–725 BC[79]. Pedogenic evidence from the Kavousi area in east Crete confirms that "the

[76] Drake 2012.

[77] Moody 2005a, 131. Cf. the ancient literary traditions collected by Panessa 1991, 603. 905–912. See also the more positive assessment by Tsonis *et al.* 2010.

[78] Moody 2005b, 464. Schilman *et al.* 2001, 165 have detected a general trend of aridity in the 1st millennium BC.

[79] Maise 1998, 219–220. 230. The crash was actually more of a gradual change. See however also van Geel *et al.* 1998, who detected an abrupt climate change to cool and wet in both hemispheres at ca. 850 BC; evidence comes from both temperate Europe and central Tunisia.

present xeric conditions have probably been in place for at least the past 3,000 years"[80]. Information for the centuries after 450 BC is not very detailed. Global data indicate a cold phase roughly between 400 and 300 BC, which confirms an oft-cited remark by Theophrast (Thphr. *Vent.* 13). A grain shortage, allegedly following severe drought, in the years around 330 BC is attested for Crete and Greece in general[81]. It has been argued that since Crete was one of the granaries of the Roman Empire, it must have been wetter than today[82]. This is not confirmed by the available data (see Fig. 3.5), although both precipitation and temperatures did reach a highpoint around 1 BC/1 AD. In this context it should also be noted that grain was grown on Crete on a reasonably large scale until very recently (about 60 years ago) and that the abandonment of this practice was caused by economic and social, not by environmental reasons[83]. Still, the notion of a slightly wetter and cooler climate seems to be in accordance with ancient written sources for Classical and Roman times[84].

Another argument in favour of climate change within the last few thousand years is the fact that most plants in Crete (and the Mediterranean in general) are maladapted to the present seasonal scheme: it would make far more sense for them if they shed their leaves in summer instead of being evergreen or winter-deciduous[85].

[80] Morris 2002, 75.
[81] Wallace 2010, 362. Large amounts of grain were imported to Knossos, Gortyn, Kydonia, Hyrtakina and possibly Elyros from Cyrene, see Tod 1948, 273–276.
[82] Higgins – Higgins 1996, 196. On Thphr. *Vent.* 13 see Panessa 1991, 78–81.
[83] Grove – Rackham 1993, 287; Grove – Rackham 2001, 150. Cf. Allbaugh 1953, 264 Table 46. 266 Table 47. 267 Table 48.
[84] Grove – Rackham 2001, 150. J. M. Wagstaff has warned though that "[t]he literary evidence consists of brief and unsystematic statements which may be interpreted as supporting or refuting climatic change according to the predisposition of the user" (Wagstaff 1981, 254). Cf. also Philippson 1948, 159: "Es sei gleich hervorgehoben, daß heute kein Zweifel mehr darüber besteht, daß das Klima Griechenlands wie der östlichen Mittelmeerländer überhaupt keine merkbare Änderung in geschichtlicher Zeit erkennen läßt [. . . ]. Da aber die Veränderung des griechischen Klimas seit dem Altertum noch immer bei manchen nicht genügend unterrichteten Autoren spukt, muß hier darauf eingegangen werden."
[85] Grove – Rackham 2001, 45; Rackham 2003, 42. Cf. however Rikli – Rübel 1923, who stress the various modes of adaptation to drought developed by the Cretan flora.

## 3.3 Flora and Vegetation

### 3.3.1 Now

The starting point for any reconstruction of an ancient landscape or environment must be its present appearance. Most species mentioned here were part of the ancient Cretan environment, too, and although the principle of uniformitarianism can be debated (see above p. 15), it is usually assumed that what applies to these plants now also applied to them then.

Apart from the cultivated species, which are, with few exceptions (olive, pear, almond[86]), all introductions of the Neolithic (cereals, pulses) or later (potato, tomato), Crete presents a patchwork of four forms of vegetation: forest (continuous trees), maquis (shrubs), *phrygana* (undershrubs) and steppe, characterized by herbaceous, non-woody plants. A fifth form, savanna, is important but not as frequently met with (see below)[87]. As elsewhere in the eastern Mediterranean, large areas covered by one single form are rather unusual; boundaries are not clearly defined, and the difference between forest and maquis is often one of definition rather than of absolute terms (see below).

The most common native trees in Crete are cypress, pine, juniper and several different species of oak. Combinations of these species constitute the Cretan woodlands. Cypress (*Cupressus sempervirens*) was mentioned by Theophrastus as the specific vegetation of Psiloritis (Thphr. *HP* 3,2,6), though today its chief habitat are the Lefka Ori[88]. In Europe, it is native to Crete exclusively[89]. Cypresses can grow on soil as well as in fissures of bare rock from sea level up to the tree limit at 1650 m (and sometimes even beyond). They are gregarious and survive harsh winds, coppicing[90] and cutting out pieces of its bark. Since its leaves are not very palatable, cypress is not much affected by browsing animals, but fire does harm it.

[86] Rackham – Moody 1996, 74.
[87] Unless otherwise stated, all information about the vegetation of modern Crete is taken from Rackham – Moody 1996 and Grove – Rackham 2001.
[88] See Rackham – Moody 1996, 62 for a distribution map.
[89] Contrary to what Baumann 2007, 25 writes.
[90] Coppicing is the repeated cutting down of woodland, to stumps or even down to the roots but without killing the plant, and allowing it to grow up again, see Fig. 3.6.

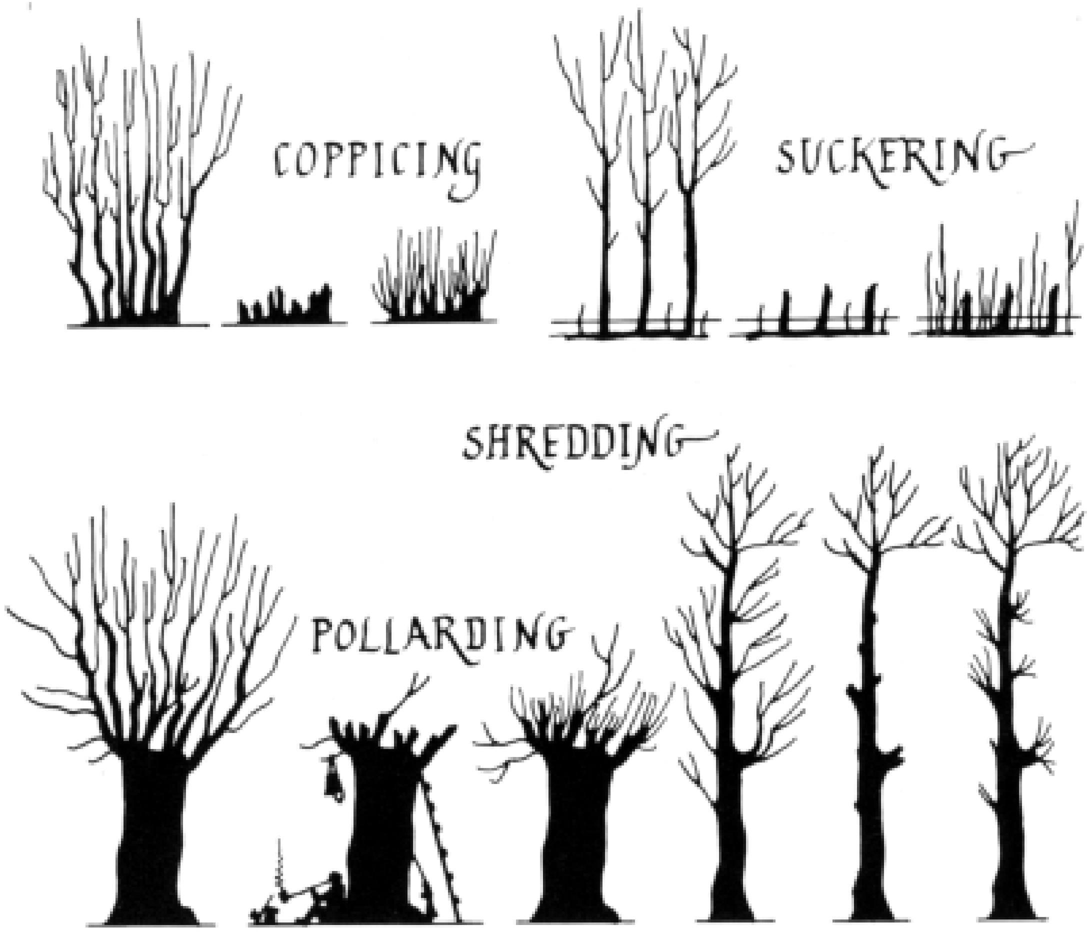


**Figure 3.6:** Forms of woodcutting, and response of trees: before cutting, immediately after cutting, one year after cutting (from Rackham – Moody 1996, 58 Fig. 6.4. Reproduced by permission)

The gregarious Calabrian pine (*Pinus brutia*) with its flat top is capable of surviving temperatures as low as $-10$ °C and grows within the same elevation range as the cypress[91]. Pines occur mainly on chalk, marl, limestone and dolomite and the soils produced by these rocks[92]. Although they are easily flammable, a thick bark makes them insensitive to burning and the leaves are not palatable at all. The pine grows fast and it can be pollarded[93], but it does not coppice and

[91] Allen 2001, 135.
[92] Zohary – Orshan 1965, 13–14; Barbéro *et al.* 1998, 159.
[93] Pollarding is the cutting of branches of trees only to a height where the regrowth cannot be reached by browsing animals, see Fig. 3.6.

dies when cut down. Pine resin used to be extracted and employed for retsina but this custom ceased in the 1950s[94].

Land-juniper (*Juniperus phoenicea*) also grows at all heights, but not in all parts of the island. It hardly ever exceeds 5 m in height and can be coppiced. Goats will not eat it but it is very fire-sensitive. M. Zohary and G. Orshan noted that it never grows by itself but always in association with Pistacia-Ceratonia maquis[95].

Several different species of oak occur naturally in Crete, some of them deciduous and some evergreen. The most versatile of all oaks is *Quercus coccifera*, prickly oak (also called Kermes oak after *Kermococcus vermilio*, an insect whose gall can be used for the production of scarlet dye[96]). It can take any shape from a cushion (ground-oak) to a tree of an impressive height of 20 metres, depending entirely on whether its habitat is being frequented by browsing animals or not[97] (see Figure 3.7). It grows gregariously from 300 to 1000 m altitude, in valleys down to 100 m[98], can be coppiced, pollarded and shredded and not even fire can destroy it. Although it produces pollen and acorns as soon as it has reached more than about 60 cm height, it seems hard to find examples of new young individuals; most of them must have been where they are for centuries. As J. Moody and O. Rackham have put it, "[i]t may be that virtually every fissure capable of holding a prickly-oak already has one"[99].

The second evergreen oak species in Crete is holm-oak (*Quercus ilex*), but it is by far less widely distributed than prickly-oak. Since it is rather sensitive to browsing, its favourite habitat are limestone cliffs in the moister west of the island where it roots in narrow cracks and grows into tall trees. Even in these remote positions it is regularly coppiced and pollarded by the locals.

Deciduous oaks in Crete are mostly of the *Quercus brachyphylla* type, only around Armenoi and in the very west of the island they are supplemented or

[94] See also Moody 2012, 253.
[95] Zohary – Orshan 1965, 14.
[96] Hence the English word 'crimson' (Hort 1916, 199 footnote 7).
[97] See Rackham – Moody 1996, 113 Fig. 10.4.
[98] Zohary – Orshan 1965, 16. Moody 2012, 258 gives "near sea level to 1700 m".
[99] Rackham – Moody 1996, 64.

**Figure 3.7:** Bitten-down prickly oak (with *Salvia cretica* in foreground right) between Askyphou and Imbros, Sphakia (April 2011)

partly replaced by *Quercus macrolepis*, valonia oak[100]. Deciduous oaks are not killed by felling or burning but sprout again. Because they have shallow roots, in Crete they grow only in areas with decent amounts of precipitation, on soils that retain enough water and allow roots to penetrate.

Cretan Maple (*Acer sempervirens*) can take the shape of a shrub or a tree and is met most often at higher elevations; indeed, it is one of the last species before the tree limit, but in gorges it can be found almost down to sea level. Cypress and pine, interspersed with prickly-oak, maple and *ambelitsia* (see below) make up the forests in the Lefka Ori, where continuous tree cover is at present most prevalent, especially in the region of Sphakia. In contrast, prickly-oak dominates

[100] Valonia are acorn-cups, exploited for their tannin, but this never seems to have been very important in Crete (Rackham – Moody 1996, 65).

**Figure 3.8:** Landscape with prickly-oaks on the south slopes of Psiloritis, to the east of the Kamares cave (April 2009; photo courtesy of Torben Keßler)

on Psiloritis (see Fig. 3.8); cypress and pine are much less common there. Dikti is divided between prickly-oak, prevailing in the north and west, and pine, covering the south and east (see Fig. 3.9). Pines also prosper on the south-west flank of the Thriphti range, whereas juniper grows on the eastern slopes of Dikti.

Outside the forests, there are other kinds of trees, too. The moisture-demanding plane trees (*Platanus orientalis*) are a good indicator of water (little streams, ground water) and of the spring in the centre of lots of Cretan villages. Many of them are coppiced or pollarded. They survive even when the landscape burns down; the biggest specimens are probably Byzantine of date and have a diameter of more than five metres (see Fig. 3.10).

Cretan elm (a variant of *Ulmus minor*) grows in similarly moist locations and is confined to the more western parts of the island, especially at the northern feet

**Figure 3.9:** The sanctuary at Kato Symi in south Dikti, with surrounding pine trees (May 2009; photo courtesy of Torben Keßler)

of the mountains; but even there it is not very common. Related to it, but with a completely different habitat is an endemic tree called *ambelitsia* (*Zelkova cretica*). Both species produce lots of suckers; from those of *ambelitsia*, the Cretans used to make shepherd's crooks[101]. The distribution of *ambelitsia* is restricted to great heights, and almost completely to the subalpine zones of the Lefka Ori; still, it was regularly pollarded. It is also very popular with browsing animals, but the sharp spines that remain when its leaves are bitten off for the first time function as an effective protection against further encroachment.

[101] Rackham – Moody 1996, 71; Beckmann 2012, 23. As of 2011, *ambelitsia* is classed as an endangered species and its exploitation hence prohibited (Beckmann 2012, iv footnote 3).

**Figure 3.10:** Giant plane tree near Kato Symi, south Dikti (May 2009)

In arid places, wild pear (*Pyrus amygdaliformis*) is the only tree; it often takes the shape of very old giant pollards. It is also very common in mountain plains, which are a favourite place of hawthorns (*Crataegus heldreichii*), too.

The strawberry-tree (*Arbutus unedo*) with its edible fruits is particularly abundant in western Crete. Another food-providing tree is the carob (*Ceratonia siliqua*), probably introduced in antiquity from Palestine or elsewhere[102], with dark brown

[102] Ethiopia has also been suggested as the origin of this species (Bottema 1999, 13). Carob wood was found in Bronze Age layers at Kommos (Shay *et al.* 1995, 120). On the question of introduction see also Moody 2012, 250.

pods which are used as animal fodder or ground into flour for a whole variety of uses, culinary or other[103].

The Cretan palm (*Phoenix theophrasti*) occurs only in a few coastal environments around the fringes of the island; they are certainly important in terms of climatic and botanic history, but need not receive further treatment in the context of the present study[104].

Maquis consists of shrubs. Many shrub species also exist as trees; their form depends on whether they are regularly browsed or not: if pressure ceases (or never existed), they can escape the critical height up to which animals can reach. Shrubs grow mostly in the heights from sea level to 600 m, but can occur up to 1000 m altitude. Examples of such tree-or-shrub plants are prickly-oak, lentisk (*Pistacia lentiscus*), Cretan maple (*Acer sempervirens*) and terebinth (*Pistacia terebinthus*)[105]. Like other maquis constituents such as phillyrea (*Phillyrea media*), wild olive or carob, they are combustible and eaten by animals, but their roots reach deep enough to survive both impacts as well as the cutting their branches for fuel.

*Phrygana* species are far less robust. Although they are often unpalatable and, despite their shallow rooting, drought-resistant, they are not very durable and many of them will not survive burning. Most of them are annuals anyway[106]. Thyme, sage or savory are examples of aromatic undershrubs; like other *phrygana*, they need insects for pollination—which in turn means that most honey comes from this type of vegetation—and grow up from seeds, mostly in groups of their own species. They are used as pasture as well as for fuel[107].

Steppe or another kind of low vegetation interspersed with trees is called *savanna*. Any combination of trees[108] with shrubs, undershrubs or even cultivated

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[103] In the European Union, it is registered as E410. Moody 2012, 250 also mentions carob bean sugar.

[104] For the Cretan palm see Greuter 1967, 243–250.

[105] According to Turland *et al.* 1995, 7, the species most frequently occurring in Cretan maquis are *Arbutus unedo* and *Erica arborea*. H. Allen also names the Cretan palm (*Phoenix theophrasti*) as a maquis species on the north coast of Crete (Allen 2001, 131). On *Pistacia terebinthus* see also Moody 2012, 253.

[106] Zohary – Orshan 1965, 17.

[107] Zohary – Orshan 1965, 17; Rackham 2003, 44.

[108] At least seventeen different species of trees form savannas on Crete (Grove – Rackham 2001, 212).

ground is possible. Savannas are often thought to be the result of human interference, and this may well be the case in certain areas of the world[109]. In Crete, however, the fact that there exist certain kinds of animals and plants which prosper only in this type of habitat demonstrates that savannas must have existed for a very long time on Crete, namely in places where there is enough water for only some trees[110]. Today, savanna landscapes can be found for example above Males in southern Dikti (oak), on the Akrotiri peninsula (wild olive) and near Rethymnon (carob). The aforementioned *ambelitsia* grows almost exclusively in the subalpine savanna of the Lefka Ori.

All in all, roughly 1800 plant species can be found in Crete today. About 80 of them are neophytes, but how many of them have been introduced by man in prehistoric or early historical times is not certain[111]. In addition to the flora described so far, there are flowers such as *Iris cretica* (see Fig. 3.11), *Viola scorpiuroides* (Yellow Violet) or *Centaurea solstitialis* (Yellow Starthistle) and lots of highly edaphically or habitat-wise specialized species. Many of these—circa 180 in the whole of Crete—are endemic: they do not occur wild anywhere else in the world, for example *Petromarula pinnata* or the aforementioned *ambelitsia*. Endemics are especially abundant in high elevations and on cliffs where they are not threatened by browsing animals or by competing species[112].*Bupleurum kakiskalae* for example is not recorded anywhere in the world apart from on a single cliff in Sphakia[113]. Other species protect themselves from being eaten by sticking close to the ground, forming a *flat-plant* or *hedgehog-plant* like *Polygonum idaeum*, typical of the Nida plain in Psiloritis. The high mountains of Crete host a mere 217 species, 35% of which are endemic[114].

[109]Schroeder 1998, 183–185. See also Allen 2001, 136–137.
[110]The relation between water availability and savanna was stressed, albeit not with particular reference to Crete, already in the 1930s (Churchill Semple 1932, 265).
[111]Kull – Diamantoglou 1998, 95.
[112]Safety from browsing is favoured by Rackham – Moody 1996, 54, no competitors by Kull – Diamantoglou 1998, 100.
[113]Greuter 1967, 250–251; Rackham – Moody 1996, 54.
[114]Kull – Diamantoglou 1998, 102.

**Figure 3.11:** *Iris cretica* on the south side of Psiloritis, below the Kamares cave (April 2009)

### 3.3.2 Then

The foursome of forest, maquis, phrygana and steppe is generally considered typical for the Mediterranean today, but it has often been stated that each form represents a certain stage of *allogenic succession*[115]: through the activities of man, forest is supposed to degrade into maquis which is supposed to degrade into phrygana which is supposed to degrade into steppe.

At least since George Perkins Marsh published his damning indictment of human impact on Mediterranean environments[116], the story has been retold countless times: once there were marvellous forests all over these lands, but at least since the Bronze Age man needed open space for his fields and pastures and wood for his buildings and ships and hearths, so he began to cut and burn down the trees. By

[115]For the term 'allogenic succession' see Branch *et al.* 2005, 14.
[116]Marsh 1864.

letting his sheep and especially his goats[117] feed on young tree sprouts, regrowth was effectively prevented. The continuing absence of vegetation and the breaking up of the ground by the goats' hooves then led to loss of soil cover through denudation[118], down to the very rock that shows up on so many mountain slopes. The evils involved are referred to as 'deforestation' and 'erosion'. Evidence is said to come from the barren appearance of the modern landscape in general, as well as from ancient textual sources[119].

In most cases (at least those concerned with Greece), such treatises will involve a reference to a passage in Platon's dialogue fragment *Kritias*. This colloquy between Kritias, Sokrates, Timaios and Hermokrates relates to a war between Athens and the subsequently drowned island of Atlantis which is said to have taken place 9,000 years ago, but the script breaks off after the description of the physical setting of the two states. The passage referred to in modern works is Pl. *Criti.* 111:

> *ΚΡΙΤΙΑΣ*
>
> *[. . . ] πολλῶν οὖν γεγονότων καὶ μεγάλων κατακλυσμῶν ἐν τοῖς ἐνακισχιλίοις ἔτεσι—τοσαῦτα γὰρ πρὸς τὸν νῦν ἀπ' ἐκείνου τοῦ χρόνου* [111B] *γέγονεν ἔτη—τὸ τῆς γῆς ἐν τούτοις τοῖς χρόνοις καὶ πάθεσιν ἐκ τῶν ὑψηλῶν ἀπορρέον οὔτε χῶμα, ὡς ἐν ἄλλοις τόποις, προχοῖ λόγου ἄξιον ἀεί τε κύκλῳ περιρρέον εἰς βάθος ἀφανίζεται· λέλειπται δή, καθάπερ ἐν ταῖς σμικραῖς νήσοις, πρὸς*

[117] Aristotle, in contrast to most modern writers, blamed sheep as more destructive than goats (*HA* VII (VIII) 596a X). On the reliability of this work see however p. 389 footnote 66.

[118] The term 'erosion' is normally used in this context, but is essentially incorrect. 'Erosion' relates to a linear process caused by a river or glacier, in contrast to denudation, which is the extensive loss of soil on slopes or through wind (Prof. Dr G. A. Wagner, formerly Max Planck Institute for Nuclear Physics Heidelberg, *pers. comm.* 2005).

[119] For example von Trotta-Treyden 1916; Philippson 1948, 161; Grant 1969, 5; Darlington 1972, 43; Renfrew 1972, 267; Naveh – Dan 1973, 373; Greuter 1975, 146. 179; Hughes 1975, 68; Verginis 1980, 206; Halstead 1981, 311; Thirgood 1981; Hughes 1982, 68; Hughes 1983; Pignatti 1983, 160; Wertime 1983, 445; Brückner 1986, 15; Lienau 1989, 117; Flaccus 1992, 27; Gifford 1992, 23; McNeill 1992, 72. 282; Zangger 1992, 16–18; Economidou 1993; Goudie 1993, 62; Hughes 1994; Jameson *et al.* 1994, 189–192; Lyrintzis – Papanastasis 1995, 79. 83 (but cf. 91–92); Runnels 1995; Higgins – Higgins 1996, 22. 25; Lyrintzis 1996 *passim*; Faulkner – Hill 1997; Pyne 1997, 82. 93; Dincauze 2000, 324; Seuffert 2000; Wagner 2001, 6; Bottema – Sarpaki 2003, 742; Chaniotis 2004, 12–13 (but cf. Chaniotis 1999b, 208–209); Hughes 2005, 40–42; Baumann 2007, 21–24; Lafreniere 2007, 53–54. 61; Ponting 2007, 75–76. Interestingly, even a botanist who explicitly states that the Mediterranean climate is not very favourable to forest joins this tenor (Eberle 1975, 23–25; cf. Rikli – Rübel 1923, 185; Turland *et al.* 1995, 7).

*τὰ τότε τὰ νῦν οἷον νοσήσαντος σώματος ὀστᾶ, περιερρυηκυίας τῆς γῆς ὅση πίειρα καὶ μαλακή, τοῦ λεπτοῦ σώματος τῆς χώρας μόνου λειφθέντος. τότε δὲ ἀκέραιος* [111C] *οὖσα τά τε ὄρη γηλόφους ὑψηλοὺς εἶχε, καὶ τὰ φελλέως νῦν ὀνομασθέντα πεδία πλήρη γῆς πιείρας ἐκέκτητο, καὶ πολλὴν ἐν τοῖς ὄρεσιν ὕλην εἶχεν, ἧς καὶ νῦν ἔτι φανερὰ τεκμήρια· τῶν γὰρ ὀρῶν ἔστιν ἃ νῦν μὲν ἔχει μελίτταις μόναις τροφήν, χρόνος δ' οὐ πάμπολυς ὅτε δένδρων αὐτόθεν εἰς οἰκοδομήσεις τὰς μεγίστας ἐρεψίμων τμηθέντων στεγάσματ' ἐστὶν ἔτι σᾶ. πολλὰ δ' ἦν ἄλλ' ἥμερα ὑψηλὰ δένδρα, νομὴν δὲ βοσκήμασιν ἀμήχανον ἔφερεν. καὶ δὴ καὶ* [111D] *τὸ κατ' ἐνιαυτὸν ὕδωρ ἐκαρποῦτ' ἐκ Διός, οὐχ ὡς νῦν ἀπολλῦσα ῥέον ἀπὸ ψιλῆς τῆς γῆς εἰς θάλατταν, ἀλλὰ πολλὴν ἔχουσα καὶ εἰς αὑτὴν καταδεχομένη, τῇ κεραμίδι στεγούσῃ γῇ διαταμιευομένη, τὸ καταποθὲν ἐκ τῶν ὑψηλῶν ὕδωρ εἰς τὰ κοῖλα ἀφιεῖσα κατὰ πάντας τοὺς τόπους παρείχετο ἄφθονα κρηνῶν καὶ ποταμῶν νάματα, ὧν καὶ νῦν ἔτι ἐπὶ ταῖς πηγαῖς πρότερον οὔσαις ἱερὰ λελειμμένα ἐστὶν σημεῖα ὅτι περὶ αὐτῆς ἀληθῆ λέγεται τὰ νῦν.*

KRITIAS

Consequently, since many great convulsions took place during the 9000 years—for such was the number of years [111B] from that time to this—the soil which has kept breaking away from the high lands during these ages and these disasters, forms no pile of sediment worth mentioning, as in other regions, but keeps sliding away ceaselessly and disappearing in the deep. And, just as happens in small islands, what now remains compared with what then existed is like the skeleton of a sick man, all the fat and soft earth having wasted away, and only the bare framework of the land being left. But at that epoch the country was unimpaired, and for its mountains it had [111C] high arable hills, and in place of the "moorlands", as they are now called, it contained plains full of rich soil; and it had much forestland in its mountains, of which there are visible signs even to this day; for there are some mountains which now have nothing but food for bees, but they had trees no very long time ago, and the rafters from those felled there to roof the largest buildings are still sound. And besides, there were many lofty trees

> of cultivated species; and it produced boundless pasturage for flocks. Moreover, it was enriched by the yearly rains from Zeus, [111D] which were not lost to it, as now, by flowing from the bare land into the sea; but the soil it had was deep, and therein it received the water, storing it up in the retentive loamy soil and by drawing off into the hollows from the heights the water that was there absorbed, it provided all the various districts with abundant supplies of springwaters and streams, whereof the shrines which still remain even now, at the spots where the fountains formerly existed, are signs which testify that our present description of the land is true[120].

Several problems with this passage have been shown to exist; as Oliver Rackham has put it, "[t]he scholar, building up an inverted pyramid of argument on scraps of data, must pay meticulous attention to what words mean"[121]. Although the passage is in difficult Greek[122], nobody seems to bother to include the original text which would allow one to scrutinize the offered interpretation on the spot. Instead, perfectly smooth translations are given, or it is simply stated that Platon observed with great woe what had become of the land[123]. However, after careful examination it turns out that despite the difficult language, the text is nonetheless not ambivalent[124]. Furthermore, the context of the passage has been utterly neglected. It has been argued that Platon does not attempt to describe the real Attica, but a mythical state of the glorified past at war with an imaginary city; this claim, however, seems debatable[125]. The most important point is that even if the text was to be taken at face value, it still, as has been pointed out, would mean

[120] Translation by R. G. Bury.

[121] Rackham 2001, 13.

[122] Rackham 1996, 34; Prof. Dr J. Grethlein, Seminar für Klassische Philologie Heidelberg, *pers. comm.* 2009.

[123] Weeber 1990, 12. 19–23; Sonnabend 1999c, 83–84 (Platon as "Kronzeuge für das antike Registrieren anthropogener, sich erst sukzessive als katastrophal herausstellender Veränderungen der natürlichen Umwelt"); Hughes 2005, 40; Baumann 2007, 21–23; Montgomery 2007, 51; Ponting 2007, 75–76.

[124] Prof. Dr J. Grethlein, Seminar für Klassische Philologie Heidelberg, *pers. comm.* 2009.

[125] The 'mythical state' argument has been put forward by Meiggs 1982, 188; Horden – Purcell 2000, 331; Grove – Rackham 2001, 288; Rackham 2001, 26; Williams 2003, 96. Prof. Dr J. Grethlein, Seminar für Klassische Philologie Heidelberg, however contends that Platon's ambition was indeed to describe the real situation in the past (*pers. comm.* 2009). Cf. also Panessa 1991, 70 footnote 1.

that deluges (*κατακλυσμῶν*) wash the soil from slopes and that as a consequence of *this* there are no trees any more—not the other way round, as it is usually presented[126]. Man is not to blame on this point[127]. It should also be noted that according to Platon (111C), not long ago timbers for the largest buildings were taken from local resources (which means that the floods did not destroy all trees)—and yet, despite the floods and despite the felling of big trees for construction, there are "still visible signs" (*ἔτι φανερὰ τεκμήρια*) of forests left in his own time[128]. In my opinion, if references to this text are made, they should include 111E-112A:

> *ΚΡΙΤΙΑΣ*
> *[...] πρῶτον μὲν τὸ τῆς ἀκροπόλεως εἶχε* [112A] *τότε οὐχ ὡς τὰ νῦν ἔχει. νῦν μὲν γὰρ μία γενομένη νὺξ ὑγρὰ διαφερόντως γῆς αὐτὴν ψιλὴν περιτήξασα πεποίηκε, σεισμῶν ἅμα καὶ πρὸ τῆς ἐπὶ Δευκαλίωνος φθορᾶς τρίτου πρότερον ὕδατος ἐξαισίου γενομένου.*

> KRITIAS
> [...] In the first place, the acropolis, as it existed then, was different from [112A] what it is now. For as it is now, the action of a single night of extraordinary rain has crumbled it away and made it bare of soil, when earthquakes occurred simultaneously with the third of the disastrous floods which preceded the destructive deluge in the time of Deucalion[129].

This underlines Platon's view of the significance of one-off events for soil loss, in this case an earthquake in combination with a flood which stripped the Athenian

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[126] "To read this piece as a denunciation of the evils of deforestation is to stand Plato on his head" (Rackham 1996, 34). See also Harfouche 2007, 147. For the impact of large flood events in the Mediterranean see also Rackham – Moody 1996, 20; Horden – Purcell 2000, 320–322; Bintliff 2002, 425–426; Allen 2003, 371; Macklin – Woodward 2009, 338.

[127] Ettrich 1999a, 126; Ettrich 1999b, 379; Horden – Purcell 2000, 331; Desideri 2001, 20. For a not very coherent analysis and assessment of the passage see Goldwin 1997, 77–78; for a political interpretation see Nenninger 2001, 195–198. L. Hempel has claimed that Platon was describing forests of coniferous trees which offer little protection from soil being washed away (Hempel 1981, 61). I am not aware of any allusion in Platon as to the kind of tree growing in Attica.

[128] I would like to thank Prof. Dr Jonas Grethlein (Heidelberg) for his comments on this passage.

[129] Translation by R. G. Bury.

Akropolis hill bare in a single night. His description resembles that of a deluge experienced by O. Rackham and J. Moody in 1986 in Pachyammos (Crete)[130].

J. D. Hughes has collected further passages from ancient authors which he believes to relate to deforestation in the ancient Mediterranean[131]. However, none of the references contains any information about the complete removal of all trees in a certain area for good, which is what I think deforestation means if the term is to be of any significance. If an area is cleared of trees but then left alone and trees grow again, this is not a long-lasting impact[132]. There is no point in going through every single citation given in Hughes' article. It is enough to note here that hardly any of them refer to Greece and that many are exclusively concerned with how the ancients viewed the *forest*, not its alleged disappearance. Besides, I do not see how the fact that a Phrygian woodcutter (*ὑλοτόμον*) who fought and died for Attica in the Peloponnesian War is honoured in the inscription of an epitaph or even the lines that a comedy chorus of goats sings about their favourite foods could possibly serve as a proof that the ancient Greeks over-exploited their forests[133]. Nor, for that matter, that this was the case with the Romans. For example, Strabon (5,2.5, C223) states that Pisa had and still has good timber. Whereas in the past it was used mainly for ships, *νῦν δὲ τό πλέον εἰς τὰς οἰκοδομὰς ἀναλίσκεται τὰς ἐν Ῥώμῃ* (at the present time most of it is being used up on the buildings at Rome[134]). This is taken by Hughes to mean that the forests in Strabon's times were being "consumed" for building houses in Rome. In fact, the change that Strabon talks about is simply one in the *use* of the timber, not one in the scale of exploitation. The exploitation of trees for timber as such is not the same as deforestation[135]. There is, therefore, at least in these texts no justification to suggest that the land was wasted through human activities in antiquity.

[130] Rackham – Moody 1996, 20; cf. Beckmann 2012, 18. For the entire passage see also Panessa 1991, 65–78.

[131] Hughes 1983. Horden – Purcell 2000, 598 denounce another work by the same author (Hughes 1994) as "just the sort of retrojection of the clichés of the modern environmentalism that we want to banish from Mediterranean historiography". For criticism see also Nenninger 2001, 10.

[132] Admittedly, the Oxford English Dictionary defines the verb 'deforest' simply as "clear of forest or trees", but see Rackham 2001, 25: "Tree-felling by itself is not deforestation: a firm may spend a billion dollars without necessarily going bankrupt."

[133] Cf. Horden – Purcell 2000, 333.

[134] Translation by H. L. Jones.

[135] Cf. Horden – Purcell 2000, 336.

Hughes' article demonstrates what can happen when two fundamental things are being neglected: the importance of regional differences in the Mediterranean and the fuzziness of the term 'forest'. Firstly, even though the common use of the term 'the Mediterranean' seems to imply a general likeness, in reality spatial contrasts are more pronounced than any affinities[136]. It should hence be borne in mind that what applies to or is correct for one region need not necessarily be the same in another area. Generalizations are—generally!—dangerous. Secondly, attention has been called to the fact that 'forest' is by no means an unambiguous concept: how tall does a plant need to be before it can be called a tree? How many trees make a forest?[137] These notions might be very different to people with different geographical backgrounds[138]. Moreover, what may look like 'forest' from afar can in reality be a much sparser scatter or a shrub cover[139]. Surprisingly, nobody seems to have argued yet that Theophrastus' detailed knowledge of (at least some species of) trees must mean that there actually *were* trees in large enough numbers in his time, the 4th and beginning of the 3rd century BC[140].

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[136]Wagner 2001, 1; cf. Hempel 1982, 7; Zangger 1992, 19; Rackham – Moody 1996, 10. "In many areas more environmental change was probably to be seen by moving twenty miles or so in the Dark Age than is to be seen by moving from the Dark Age to the present day in the same place" (Osborne 1996, 58).

[137]See also Goldberg – Macphail 2006, 193–194. Cf. also the differentiation by the UN's Food and Agricultural Organization (FAO): "6,52 Mio. ha waren 2005 lt. FAO in Griechenland von Bäumen bestanden (Wald: 3,75 Mio. ha; Anteile an der Landfläche: 50,7 bzw. 29,1 %)" (quoted from Munzinger Archive 2009). S. Beckmann has tried to find a definition especially for Crete: "forest is defined as an area larger than 100 × 100 m with trees higher than 4 m and shady enough to prevent underbrush from being so dense as to make passage impossible for humans. [...] The density of trees in forests [...] may be as open as 10 m between individual trees" (Beckmann 2012, 22).

[138]"[M]odern Crete would be 'wooded' to an Arab but not to a Finn" (Rackham – Moody 1996, 128), and in antiquity may have seem wooded to someone from Attica (Rackham 1990, 36 footnote 7). E. Churchill Semple, who taught in Massachusetts in the 1930s, had a notion of 'forest' that led her to state: "The dense continuous forests which stretch across middle and northern Europe under the influence of an ample and well distributed rainfall reach their southern limit just within the northern border of the Mediterranean Basin", making it clear that the scarcity of trees in certain areas is not man's fault (Churchill Semple 1932, 265). She contradicts herself later on however (Churchill Semple 1932, 291).

[139]Hempel 1991, 150.

[140]Theophrastus came from Lesbos but lived in Athens; according to O. Rackham, he was "no great traveller, he relied on what people told him, and seldom displays interest in verifying the data" (Rackham 2001, 13). See also Rackham 2001, 26.

In fact, it has been argued that other ancient writers describe landscapes that are quite in keeping with their modern (*i. e.* early twentieth century) appearance[141]. In the Odyssey (19,439–440), Homer describes a hunt on Mount Parnassos: the mountain was *καταειμένον ὕλῃ*, covered with forest, and a wild boar is hiding in a thicket that is depicted like a dense maquis:

> *ἔνθα δ' ἄρ' ἐν λόχμῃ πυκινῇ κατέκειτο μέγας σῦς·*
> *τὴν μὲν ἄρ' οὔτ' ἀνέμων διάει μένος ὑγρὸν ἀέντων,*
> *οὔτε μιν Ἠέλιος φαέθων ἀκτῖσιν ἔβαλλεν,*
> *οὔτ' ὄμβρος περάασκε διαμπερές.*
>
> Now thereby a great wild boar was lying in a thick lair, [440] through which the strength of the wet winds could never blow nor the rays of the bright sun beat, nor could the rain pierce through it, so thick it was; and fallen leaves were there in plenty[142].

Pausanias (in the 2nd century AD) apparently did not take the existence of forests for granted but thought them remarkable enough to mention it when he saw one (*e. g.* in Laconia (3,19,11; 3,26,6) or in Boeotia (9,19,2))[143]—but I guess some people could take this as an argument in favour of the degradation hypothesis, too. In the context of the present study, it is interesting to note that in Byzantine Greek, the word for 'forest' was the same as that for 'mountain'[144]. To me this seems to be evidence that not all trees can have disappeared in the course of antiquity; the strong association of elevation and forest may indicate that dense stands of trees were not to be expected in the plain, but were typical for mountainous areas.

For these reasons, it cannot simply be assumed that once there were trees and soil in any province of the Mediterranean: more reliable and more specific evidence for erosion is needed. Geological investigations have therefore been undertaken to address this issue. One of the first projects of this kind was Claudio Vita-Finzi's study of "The Mediterranean Valleys", published in 1969. His work has been

[141] Rackham – Moody 1996, 128–129.
[142] Translation by A. T. Murray.
[143] Cf. Williams 2003, 77. See also Rackham 2001, 16. On single trees and stands of trees in Pausanias' description see Birge 1996.
[144] As pointed out by Rackham 2001, 15, with reference to Dunn 1992.

discussed so often that there is no need to go into too much detail here, especially since his research in Greece was confined to the area of Olympia in the Peloponnese and therefore does not bear implications for Crete. At any rate, the basic feature of his theory are the 'Older Fill' and the 'Younger Fill', two aggradation levels which Vita-Finzi claimed to have traced all across the Mediterranean and which he dated to the Palaeolithic and the Middle Ages respectively and ascribed to climatic influences[145]. John Bintliff and, on a smaller scale, J. Hutchinson, confirmed these findings for certain regions of Greece[146], and Greece has since remained the main geographical area under question. In 1981, J. Wagstaff made explicit his doubts about Vita-Finzi's and Bintliff's hypotheses. He pointed out that the synchronism which climatic alluviations would imply cannot be confirmed by the available data and that hence human-induced erosion remains a very possible suggestion[147]. The results of the Southern Argolid project in the 1980s supported the anthropogenic hypothesis, even though it was stressed that these conclusions applied *exclusively* to the study area and that the geological record as such does not comprise any indication as to what effected the alluviation[148]. Tjeerd van Andel and Eberhard Zangger, both members of the Southern Argolid venture, therefore embraced similar outcomes of the explorations of the Argive Plain and the Peneios Plain in Thessaly. Erosion events varied, so they subsumed, from region to region and could be very brief, but human impact could not be denied[149].

Few scholars have, after Vita-Finzi's thesis had been refuted, dared to reject human fault completely[150]. However, a more moderate position which emphasizes the interaction of climatic and geological factors with human activities and calls

[145] Vita-Finzi 1969, 95. 101–102. For a concise up-to-date discussion of the book and reactions to it see Macklin – Woodward 2009, 335–340.

[146] Hutchinson 1969; Bintliff 1977. Bintliff later revised his opinion (see Bintliff 1992, 125; Bintliff 2002, 431).

[147] Wagstaff 1981, 249–253. Evidence from the Kavousi area in Crete does not support Vita-Finzi's hypothesis either (Morris 2002, 76).

[148] van Andel *et al.* 1986, 105; Zangger 1992, 19; Zangger 1993, 54. 83.

[149] van Andel – Zangger 1990, 141. 147. 152–154, but cf. Andel – Runnels 1987, 142. 153. For a summary of erosion research in mainland Greece and regional variations see Runnels 2000.

[150] van Andel – Runnels 1987, 153; Grove – Rackham 1993, 282; Dickinson 1994, 25; Rackham 1996; Perry 1997, 34–42; Atherden 2000, 62; Forbes 2000, 107; Allen 2003, 371–372.

for regional differentiation is being favoured by a growing number of people, most of which follow O. Rackham's almost revolutionary propositions[151].

If there had once been trees all over Greece and they had disappeared, this would be reflected in pollen records from this area. It is impossible here to relate in any detail the evidence from various pollen cores in mainland Greece. Suffice it to say that the history of vegetation differs from one region to the next, and even where human impact may be reflected in the diagrams, they do not indicate that an originally extensive forest cover was replaced by denuded hillsides[152]. Moreover, from a botanical point of view, the degradation theory (forest to maquis to phrygana) cannot be sustained: Oliver Rackham was the first author to observe that shrubs can grow into trees if not disturbed by browsing or cutting, but undershrubs can never develop into shrubs, no matter how long they are left to their own devices. The concept of succession, climax communities and equilibrium, widespread in earlier literature on the subject, is today mostly considered inappropriate[153]. Which type of vegetation and how much of it grows in a certain place depends to a large part on geological features such as the water retention

[151] Poser 1957, 124. 126; Aschmann 1973, 363–366; Meiggs 1982, 5; Osborne 1987, 31; Bell – Walker 1992, 190–192; Atherden – Hall 1994, 128; Roberts 1998, 191; Sonnabend 1999c, 85 (despite his opinion "[daß] sich Griechen und Römer in den antiken Wäldern ziemlich hemmungslos bedient [haben]"); Bintliff 2000, 58. 61; Horden – Purcell 2000, 185 ("There have undoubtedly been instances of over-exploitation and deforestation, sometimes on a quite large scale. No mystical equilibrium between human demands and natural resources in the Mediterranean has ever existed [...]. [...] But it can be asserted that, before the nineteenth century, the urgency of societies' needs for woodland products led to the active integration of forest or scrubland into the managed environment more often than it caused irreversible loss of so flexible and varied a resource."). 308–310. 330 ("the crisis of a mountainside in Cyprus can only with an unrealistic effort of the imagination be said to affect an entity—such as 'the Mediterranean forest'—which also includes the woods of Catalonia"). 337–338; Shiel 2000; Nenninger 2001, 191–202; Bintliff 2002, 420–421. 424–425. 428; Fitton 2002, 15–16; Morris 2002, 5; Williams 2003, 96–97; Haversath 2004, 96–97; Siart *et al.* 2009, 16. In 1992, J. R. McNeill still called Rackham's views "a maverick opinion" (McNeill 1992, 72). H. Brückner accepts the need for regional differentiation, but still blames man as "the main geomorphological agent in historical times" (Brückner 1986, 16). Robin Osborne acknowledges human impact on the vegetation of Greece, but denies that this would have altered the actual landscapes in any significant way (Osborne 1996, 55); a similar view, namely that the Greek environment has not changed substantially since antiquity, is held by T. Howe (Howe 2008, 18–20). See also Dillon 1997, 127.

[152] For pollen cores from mainland Greece see Turner – Greig 1975; Bottema 1994.

[153] Blumler 1993, 291; Blumler 1996, 31–34; Simmons 1993, 49–53; McGlade 1995, 116; Allen 2001, 130; Allen 2009, 223. See also Haupt 2012, 18. Cf., however, Redman 1999, 89–90.

potential of the soil, not solely on human interference[154]. Moreover, in terms of optimized adaptation, a plant may be better off as a shrub than as a tree[155]. All this of course applies not only to shrubs and undershrubs in mainland Greece, but also in Crete.

For Crete, too, has been subjected to "Ruined Landscape theory" and is considered to have, through human fault, degraded from a fertile, densely forested land to its (allegedly) utterly barren state of today; Arthur Evans even attributed the decline of the Minoan palaces to deforestation[156]. As with mainland Greece, environmental information has been sought in ancient literature. Platon lets a Cretan called Kleinias, a certain Megillos from Sparta and an unnamed Athenian stranger discuss his *Laws* one afternoon, during a leisurely walk from Knossos to the Idaian Cave (Pl. *Lg.* 1,625B):

*ΑΘΕΝΑΙΟΣ*

*πάντως δ' ἥ γε ἐκ Κνωσοῦ ὁδὸς εἰς τὸ τοῦ Διὸς ἄντρον καὶ ἱερόν, ὡς*

[154] Rackham 1982, 188; Rackham 1983, 304–305; Rackham 1990a, 35. See also McGlade 1995, 123–124; Williams 2003, 77.

[155] Blumler 1993, 290–291; Allen 2009, 222. Cf. Hempel 1982, 55.

[156] Evans 1928b, 565. Other authors claiming anthropogenic deforestation for Crete are Creutzburg 1928, 28; Churchill Semple 1932, 278; Pendlebury 1939, 6; Demargne – Gallet de Santerre 1953, 2–3; Zohary – Orshan 1965, 13. 18. 41–42; Hood 1971, 20 (but see also his endnote 6); Rossignol – Pastouret 1971, 236; Darlington 1972, 42; Davaras 1976, 53. 101; Durrell 1978, 93–94; Bottema 1980, 194. 196; Perlin 1989, 51; Papanastasis *et al.* 1990, 42; Chew 2001, 43–47. To cite just two of these as examples, Perlin writes, without further botanical information as to which species would have constituted the "original forest": "By Classical times the original forest growth had been replaced by the cypress as the dominant tree on the island, and this change in dominant tree type suggests extensive deforestation of pre-Classical Crete." Botanists M. Zohary and G. Orshan explain the present state as follows: "The many arboreal plant communities mentioned in former paragraphs are nowhere represented by extensive forests. There are, at most, small fragmentary stands which, according to their distribution, testify to former continuous forest areas. As elsewhere in the Mediterranean countries, deforestation was mainly the result of fuel collection and wood industry. Considering the enormous span of time during which the natural vegetation was the source of fuel and timber supply, it is astonishing that so much of the previous woody vegetation escaped extermination. This phenomenon can be explained only by the fact that until recently man was deprived of the proper tools to fight nature radically. Consequently much of Crete's surface is covered today mainly with trees and shrubs that withstand fire, axe and erosion, and regenerate vigorously; other less resistant trees have no doubt vanished altogether" (Zohary – Orshan 1965, 42). Adaptation to fire may be a natural response to competition, see Rackham 2001, 8. In fact, *Pinus halepensis* (which does not grow in Crete) is dependent on frequent fire and would possibly disappear from the landscape if it were protected from fire for a century or longer (Agee 1998, 208).

*ἀκούομεν, ἱκανή, καὶ ἀνάπαυλαι κατὰ τὴν ὁδόν, ὡς εἰκός, πνίγους ὄντος τὰ νῦν, ἐν τοῖς ὑψηλοῖς δένδρεσίν εἰσι σκιαραί, καὶ ταῖς ἡλικίαις πρέπον ἂν ἡμῶν εἴη τὸ διαναπαύεσθαι πυκνὰ ἐν αὐταῖς, λόγοις τε ἀλλήλους παραμυθουμένους τὴν ὁδὸν ἅπασαν οὕτω μετὰ ῥᾳστώνης διαπερᾶναι.*

*ΚΛΕΙΝΙΑΣ*

*καὶ μὴν ἔστιν γε, ὦ ξένε, προϊόντι κυπαρίττων τε* [625C] *ἐν τοῖς ἄλσεσιν ὕψη καὶ κάλλη θαυμάσια, καὶ λειμῶνες ἐν οἷσιν ἀναπαυόμενοι διατρίβοιμεν ἄν.*

ATHENIAN

Certainly, as I am told, the road from Cnosus to the cave and temple of Zeus is a long one, and we are sure to find, in this sultry weather, shady resting-places among the high trees along the road: in them we can rest ofttimes, as befits our age, beguiling the time with discourse, and thus complete our journey in comfort.

KLINIAS

True, Stranger; and as one proceeds further one finds in the groves cypress-trees of wonderful height and beauty, [625C] and meadows too, where we may rest ourselves and talk[157].

These lines have been interpreted to mean that in Platon's times Crete was covered with trees[158], but it has rightly been pointed out by O. Rackham and J. Moody that "[t]his does not prove that Crete was forested; all it proves, to anyone who has ever done the long and arduous trip, is that Plato did not know Crete"[159]. Even if the text was to be taken literally, it would only indicate the presence of *some high trees along the road* and of *groves*, not a continuous forest cover. In fact, in another passage (4,704D; see below), Platon himself refutes the modern notion that Crete had good shipbuilding timber in antiquity (he does mention the mighty fleet of Minos though, another of Platon's comments on which archaeological dogmas have been built, in this case concerning the Minoan 'thalassocracy'), but of course it is not possible to trust him on this either. Kleinias tells about a new *polis* that

[157] Translation by R. G. Bury.

[158] Faure 1965, 40 footnote 6; Chaniotis 2004, 12–13.

[159] Rackham – Moody 1996, 130. Cf. Rackham 1996, 22. It is uncertain whether Platon ever visited Crete (Panagopoulos 1981, 14–15).

the Cretans plan to found in their island (3,702B-D), and the conversation turns to what the geography of this state would be like (4,704):

*ΚΛΕΙΝΙΑΣ*

*σχεδόν, ὦ ξένε, ἀπέχει θαλάττης γε ἡ πόλις, ἧς πέρι τὰ νυνδὴ λεχθέντα ἡμῖν, εἴς τινας ὀγδοήκοντα σταδίους.* [...] [704C] [...]

*ΑΘΕΝΑΙΟΣ*

*παπαί, οἷον λέγεις. τί δὲ περὶ αὐτὴν ἡ χώρα· πότερα πάμφορος ἢ καί τινων ἐπιδεής·*

*ΚΛΕΙΝΙΑΣ*

*σχεδὸν οὐδενὸς ἐπιδεής.*

*ΑΘΕΝΑΙΟΣ*

*τί δὲ πεδίων τε καὶ ὀρῶν καὶ ὕλης· πῶς μέρος ἑκάστων ἡμῖν εἴληχεν·*

*ΚΛΕΙΝΙΑΣ*

*προσέοικε τῇ τῆς ἄλλης Κρήτης φύσει ὅλῃ.* [704D] [...] [705C]

*ΑΘΕΝΑΙΟΣ*

*τί δὲ δή· ναυπηγησίμης ὕλης ὁ τόπος ἡμῖν τῆς χώρας πῶς ἔχει·*

*ΚΛΕΙΝΙΑΣ*

*οὐκ ἔστιν οὔτε τις ἐλάτη λόγου ἀξία οὔτ' αὖ πεύκη, κυπάριττός τε οὐ πολλή· πίτυν τ' αὖ καὶ πλάτανον ὀλίγην ἂν εὕροι τις, οἷς δὴ πρὸς τὰ τῶν ἐντὸς τῶν πλοίων μέρη ἀναγκαῖον τοῖς ναυπηγοῖς χρῆσθαι ἑκάστοτε.*

KLINIAS

The State which I mentioned just now, Stranger, lies about eighty stades, roughly speaking, from the sea. [...] [704C] [...]

ATHENIAN

Dear me! how unfortunate! But what of the surrounding country? Is it productive in all respects, or deficient in some products?

KLINIAS

There is practically nothing that it is deficient in.

ATHENIAN

How about plains, mountains and forests? What extent of each of these does it contain? [704D]

KLINIAS

> As a whole, it resembles in character the rest of Crete. [...] [705C]
>
> ATHENIAN
>
> Well, then, how is our district off for timber for ship-building?
>
> KLINIAS
>
> There is no fir to speak of, nor pine, and but little cypress; nor could one find much larch or plane, which shipwrights are always obliged to use for the interior fittings of ships[160].

The *chora* of the new state is described as being typical of Crete, and the alleged lack of fir and pine and the rareness of cypress, larch and plane would thus have been considered characteristic for the whole island. However, as already mentioned, Platon is not trustworthy on this subject, and the modern circumstances seem to point in a different direction[161].

A single word in a line from Strabon's description of Crete in his *Geographika* (10,4.4) has likewise been used as evidence for forests all over Crete[162]:

> *ἔστι δ' ὀρεινὴ καὶ δασεῖα ἡ νῆσος ἔχει δ' αὐλῶνας εὐκάρπους.*

The adjective *δασύς* is usually translated as 'thickly wooded', even though it can also mean 'bushy' and is used by Herodotus to describe a head of lettuce that has not been deprived of any of its leaves (Hdt. 3,32). Consequently, it seems to me that there is no secure argument in favour of any notion of *forest* in what Strabon says; he simply states that the island is covered with *vegetation* of some kind or other[163].

Similarly, a remark by Theophrastus' (Thphr. *HP* 4,1,3) has been mistaken as a description of a densely forested island[164]:

> *ἐν Κρήτῃ γοῦν φασιν ἐν τοῖς Ἰδαίοις ὄρεσι καί ἐν τοῖς Λευκοῖς καλουμένοις ἐπὶ τῶν ἄκρων ὅθεν οὐδέποτ' ἐπιλέιπει χιών κυπάριττον εἶναι· πλείστη γὰρ*

[160] Translation by R. G. Bury.

[161] It has been stated that Platon indeed *preferred* a country with rather little shipbuilding timber because of his aversion to the political power of sailors (Hughes 1982, 62). Oliver Rackham's reasoning that "we are told which were the timber-producing regions of the Greek world, and Crete was not one of them" with a reference to Thphr. *HP* 4,5,5 (Rackham 1990a, 36) remains enigmatic.

[162] Meiggs 1982, 99.

[163] Rackham – Moody 1996, 128. See also Hempel 1991, 149 and Hempel 1981, 61.

[164] Cary 1950, 96.; however, his statements about cypresses growing on Psiloritis, the Lefka Ori and generally in Crete is still true today

*αὕτη τῆς ὕλης καὶ ὅλως ἐν τῇ νήσῳ καὶ ἐν τοῖς ὄρεσιν.*

> Thus they say that in Crete on the mountains of Ida and on those called the White Mountains the cypress is found on the peaks whence the snow never disappears; for this is the principal tree both in the island generally and in the mountains[165].

Another piece of evidence must be rejected, too: "Place-names are easily over-interpreted. Names of trees do not imply forests. If Hesychos [in his *Lexicon*] pointed out that the name of Mount Ida in Crete resembled an obscure word for tree, it does not follow that this mountain, despite its impossibly great height, must have been covered in forests. There is a limit to what can be inferred from a name of only three letters, especially as it may not be in the Greek language at all"[166]. Besides, as has been pointed out, it would not make much sense to name a mountain after its bald summit which is far higher than the tree limit could ever have been[167].

**Pollen** Palynology could possibly help to clarify the situation[168]. Unfortunately, however, there are but very few wet sites left in Crete; many have been deliberately drained during the 20$^{th}$ century, perhaps to combat malaria[169]. Apart from a deep-sea drilling retrieved off the east coast of the island[170], only five sites in Crete have up to today produced cores that did contain pollen: Kournas, Delphinos, Agia Galini, Tersana[171] and Asi Gonia. These locations are by no means evenly distributed across the island; they come, with one exception, from lowland

165 Translation by A. Hort.

166 Rackham 2001, 27. Cf. Lyrintzis – Papanastasis 1995, 79, where the name 'Idi/Ida' is explained to originate from the panoramic view the mountain offered *and* from its alleged former (oak) wooded state.

167 Rackham – Moody 1996, 130.

168 But see the chapter on methods, p. 24.

169 Cf. Creutzburg 1928, 17. However, one vector of the disease is the mosquito of mountain streams up to 1200 m, the other occurs in saline water (McGeorge 1987, 412; Rackham – Moody 1996, 98), and malaria seems to have occurred everywhere in Crete, not only in the marshes (Rackham 1990, 36 footnote 6; cf. Spratt 1865b, 151–152). See also Grove – Rackham 2001, 79.

170 Rossignol – Pastouret 1971.

171 Another core comes from Limnes near Tersana but cannot be dated and does not provide information exceeding that gained from the Tersana core (Moody *et al.* 1996).

sites, and what is worse, only three of them preserved pollen records covering the timespan of interest here.

The Agia Galini core was obtained from the mouth of the river Platys on the south coast of Crete, to the west of the Mesara plain[172]. It contains valuable information about Holocene vegetation in this area, but unfortunately not for the last 5000 years. For an unspecified timespan up to 9500 BP, there was a clear domination of pine (70%), with only little deciduous oak. Vine is detected in the ensuing phase (9500–8000 BP). Asphodel represents up to 10% of this assemblage, and hence must have been abundant in some areas around the coring site, indicating that open vegetation existed alongside numerous trees: pine continues to be important, while tree pollen in general and especially both deciduous and evergreen oak increase. Only around 7500 BP does the rise of oaks lead to a diminution of pine. For the next stage, no dates are given, and it cannot be stated with certainty that the retrieved plant remains originate from the whole region and not only from the close vicinity of the core site; they indicate open vegetation. However, already at 7300 BP, oak pollen become more abundant again. Ivy and vine are well-attested. Finally, arboreal pollen fall again to values resembling those from modern samples. S. Bottema sees in this core confirmation of the notion that deciduous forest was a dominant feature at this time. A. T. Grove and O. Rackham also speak of pollen from hazel, alder and lime, but unfortunately do not provide any reference[173]; none of these trees appears in S. Bottema's publication of the core.

The small river called Delphinos in north-west Crete runs from Lake Kournas northwards to the coast[174]. The pollen record obtained from its deposits begins at 8300 BP (7375 cal. BC) and ends around 3200 BP (1470 cal. BC) (see Fig. 3.12). It provides clues that even before widespread human settlement on the island, namely 8300–7500 BP (7375–6310 cal. BC), there were periods in which forest was very sparse. Arboreal pollen increase for the following 500 years up to 7000 BP (5825 cal. BC), before they drop for the time between 7000 and 6700

[172] This was the first core ever taken in Crete (Moody *et al.* 1996, 273). Unless stated otherwise, all information on the Agia Galini core is taken from Bottema 1980.

[173] Grove – Rackham 2001, 144.

[174] Unless stated otherwise, all information on the Delphinos and Kournas pollen records is taken from Bottema – Sarpaki 2003.

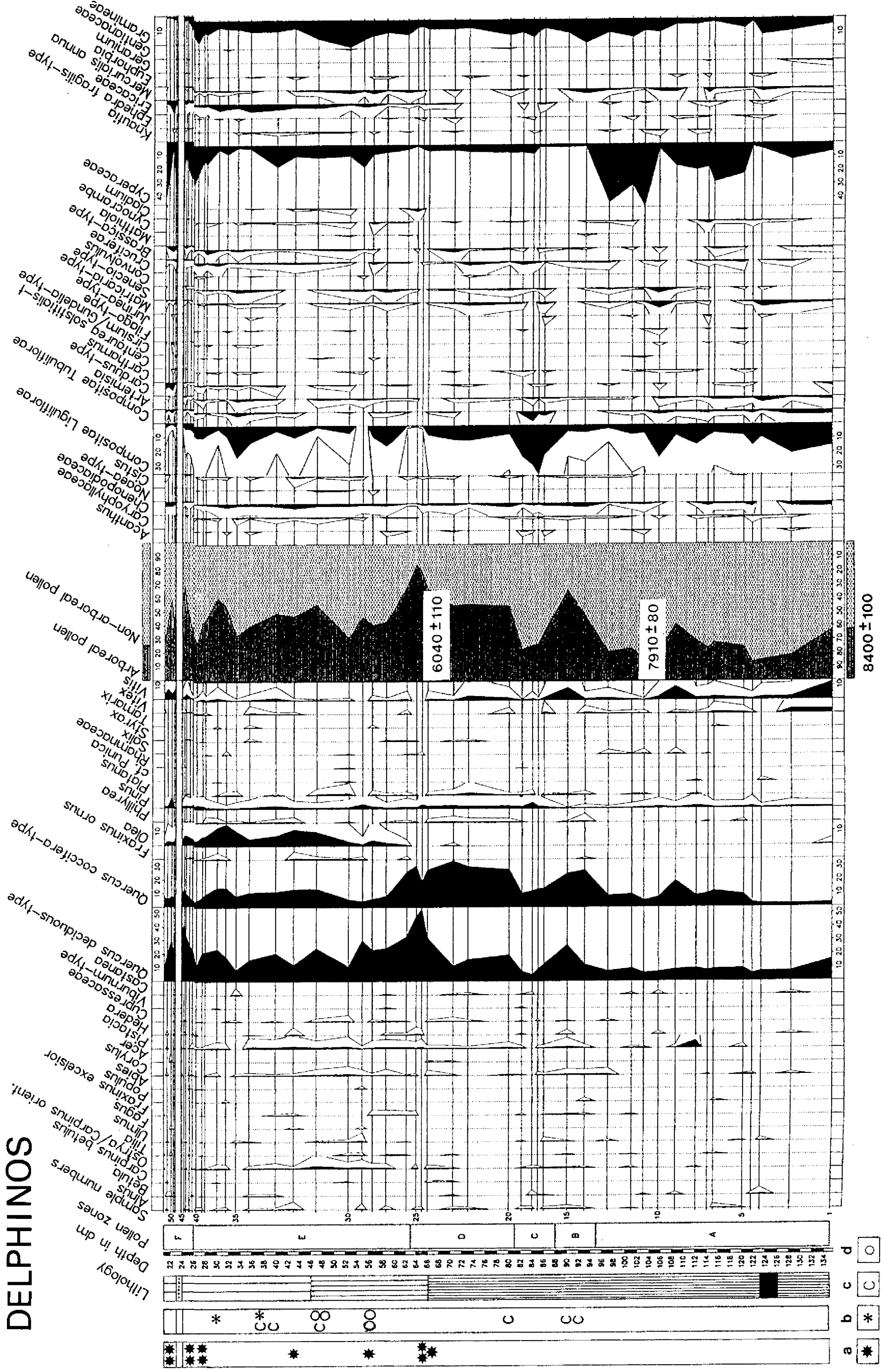


**Figure 3.12:** Pollen diagram from Delphinos (from Bottema – Sarpaki 2003, 738–739 Fig. 4)

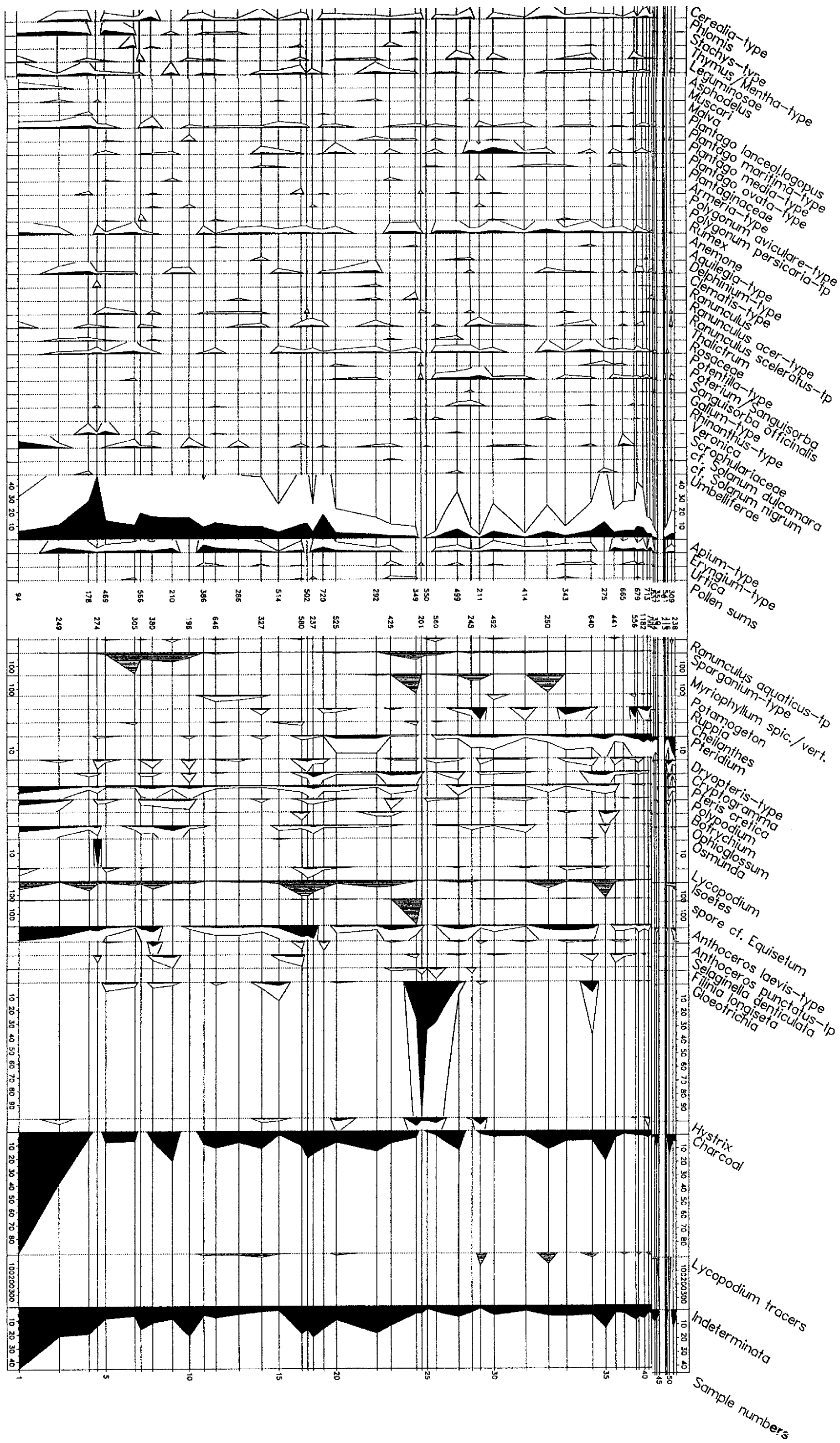


Fig. 3.12 continued

BP (5825–5560 cal. BC). Combined with the appearance of liverwort (*Anthoceros laevis*) which is supposed to grow mainly on fallow land, this is interpreted as the impact of the first settlers. However, it should then be surprising that between 6700 and 6000 BP (5560–4870 cal. BC), deciduous oak increases to a percentage of 50% of the total pollen. S. Bottema and A. Sarpaki explain this with a supposed development of small, disconnected areas of dense forest, in which ivy could grow unhindered, indicating that grazing cannot have been severe. Around 6200 BP (ca. 5200 cal. BC)[175], the olive tree appears for the first time, becoming a regular feature of the record around 5700 BP (ca. 4530 cal. BC)[176]. Interestingly, this coincides with a reduction in oak pollen. The inference (by Bottema and Sarpaki) that Neolithic settlers caused this change through their economic activities is enticing, although deciduous oak continues to dominate the spectrum and even increased again between 3600–3200 BP (1935–1470 cal. BC) to 70%[177]. Olive and vine also feature during this phase, after which the record stops.

Tersana is the name of a doline collapsed into a (now cultivated) sinkhole, located on the Akrotiri peninsula to the north of Chania in north-western Crete. The core drilled from its deposits provided radiocarbon dates of 5800 ± 130 b.p. (5070–4415 BC) and 2110 ± 130 b.p. (415 BC–210 AD), but pollen peters out after ca. 1700 BC (see Fig. 3.13)[178]. From the position of the dated samples within the core and the inferred sedimentation rate, the beginning and end of deposition were assigned to the Early Neolithic (ca. 6100 BC) and the Middle Bronze Age (ca. 1950 BC) respectively. Interestingly, the core contained pollen of trees that today grow only in more northern European regions, namely lime (*Tilia*), hazel (*Corylus*) and hornbeam (*Ostrya*). This implies that the Cretan climate of the Neolithic and Bronze Age was markedly wetter than today[179]. In spite of the

[175] Calibrated according to Intcal04, obtained from <`http://www.radiocarbon.org/IntCal04%20files/Intcal04wcaption.pdf`> (3/10/2011).

[176] Calibrated according to Intcal04, see footnote 175.

[177] In the Balkans, a lag in time between the beginnings of Neolithic settlement and evidence for deforestation has been noted. "These results demonstrate that population densities at the Neolithic transition were low and that farming techniques had little or no impact on the existing vegetation" (Willis – Bennet 1995, 327–328). See also Allen 1996, 367; Allen 2001, 185.

[178] Unless stated otherwise, all information on the Tersana pollen core is taken from Moody *et al.* 1996.

[179] Bottema – Sarpaki 2003, 743 and Moody 2005b, 461 (see above, footnote no. 48). Cf. the section on climate, p. 64.

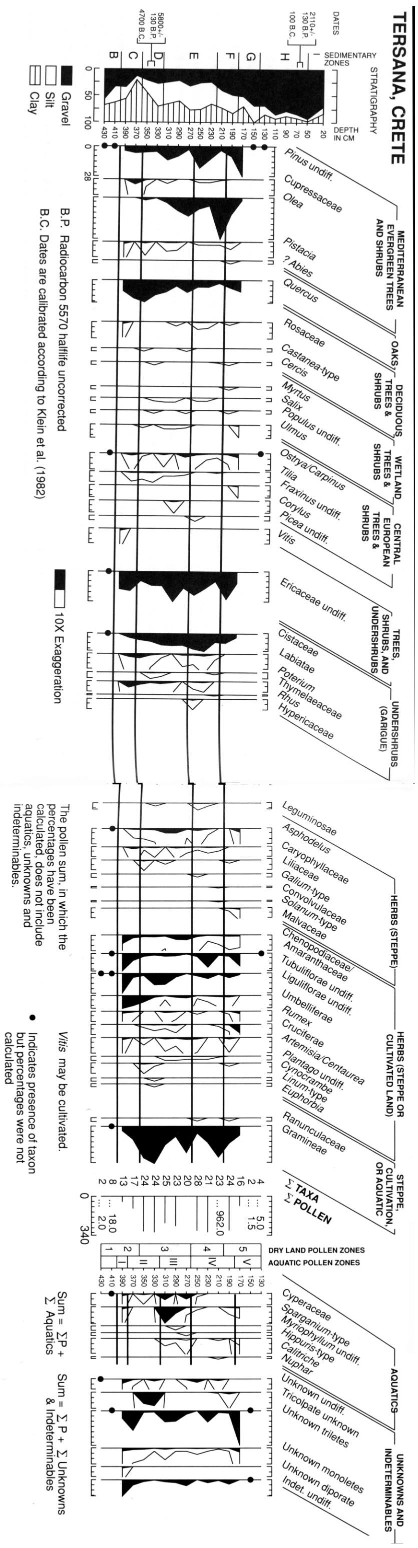


**Figure 3.13:** Pollen diagram from Tersana (from Moody *et al.* 1996, 282–283 Fig. 8)

limited area for which the results can confidently be used to reconstruct the environment, it is interesting that at no time of the period represented by the core was there continuous forest. Instead, the region must be envisaged as being covered by patches of vegetation divided equally between oak woodland and other types of plant communities (maquis, little *phrygana*, steppe). However, it is possible that the *phrygana* of the early stages developed as a consequence of human activities. The first traces of olive in this core appear around 4750 BC, *i. e.* in the Middle Neolithic. Nevertheless the authors suggest that *Olea* may have been indigenous to Crete already in the Pleistocene and that the pollen derive not from cultivated trees but from wild ones that formed part of the natural oak forest[180]. Only by the time of the Late or Final Neolithic do percentages of 15% clearly indicate deliberate planting and tending of olive trees, rising to even 40% in the Early Bronze Age. In combination with an increase in grass pollen in the latter period this indicates intensive clearing for agricultural purposes. This is in contrast to the evidence from the Delphinos core as outlined above and, given that both interpretations are correct, demonstrates that pollen cores cannot be used for the reconstruction of the vegetation of a large area. In the catchment area of the Tersana core, wild species become more important than cultivated ones after this phase, implying a reversed scheme of land use. However, these interpretations may not be as straightforward as it appears at first sight: Margaret Atherden has criticized that the diagram visualising the data of this core does not plot deciduous and evergreen oak as two separate curves. Presented like this, maquis and woodland cannot, she claims, be distinguished[181].

Although the drill location in Lake Kournas is only 3 km from the Delphinos site, its catchment area is markedly different and described as low hills covered with "upland vegetation". The record covers a timespan of around 3500 radiocarbon years, beginning around 3500 BP (ca. 1875–1775 cal. BC)[182]. In its first phase,

[180] On the issue of pollen from wild or domesticated olive see also Bottema 1999, 13, who claims that many 'wild' olives are indeed only abandoned cultivated ones. He goes on to state that "the majority of the pollen, if not all, was produced by cultivated trees". On this issue see also Moody 2012, 249. New evidence for the domestication of olives also comes from residue analysis of sherds from East Crete, see Koh – Betancourt 2010.

[181] Atherden 2000, 65.

[182] Calibrated according to Intcal04, see footnote 175. The curve wiggles at this point, hence the timespan.

3500–1000 BP (ca. 1875 BC–AD 1025)[183], deciduous and evergreen oaks were the most common trees, joined by *Pistacia*, juniper, phillyrea, plane tree and carob[184]. However, these arboreal pollen gradually decrease from 70 to 50%. Moreover, in the second half of this period, sedimentation rates were five times higher than in the first half. These changes are attributed to human impact on the surrounding landscape. Nonetheless, O. Rackham and J. Moody have demonstrated that one-off events like deluges are much more erosion-potent than anthropogenic factors on Crete[185], and I think this should be considered here, too. In the succeeding sequence, dated to the period between 1000 and 275 BP (1025–1650 AD)[186], pollen from trees diminish, and there are substantial amounts of asphodel which is an indicator species for overgrazed land[187]. Finally, in the period of 275–0 BP (1650–1950 AD)[188], vegetation resembles that of the first phase, but with reduced amounts of some tree species, for example oaks, and increased values of *Pistacia* pollen (up to 10%), probably *Pistacia terebinthia* (terebinth). During the last 200 years represented in this sample, olive reaches levels of up to 20%, whereas evidence for cereals lessens towards the upper end of the core. This is well in accordance with the decline of grain cultivation in Crete towards the second half of the 20[th] century.

The Asi Gonia core was extracted from a peat bog in the eastern Lefka Ori, at 780 m ASL, which would be perfect for the purposes of this study, but unfortunately the data derived from it cover only the last 1500 years. Still, they do provide useful clues about the extent to which vegetation can vary over time through changes in the intensity of human-induced impacts such as grazing and burning[189].

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[183] Calibrated according to Intcal04, see footnote 175.

[184] This is apparently unusual because carob (*Ceratonia siliqua*) is pollinated by insects, hence does not produce a lot of pollen and as a consequence is seldom found in pollen spectra (Bottema – Sarpaki 2003, 742).

[185] Rackham – Moody 1996, 20. See also Bintliff 1992, 126 and Bintliff 2002, 422–423; Beckmann 2012, 18.

[186] Calibrated according to Intcal04, see footnote 175.

[187] Hempel 1995, 222; Bottema – Sarpaki 2003, 742.

[188] Calibrated according to Intcal04, see footnote 175.

[189] The palynological indications of such changes are supported by written evidence available for this time and area (Atherden 2000, 76).

A deep-sea core taken off the east coast of Crete provides evidence for a period of unknown extent starting at 7900 ± 170 years BP. Pine and oak are the dominant species; whether the presence in this offshore core of species that today do not grow in Crete such as lime, sweetgum, alder, birch, hazel and cedar can really be taken as proof of their former presence[190] seems doubtful.

To sum up, the available palynological results are of limited use for the question of forest cover, but they do make clear that vegetation patterns have never been stable, not even before human settlement on Crete, and they also reenforce the notion of regional variance.

**The balanced view** Already in 1963, the French excavators of the Minoan town of Malia painted a differentiated picture of what Crete had once looked like. They examined the soils in the hinterlands of the site and concluded that the scarps of those mountains could never in prehistoric times or later have supported even the sparsest vegetation. They also drew attention to the fact that the island today is *not* completely devoid of forests, as is often postulated, and that bushes are the *normal* vegetation of many Mediterranean soils and not a form of degradation at all[191]. Unfortunately, their comments seem to have gone largely unnoticed[192], just like O. Rackham's account of the vegetation of the Myrtos region a few years later, in which he made explicit the limitations that climate and soil put on the flora of the area[193]. Nor do many people seem to have paid attention to Ludwig Hempel's geological investigation of the Cretan mountains in the 1980s. He unequivocally stated that the contribution of humans (and goats) to the denudation of the examined Cretan mountains was grossly exaggerated: the greatest part of the former soils had already been washed down from the slopes when man started to interfere with the environment, and he also found that phrygana and macchia can protect the soil better from erosion than trees[194]. Geological conditions have also been put forward by J. Bintliff: "The steep river catchments of most

[190] Roussignol – Pastouret 1971, 227.
[191] Dewolf *et al.* 1963, 31–32.
[192] Apart from Rutkowski 1986, 73.
[193] Rackham 1972, especially 291–296.
[194] Hempel 1981, 63. 70; 1984a, 28; 1984b, 123. 127–128. 132; 1984c, 192; 1991, 150. 157; 1987, 170–171. For critique of his dating of these events see Brückner 1986, 13. For lichen, phrygana and erosion see also Rackham – Moody 1996, 22; Beckmann 2012, 20. It is as yet completely

Mediterranean rivers due to their limited water-shed distances from the Sea [...], the naturally high bedload supply in Alpine Mediterranean rivers, the extreme sensitivity of the increasingly arid east and south Mediterranean lands to minor climatic perturbations, and an exceptionally plentiful supply of readily erodable geology put in place by the Alpine orogeny [...], all provide ideal forces, ready to sweep into action, when either periglacial open environments or humanly cleared environments reach major proportions. This pre-adaptation scenario seems to me to make far more sense than the unsustainable view implied earlier—that Mediterranean peoples have been more environmentally careless and reached greater overpopulation than the peoples in any other ecozone of the world"[195]. These arguments have been thoroughly supplemented by the observations recorded by a group of scholars, foremost Oliver Rackham, Jennifer Moody and Alfred Thomas Grove. They argue that the way in which the present Cretan landscape works is proof that it has been like this for a long time and that the landscape of today preserves all clues about the past[196]. In numerous publications they have tried to replace the prejudiced and biased notions of many people about Mediterranean and Cretan vegetation, soils and rural economy, from antiquity to the present day[197]. Their landmark publication is certainly "The Making of the Cretan Landscape" by O. Rackham and J. Moody (1996), expanded by Rackham and Grove to a broad panorama of "The Nature of Mediterranean Europe" (2001). Their notion that the modern extent of tree cover is governed first and foremost by geological and climatic conditions has found support from other botanists[198]. That this was no different in the past is convincingly demonstrated not only by the pollen record, showing that non-forest species were always present[199], but also by observations

unclear how the now evident presence of humans in Crete in the Palaeolithic could change these assessments.

195 Bintliff 2002, 424–425. Cf. Roberts 1998, 192.

196 Rackham – Moody 1996, 10. 109. Robin Osborne, referring to mainland Greece in general, has advocated this approach: "A lot has happened in the Greek landscape since the Dark Age, but if we want to conjure up a picture of any particular area of Greece at that time we could probably do a lot worse than start from the appearance of that landscape today" (Osborne 1996, 58).

197 Cf. Forsyth 1998.

198 Turland *et al.* 1995, 4. 8; Allen 2009, 223.

199 Their presence is even more significant considering that as mostly entomophilous (insect-pollinating) species, they were much less likely to be included in the pollen core than anemophilous (wind-pollinating) taxa (Turland *et al.* 1995, 4).

such as that the greatest number of the distinctive plants of Crete are specialized to sun exposure: this means that there must always have been open land to which these species have adapted through the slow process of evolution; this can by no means have happened within the last 8000 years[200]. Nonetheless, they do admit that the coming to the fore of undershrub communities is to a large extent owed to the effects of human interference with the natural environment and that until the end of the Early Bronze Age, vegetation *was* very different from the present[201].

In fact, claims that Crete was once covered with forests are based on a kind of circular reasoning: it is said that there had been forests all over Crete and they were cut down because of the huge demand for wood (for timbers, ships and fuel). Or it is argued the other way round: wood was needed in such quantities that demand could only have been satisfied if there *were* local supplies[202]. It has even been suggested that Bronze Age trading contacts between the Near East and Crete developed only because Oriental rulers needed to import timber of which Crete had plentiful supplies[203]. Cypress is mentioned in the context of chariots and furniture

[200] Rackham – Moody 1996, 212; Grove – Rackham 2001, 153; Rackham 2001, 7–8; Rackham 2003, 58.

[201] Before the beginning of human activities, *phrygana* had been confined to locations with limited plant growth. The climate got dryer at the time of human settlement, however, and this may have supported the spread (Grove – Rackham 2001, 161). See also Rackham – Moody 1996, 127.

[202] Cf. Rackham 2001, 38. Rackham has also pointed out that—with regard to the whole of Greece—the 'aboriginal forest', if it ever existed, would not have produced much good timber because of the nature of the trees such as prickly-oak (Rackham 1990c, 95). A. Chaniotis on the other hand believes that without mountain forests, the Cretan poleis could not have been autarkic and that this was one of the reasons why border disputes between them often concerned mountainous areas (Chaniotis 1991, 99–100).

[203] Perlin 1989, 46-48. As evidence he cites a Cretan hieroglyphic steatite seal, said to date to the beginning of the 2nd millennium BC, showing a ship and five tree signs. According to Perlin, who in turn relates to an interpretation by Arthur Evans (Evans 1909, 154 (P. 26); Evans 1928a, 247–248), this suggests forest (as opposed to single trees) and timber commerce between Crete and the outside world (the first publication of this piece, Evans 1897, 337–338, mentions neither forest nor export). Perlin's ideas about Minoan management of wood resources seem in general rather weird. He supports his statement that the Minoans used cedar wood "for such mundane applications as the construction of tool handles, indicating that perhaps cedar had once grown in relative abundance on the island" (Perlin 1989, 47) with a citation to R. Meiggs (Meiggs 1982, 99–100) who in turn refers to Vitruvius (Vitr. 2,9,13) for evidence that cedars may have grown in Crete (cf. Churchill Semple 1932, 278). However, O. Rackham and J. Moody have pointed out that this notion is likely to result from a misinterpretation by Vitruvius (who probably never visited Crete) of the Cretan name for juniper, *κέδρος*, and that the the tool handles were probably imported (Rackham – Moody 1996, 130; Rackham 2001, 14). Perlin further suggests that the beginning bronze reuse in the Late Bronze Age indicates that there was a shortage of wood (for

in the Knossian Linear B tablets, as are elm, willow, boxwood and possibly yew and ebony[204]; the last three never grew on Crete and must have been imported, but there is certainly no indication here of any exchange for Cretan wood. Export of cypress logs is referred to in Roman written sources[205], but this does not mean it was a common type of wood[206]. However, ethnographical research makes it clear that there are alternatives to the view that there must have been dense forests to satisfy the needs of ancient people. As for architecture, M. S. Mook's observation of traditional houses in eastern Crete, to name but an example, has found that the longest beams necessary to support the flat roofs were made of the trunks of pine trees, of which there must have been enough[207], and O. Rackham has calculated that the needs for shipbuilding could have been met both by imports

charcoal), since bronze had a lower melting point than copper (Perlin 1989, 52). The addition of tin in a 9:1 weight ratio does indeed lower the melting temperature—but only from ca. 1085 °C (pure copper) to about 1030 °C (I would like to thank Dr David M. Collins (Department of Materials Oxford) for this information). The more common and much more sensible argument is therefore that if anything, there would have been a shortage of new metal (see also Rackham 2001, 33). Perlin also claims that at the same time portable braziers instead of fixed hearths came into use: "Hearths consumed more fuel because the flames were usually allowed to burn all night whereas the fire of a portable brazier was extinguished when not in use" (Perlin 1989, 52). Moreover, he contends that braziers would not have used wood but charcoal, which can be made from shrubbery. This of course contradicts his aforementioned claim that charcoal was in short supply. Finally, Perlin notes that from 1500–1450 BC onwards, doorjambs in Knossos were now made of gypsum instead of wood (an argument brought forward by Evans 1928b, 518–519), and that "[t]hrones, built of wood in former days, were now also constructed of gypsum" (Perlin 1989, 54). This is a particularly queer argument, since no thrones are known from Crete except the one in the Throne Room in Knossos, which probably was not installed before LM IIIA, *i. e.* the Mycenaean phase—and according to Perlin himself, earlier on the same page, the Mycenaeans had plenty of timber. For a discussion of the date of the Knossos throne see Mirié 1979, 49–56. For thrones and all kinds of seats in the Aegean see Mirié 1979, 71; Jahn 1990.

[204] Ventris – Chadwick 1973, 135. Woodcutters are also mentioned in the tablets (Ventris – Chadwick 1973, 123).

[205] See Bosanquet 1939–40, 72; Sanders 1982, 32–35; Petropoulou 1985, 61; Chaniotis 1988b, 62–89; Harrison 1988, 152–53; Tsoungarakis 1990, 67–69; Chaniotis 1995, 76; Haggis 1996b, 201; Chaniotis 1999b, 184 (Hellenistic times). 209 (luxury item); Viviers 1999, 229 (important commodity even before Roman times).

[206] See Rackham 2001, 26–27. The city of Tarrha at the south end of the Samaria gorge may have specialized in cypress export, offering literally no other resources to live on (Rackham 1990c, 108–109).

[207] Mook 2000, 98–99. See also Rackham 2001 Pl. 21. Olive wood is said to have been another favourite for construction, see Shay *et al.* 1995, 129.

and by local supplies without any environmental damage, even more so since the size of a possible Minoan 'fleet' tends to be vastly overestimated[208].

However, "[i]n sheer quantity the amount of wood required for fuel probably surpassed the combined requirements of the builders of ships and houses"[209]. In absolute numbers, 1–2 tons a year per household have been estimated[210]. Adding to this there would have been large amounts needed for cooking in and heating of public buildings[211], but especially for the firing of terracotta ovens, for the mining, smelting and melting of metal and for the production of lime plaster[212]. O. Rackham is confident that these needs could have been met by the wood available from olive orchards (olive wood can be used to make charcoal), and coppicing and pollarding of both olives and many other species would have represented a sustainable way of obtaining high-quality fuel[213]. It is interesting to note however that managed trees are often not suitable for use in construction, so that different trees would have had to be used for different purposes[214]. Moreover, in the present climate olive does not grow above 750 m ASL; construction works in some areas and in some periods concerned by the present study hence would have had to rely on other species, too (or go to great lengths to transport the beams).

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208 Rackham 1990, 35; Rackham 2001, 38–39. For the often overestimated size of the individual ships see Grove – Rackham 2001, 168.

209 Meiggs 1982, 97. Cf. Redman 2004, 90.

210 Wertime 1983, 446; cf. Evely 2000, 531. See also Redman 1999, 136. 182. O. Rackham has shown that even the wood or charcoal needed for big enterprises such as the silver mines in Laurion could easily have been met through coppicing and pollarding (Rackham 2001, 34).

211 The religious sacrificial practice of burning animals such as bulls and goats known from historical times was another contributor to wood demand, as O. Rackham points out, even though "pigs might have been self-combusting" (Rackham 2001, 33).

212 The production of 1 ton of lime plaster requires an estimated 4 tons of wood (Redman 1999, 107).

213 Rackham 1982, 192; Hughes 1982, 62; Rackham 1996, 30 (with calculations for silver mining); Rackham 2001, 28; Williams 2003, 92. See also Rackham – Moody 1996, 131. 177; Forbes 1996, 84–85. For woodland management in the Mediterranean see Horden – Purcell 2000, 183–186; Allen 2001, 188–191. Olive wood is dense and has a high heat yield (Shay *et al.* 1995, 129). Olive prunings and brushwood were evidently used as fuel not only in ancient Crete (Moody 2012, 249) but also at Sagalassos, despite the former existence of forests suggested by palynological evidence (Vanhaverbeke – Waelkens 2003, 44). Cf. however McNeill 1992, 137–138 who states that small dispersed villages mean a more even distribution of pressure on forests, and continues: "Perhaps this helps to explain why only in southern Italy did the practice of managed coppices catch on"; he also explains however that coppicing yields three to four times the amount of fuel per hectare as forest.

214 Tierney 1998, 70.

Even without taking the Pleistocene fauna into account (see below), the Mediterranean lands have been grazed for about 8,000 years, ever since the introduction of sheep and goats. Like fire, grazing is hence an integral part of these ecosystems and not *per se* a bad thing[215]. This is not to say that the present state of vegetation in the Mediterranean in general and in Crete in particular was not the result of human intervention and influence—it certainly is[216], but the point is that it seems that this is not necessarily disadvantageous: certain forms of forest are argued to have survived only *because* of human management[217]. Fire can have beneficial effects on the genetic diversity of plant communities[218], and coppicing and pollarding both mean that trees will survive over long periods of time.

**Conclusion** All in all, the view that man has devastated the whole of the Cretan environment since antiquity cannot be upheld any longer. There is no evidence for this theory, not in written sources or in the much more reliable geological record or in the ecology of Crete today. Rackham's arguments are convincing, even more so since even regional studies of Cretan landscape development fail to produce evidence for the degradation they claim to record[219]. One of the key points in environmental reconstruction is that no piece of evidence or explanation must be extrapolated and taken to apply to the whole island. Every microregion must

[215] Goudie 1993, 39; Allen 2001, 119–120. 145–148; Allen 2009, 220. L. Hempel even attests pastoralism a stabilizing effect on the Cretan mountains subjected to natural hazards like storms and fires (Hempel 1995, 216). In a more general perspective, McGlade argues against the notion of viewing land degradation, desertification and all kinds of human impact as perturbations on an idealized stable system (McGlade 1995, 115).

[216] See also Horden – Purcell 2000, 327. Cf. Dincauze 2000, 391: "A productive and realistic approach to human influences on phytogeography is to ask not whether people affected the distribution and composition of vegetation but *when*, *how*, and *how much*." See also Palyvou 2009, 71.

[217] This has been claimed for holm-oak forests, in which saplings are bound to be killed by fire before they can grow into trees (Allen 2001, 132–133; Allen 2009, 223). See also footnote no. 156 on *Pinus halepensis*. Cf. Horden – Purcell 2000, 182–183. For the Levant, it has been argued that the present state of the environment need not be regarded as degradation but as a new equilibrium (Redman 1999, 104), cf. Vernicos 1990, 141–142; McNeill 1992, 85.

[218] Goudie 1993, 37; Horden – Purcell 2000, 329; contra: Pignatti 1983, 155. R. Meiggs has pointed out that fire can also strengthen the forest in the sense that weak plants are eradicated (Meiggs 1982, 375–376). See also McGlade 1995, 124.

[219] Lyrintzis – Papanastasis 1995; Lyrintzis 1996; Hill *et al.* 1998; Bergmeier 2002. If anything, it can be claimed that ancient Crete was even less densely wooded than today, as the perambulations of Lato (Hellenistic to Roman) make almost no references to trees although there are now so many that they could not be neglected (Rackham 2001, 16. See also Turland *et al.* 1995, 5).

needs be studied independently: it may well be that one region in Crete is indeed a 'Ruined Landscape' and another not[220]. And it should be very clear that even in areas where man is not to blame for the barren appearance of the landscape, there may well be other man-made environmental problems, of which there is never a shortage in the world.

## 3.4 Fauna

### 3.4.1 Now (and then)

Typically for an island, the variety in faunal species in Crete today is rather poor[221]. A great proportion of them are not native: sheep, goat, pig, cattle and dog were without doubt all introduced by the first Neolithic settlers. Sheep and even more so goats have been accused of having altered (and still altering) the Cretan landscape by their excessive browsing, thereby preventing regrowth of trees (see also section 3.3). This view, too, has been challenged by J. Moody and O. Rackham who state that the native Pleistocene fauna (see below, section 3.4.2) would have harmed young shoots and leaves "at least as severely", so that the vegetation had had millennia to adapt to this kind of damage[222]. They may be right about the adaptation, but it is hard to believe that the curious Pleistocene species ever reached numbers even remotely near those of modern livestock husbandry[223]. Surely they can't have swum over to Crete in large herds and then have multiplied with miraculous fertility? Although the absence of predators would have favoured a fast growth of the population, I am not convinced that their impact could have been as long-lasting as that.

[220] Rackham – Moody 1996, 10. An example of a Cretan landscape destabilized by man is the area around Sougia on the south coast in western Crete (Rackham 1990b, 87). The "steep environmental gradients and spatial heterogeneity of ecosystems" in the Mediterranean have also been stressed by Allen 2003, 370. See also Wallace 2010, 33–35.

[221] Lax – Strasser 1992, 205; Kotjabopoulou – Gamble 2003, 51; Mavridis 2003, 65.

[222] Rackham – Moody 1996, 124; supported by Turland *et al.* 1995, 4. See also Rackham 2003, 42.

[223] According to official statistics, there are ca. 1.6 million sheep and 600,000 goats in Crete these days (Greek National Statistics Service 2008); compare these numbers with the about 700,000 sheep and 300,000 goats given in Rackham – Moody 1996, 115. Cf. also footnote 23 in chapter 10.

The famous Cretan wild goat known as *agrimi* (*Capra aegagrus creticus*, see Fig. 3.14) is first attested in the Late Neolithic at Phaistos. Today, with less than 1000 living individuals, some of which are killed every year by hunting locals in spite of their official protected status, the species is endangered[224]. Since they are very similar (but not exactly alike) to wild goats on the mainland, it is possible that they were brought over to the island as genuine wild animals which then by "rapid *in situ* evolution" developed into their island type still known today[225]. Most scholars think, however, that the *agrimi* is probably feral, *i. e.* descended from domesticated goats that have escaped from their herds. Their similarity to wild specimens indicates that domestication had not reached its final stage yet when the animals achieved their freedom[226]. A new hypothesis is based on genetic evidence, suggesting that wild goats were imported and interbred with domesticated specimen[227]. The feral theory may also apply to the wildcat (*Felis sylvestris*), remains of which are reported from Kavousi Kastro and Smari and which—hopefully—still exists[228].

Opinions differ as to which wild mammals are native to the island and which were introduced; in fact, they differ to an extent which leaves hardly any species apart from bats as truly native[229]. Shrews, mice, hares, spiny mice, foxes, weasels and hedgehogs are all said to be introduced[230]. Deer bones are reported from many sites, though normally in small numbers. There is an ongoing debate about the reliability of these identifications, since the Bronze Age deer are not related to those known from the Pleistocene (see below, p. 117)[231]. It seems most likely that

[224] On the early date for their first occurrence and on *agrimia* in general see Porter 1996. Other sources attest the first secure appearance in the Bronze Age (Rackham – Moody 1996, 47).

[225] Groves 1989, 46.

[226] Rackham – Moody 1996, 46–47; Groves 1989, 46. 53. 57. See also Strasser 1992, 94.

[227] Horwitz – Bar-Gal 2006, 135. This hypothesis had already been put forward by Jarman 1996, 217–218.

[228] A male wild cat was "captured" in Psiloritis in 1996, and I dearly hope it was not the last of its kind (Masseti 2003, 54). Wildcat remains at Kastro: Snyder – Klippel 1996, 284. Wildcat remains at Smari: Tsoukala 1996, 273.

[229] Bats: Rackham – Moody 1996, 47.

[230] Hedgehog, weasel: Rackham – Moody 1996, 47. The presence of weasels by MM may be indicated by figurines from the peak sanctuary at Petsophas (see Peatfield 1990, 118 Fig. 2. 120). Hare: Rackham – Moody 1996, 47; Jarman 1996, 213. All others: Groves 1989, 46. See also Moody 2012, 247–248.

[231] See p. 456 Table 13.3 and p. 457 Table 13.4 for sites with deer bones. Others include LNL deposits in the Miamou Cave and at Phaistos (Hutchinson 1962, 238; Vickery 1936, 18. 82), Agia Triada

**Figure 3.14:** Minoan gold pendant in shape of *agrimi* (photo ©Trustees of the British Museum)

different types of deer were "introduced to Crete three or four times—Late Neolithic, Middle Minoan, possibly Late Minoan II/III, and Roman—and either never successfully naturalized or were hunted to extinction several times, or both"[232].

With martens and (fat-)dormice the case seems not clear[233], nor with *Meles meles*[234]: badgers were suggested to have been deliberately introduced as early as the Aceramic Neolithic to exploit their skins like it is still done today[235]. They

(MM-LM), the Neopalatial sanctuary at Chania-Kydonia (Mylona 1999; Andreadaki-Vlazaki 2008, 114), LM I-II Tylissos (Hutchinson 1962, 239), the Tsikouriana hill in west Crete (Moody 2004, 257), Prinias (6$^{th}$-7$^{th}$ century AD) and Gortyn; for references see Vickery 1936, 82–83; Jarman 1996, 219 endnote 30. See also p. 455 footnote 86. Plinius mentions the presence of stags in the western part of Crete exclusively (Plin. *HN* 8,228); see however Moody 2012, 245. Cf. Warren 2008, 17; Shapland 2010, 123. I would like to thank Dr Valasia Isaakidou (University of Louvain) for drawing my attention to the deer problem.

[232] Moody 2012, 245.

[233] Native: Rackham – Moody 1996, 47. Introduced: Groves 1989, 46; Halstead 2008, 237. On the breeding of dormice as food in Roman times see Brothwell – Brothwell 1998, 48–49.

[234] Native: Rackham – Moody 1996, 47. Introduced: Jarman 1996, 213 (with question mark); Masseti 2003, 54; Mavridis 2003, 67; Halstead 2008, 237. Native or introduced: Snyder – Klippel 1996, 283.

[235] Jarman 1996, 217.

could even have been tamed as pets which would have rendered their use very easy. Their rating as "by no means edible"[236] probably has to be revised since there are clear indications that they *were* eaten by prehistoric people[237]. Moreover, there is said to be a long tradition of the use of badger fat for medical purposes[238]. But while there is only a single piece of bone from the earliest stage at Knossos, for which the possibility of later intrusion cannot be ruled out, upper levels in some Pleistocene caves in Crete also bore some badger remains, and only two of these caves were used in the Neolithic[239]. It is therefore possible that the badger is indeed a native animal in Crete. Certainly introduced is the notorious rat that probably arrived with the Romans. Donkeys may have come with the first settlers, whereas the horse is not present before the Late Bronze Age[240].

The European honeybee (*Apis mellifera*) is native to Crete[241]. Wild bees must have been more common once than they are today since certain flowers depend on them for pollination[242].

Beyond the use of cattle for agricultural purposes, the bull seems to have held a special position in Minoan culture, with the ubiquitous imagery finding one of its climaxes in the famous bull-leaping fresco from Knossos. Since such activities seem to indicate a different breed from the more or less docile animals used for traction, the presence of aurochs (wild cattle) in Crete has sometimes been postulated from both iconographical and skeletal evidence but always remained somewhat doubtful[243]. Representations of human individuals trying to catch a

[236] Jarman 1996, 217.

[237] Evidence for the exploitation as a source of meat comes from Pefkakia and Lerna in mainland Greece (Yannouli 1996, 184) as well as from Kavousi in Crete (Snyder – Klippel 1996; see below p. 328).

[238] Yannouli 2003, 184.

[239] Jarman 1996, 213 with endnote 7. See Moody 2012, 246 for a discussion of the evidence.

[240] Rackham – Moody 1996, 75; Jarman 1996, 212–214; Moody 2012, 241.

[241] For the distribution of different bee species see Crane 1983, 14–15 Fig. 2.

[242] Rackham – Moody 1996, 86.

[243] It is unlikely that aurochs could have reached Crete during the Pleistocene by swimming (van Vuure 2005, 51). Bones of aurochs have been reported from Minoan Tylissos (Vickery 1936, 15–22 with endnote 1), LM I to LM IIIA1 Chania (Hallager 1995) and from Archaic to Roman layers at Eleutherna (Nobis 1999, 58; Nobis 2003, 97). For a discussion of the issue see Nobis 1993, 115–119; Persson 1993; Nobis 1996 (with further references). See also Younger 1995a, 508 footnote 7; Nobis 1998, 409. On the aurochs as such see also Clutton-Brock 1987, 63–64; van Vuure 2005.

bull in the landscape have fuelled the idea of wild bulls further[244]. However, the setting shown for example on an ivory pyxis from Katsamba would be a highly unsuitable habitat for cattle, whether domestic or wild, being far too rocky. Although it has not been made explicit for this particular piece, depictions of rocky terrain are normally taken to indicate mountainous surroundings (cf. p. 401). This notwithstanding, in those parts of Europe and northern Africa where the existence of aurochs is documented, it seems to have preferred wettish lowland areas with a more or less dense forest cover and to have avoided the uplands[245]. A feasible compromise between the two extremes—wild vs. domesticated—is that the bulls portrayed in the imagery were domesticated cattle that had escaped and lived in the wild, as contemporary examples illustrate[246].

Michael Jarman's concluding verdict about the impact of man on Cretan animals is very positive: he thinks it "interesting to note that man has acted on Crete not as an agent of zoological impoverishment, as he has done in so many mainland situations, but has considerably enriched the Cretan fauna over the past eight thousand years"[247].

## 3.4.2 Then

In the Pleistocene, there was a wider range of native animals: birds[248], at least seven species of deer[249] (see Fig. 3.15), but more spectacularly giant insectivores and rodents, dwarf elephants (*Elephas creticus*, see Fig. 3.16) and mini hippos about the size of a pig (*Hippopotamus creutzburgi*)[250] (see Fig. 3.17).

Hippopotamus remains have been found high up in the mountains, in the Katharo Plain at 1100 m ASL, and assigned dates by Electron Spin Resonance of tooth

[244] See Younger 1995a, 524–525 for a list.

[245] van Vuure 2005, 233–235. 248. N.B. John Younger's identification of the vegetal components of the scene as "palm trees" (Younger 1995a, 524), contradicting the idea of an upland setting. For the ivory pyxis see Alexiou 1967, 55–56. 71–75. Pl. 30.

[246] Bloedow 1995; Younger 1995b; van Vuure 2005, 51. 324. As far as the bones from Eleutherna are concerned, Moody 2012, 243 thinks that "[i]n all likelihood it is a large domestic or feral ox".

[247] Jarman 1996, 221.

[248] On Pleistocene birds see Lax 1996.

[249] On the endemic deer of Crete see de Vos 1996 and Caloi – Palombo 1996. These animals apparently "could not run (for there was nothing to run away from)" (Rackham 2003, 47).

[250] Rackham – Moody 1996, 47. On *Hippopotamus creutzburgi* see Spaan 1996. For a short explanation of nanism (dwarfing) and gigantism see Strasser 1992, 156.

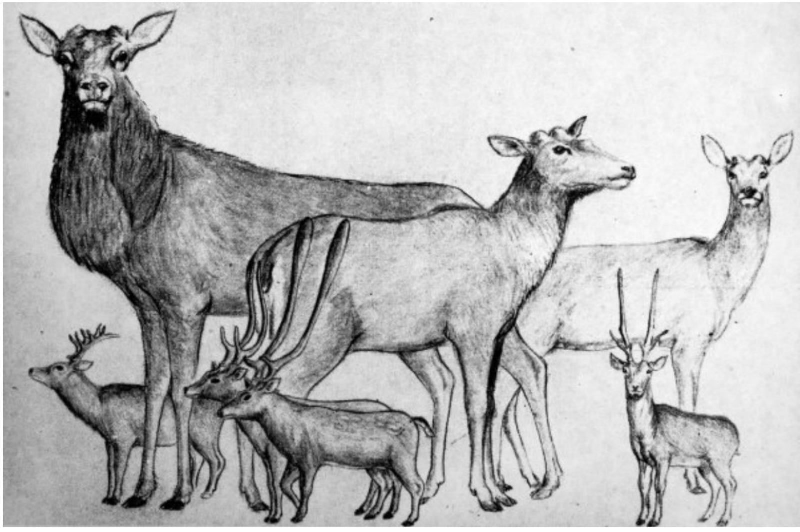

**Figure 3.15:** Cretan Pleistocene deer (from Schlager 1991 Plate 6A)

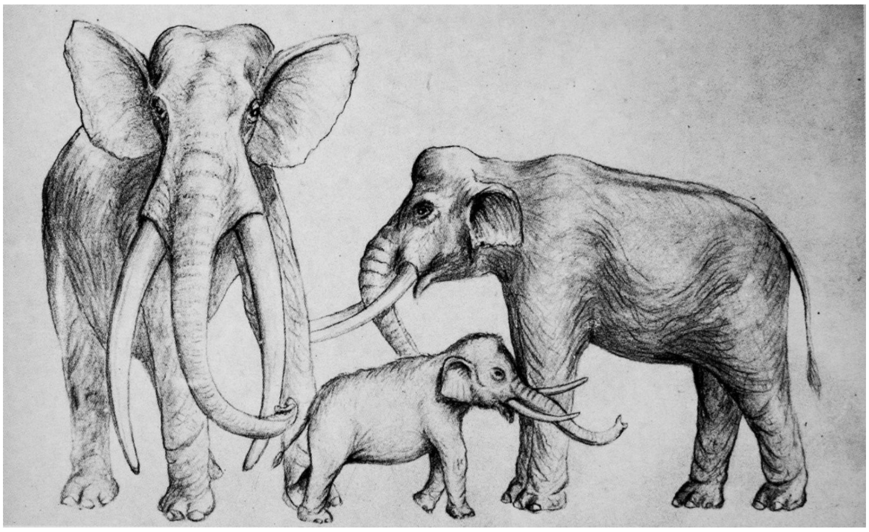

**Figure 3.16:** Cretan Pleistocene elephants (from Schlager 1991 Plate 6B)

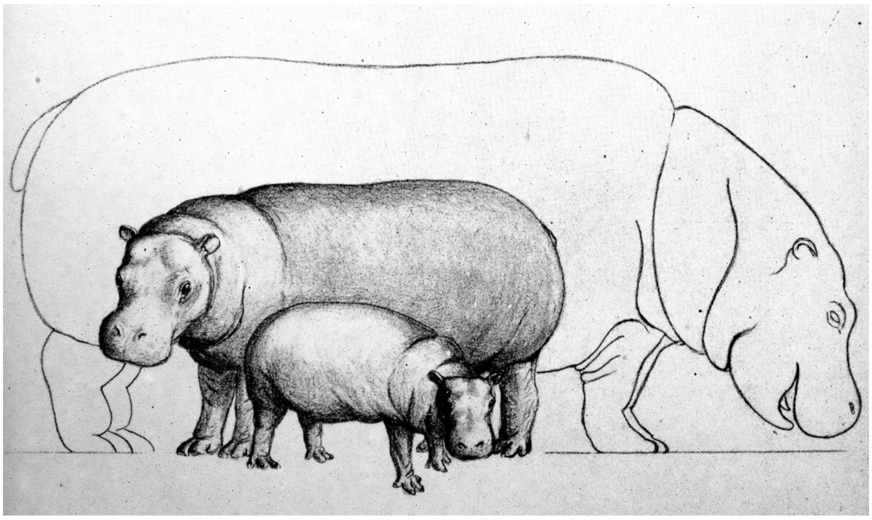

**Figure 3.17:** Cretan Pleistocene dwarf hippos (from Schlager 1991 Plate 5B)

enamel that lie within the range of 846,000–378,000 BP[251]. Bones of endemic deer from the Simonelli and Bate caves are between 152,000 and 32,530 years old[252]. There were also—later—larger and more massive species of both hippo and elephant[253]. The only carnivores in this period were otters (*Lutrogale cretensis*)[254].

Since this range of species does not represent the spectrum that could be expected had there ever been a landbridge, it is supposed that these mammals arrived on the island by swimming (deer, elephant and hippo are good swimmers) or drifting on logs (this would apply to the rodents)[255].

Why these original creatures—they must have been a gorgeous sight—are no longer existent is not known with certainty. Climatic change as such (*i. e.* the Ice Age) seems not very likely as a cause since even though parts of the mountains of Crete may have been glaciated during the last Ice Age, the endemic Cretan palm (*Phoenix theophrasti*) survived this period, implying that not all of the island was

[251] Reese *et al.* 1996, 47; Spaan 1996, 102; Mavridis 2003, 65. Watrous 2001, 161 still cites radiocarbon dates from the 1980s (12,135 ± 485 B.P.) that Reese, Belluomini and Ikeya already knew to be "wildly incorrect" (Reese *et al.* 1996, 47); cf. Broodbank 2008, 275.

[252] Reese *et al.* 1996, 47. See Hamilakis 1996 and Hamilakis 1998, 93 for the Pleistocene deer remains from the Sentoni Cave at Zoniana (Psiloritis).

[253] Sondaar *et al.* 1996, 65.

[254] See Willemsen 1996.

[255] Lax – Strasser 1992, 205; Strasser 1992, 93–94. 154. See also Davis 1987, 121 who states that in fact Crete might have been joined to the Greek mainland during the Pleistocene.

as cold as that[256]. It has hence been suggested that the change in climate combined with a reduction in sea level could have led to the influx of other species that would then have competed for food with the mammals already present, eventually leading to the extinction of the latter[257]. Still, eradication by humans seems to be more widely favoured as the reason for the disappearance of Crete's Pleistocene fauna[258], even though J. F. Cherry warns that the evidence available is as yet not sufficient to assume that "man has here been discovered, as it were, holding a smoking gun"[259]. Two possible opposed ways of anthropogenic extermination have been suggested: the *'Blitzkrieg'* and the *'Sitzkrieg'*. The former term was coined by P. S. Martin and J. E. Mosiman in 1975 to describe an overkill within a rather short period of time[260]. The fact that bones of wild animals are not found in great numbers at Neolithic Knossos (see Table 13.3) would then indicate that this would have taken place before this phase of permanent human settlement on the island. Until recently, such activities had to be attributed to expeditions of hunting groups coming over by boat[261]. The word *'Sitzkrieg'* on the other hand was used by Jared Diamond in 1989 to indicate an anthropogenic successive destruction of the habitat of a certain species[262]. In contrast to a *'Blitzkrieg'*, this would produce hardly any or even no distinguishable trace in the archaeological record[263]. Endemic types of mouse and shrew[264] do not occur after the Neolithic, and are sometimes said to have been extinguished in this way[265]. The overkill theory is favoured by J. Moody and O. Rackham who point out that even by the time of the Early Bronze Age, sufficient areas would have been untouched for

[256] Lax – Strasser 1992, 213; cf. Cherry 1990, 163. It seems certain that the palm was *not* introduced later (Greuter 1967, 245), despite the countless tales about Egyptian soldiers and other exotic variations cited in travel guides. See also Strasser 1992, 153. For a discussion of the climate hypothesis see Strasser 1992, 161–163.

[257] Spaan 1996, 108.

[258] *E. g.* Strasser 1992, 153. 160. See Strasser 1992, 159 for references to works favouring either hypothesis. The case of Cyprus is similar but evidence seems slightly more conclusive in favour of human overkill (Simmons 1999, 27–31. 323–334).

[259] Cherry 1990, 195.

[260] Mosimann – Martin 1975, cited after Lax – Strasser 1992, 211.

[261] As J. Moody has put it, "by the time the Neolithic settlers arrived in Crete there was not much left to hunt" (Moody 1987, 145).

[262] Diamond 1989.

[263] Strasser 1992, 161.

[264] On Pleistocene shrews see Reumer 1996.

[265] Watrous 2001, 161.

the animals to retreat[266]. T. Strasser on the other hand favours a combination of habitat destruction for agriculture and competition for food with the domesticated browsing species introduced by the settlers[267]. All these theories may need new evaluation in light of the recent discovery of Palaeolithic stone tools in Crete, which indicate that the presence of humans on the island was more regular than previously thought.

The scantiness of these animals' bones in archaeological contexts can be taken to support the hypothesis of human-induced elimination: "an archaeological record that is abundant with information indicating the contemporaneity of humans and extinct fauna would suggest moderate culling more than excessive predation"[268].

At any rate, "it must be concluded that they [the first settlers] never considered conserving the resources of their new island home, but instead actively engaged in changing the environment, better to suit their cultural imperatives"[269]. This would represent the first interaction between man and the environment on Crete that we can grasp, and it would have to count as a severe one. As T. Strasser has put it: "Could the first farmers on Crete have avoided severely altering the island's ecosystem? It seems doubtful. Land clearance for farming and for timber for construction, as well as for introduced grazing herbivores, are the leading causes of habitat destruction [...]. The evidence from Knossos indicates that all three of those activities occurred. I suggest the Cretan colonists actively engaged in changing the environment with no consideration of a conservation ethic. The requirements of survival and subsistence far outweighed any concern for the local plants and animals."[270]

[266] Rackham – Moody 1996, 49. Cf., however, Rackham 2003, 47: "It is very likely that the first people to reach the islands would have found them in a state that would now be called overgrazing, with numbers of herbivores limited by food supply, not predation."

[267] Strasser 1992, 170–172. "Pig in particular would have competed against elephants and hippopotami for the same food resources" (Strasser 1992, 172).

[268] Strasser 1992, 166. "In comparison to the North American scenario, extinctions of megafauna on Crete would have been quickly accomplished" (Strasser 1992, 169).

[269] Lax – Strasser 1992, 219. Cf. Strasser 1992, 164.

[270] Strasser 1992, 176. See also Grove – Rackham 2001, 72.

# Chapter 4

# Mountains

*A mountain is in the eye of the beholder.*

Buxton 1994, 81

Mountains are often defined as an area elevated above a certain absolute height. The heights given vary enormously, and even more so when a distinction is made between 'mountains' and 'high-altitude' mountains, a differentiation which may actually be hindering fruitful comparison[1]. It is not my aim here to present a final definition of 'mountain', 'mountains' or 'uplands'; it has been made clear at the beginning what the working definition is for this study. Obviously, a mountain, *i. e.* what is *perceived* as a mountain, is, to some extent, a cultural construct, and would probably be formulated very differently by, say, someone from Belgium and a Nepalese Sherpa[2]. It follows that definitions can—and maybe ought to—vary from a physical-geographical and a cultural-geographical viewpoint[3]. From the musings of several scholars it emerges that the latter is often a more useful approach. When looked at in this respect, an essential characteristic of mountains

[1]Schweizer 1984, 33. 35–36. See Soffer 1982, 393 for a comparison of differing definitions, and *e. g.* Parish 2002, 1 for yet another one. Rather than absolute height, it should be elevation above the surrounding land (and possibly the resulting impressiveness) that make a mountain (Peattie 1936, 3–4). Where the focus is on biological adaptation to extreme environments, it is not surprising that 'high altitude' is defined as 'above 2500 m ASL' (Pawson – Jest 1978).

[2]Cf. Price 1981, 1–5; Buxton 1994, 81; Rackham – Moody 1996, 128 (with regard to the possible definitions of 'forest').

[3]See Schweizer 1984, 33. 35.

is the culturally distinctly different character from the surrounding area[4]. A. Soffer has suggested dividing the elevated area itself into three belts, each with a specific socio-economic basis: an upper belt, often with permanent snow, an intermediate belt consisting of forest and pasturage, and a lower belt with intensive as well as extensive agriculture and close ties to the lowlands[5]. Although the mountain ranges of Crete fulfill all criteria of all viewpoints (in a cultural-geographical sense they might even be considered 'high-altitude'), they are being almost completely neglected in comparative mountain studies[6]. The at first sight arbitrary definition of the area of special interest as lying above 400 m can actually be backed by observations about the Cretan landscape: vegetation and density of settlement seem to change at the height of about 300–400 metres[7].

## 4.1 Mountains in Archaeology

Despite the tendency in academic research to separate into specialized units, a branch of archaeology focussing on all aspects of life in the mountains has not, so far, developed. Such a comparative approach to mountain environments all over the world could attempt to evaluate and compare data from upland areas and sites and strive to optimize methods and theories for research in these par-

[4]Schweizer 1984, 35. Cf. Braudel 1966, 27: "Qu'est-ce au juste qu'une montagne? En donner quelque définition simple—l'ensemble des terres méditerranéennes au-dessus de 500 m par exemple—inutile précision. C'est de limites humaines, incertaines, malaisées à reporter sur la carte, qu'il doit être question."

[5]Soffer 1982, 397. In the statement that "populations inhabiting mountain regions exploit an environment with a steep gradient in which climatic belts influence vegetation zones, and these are in turn reflected in a succession of human production zones" (Rhoades – Thompson 1975, 539), resulting in a mixed agropastoral economy and integration of the different zones of production through regional trade, there is nothing that would not apply to the uplands of Crete, even though it originally referred to the Alps, Andes and Himalayas. The same is true of the landholding systems which emerged in these regions: "The typical pattern, which is subject to variation according to local circumstances, consists of individual ownership of small cultivated plots and hay meadows in the vicinity of the main village and communal ownership of larger unfragmented forest and pasture lands lying at higher altitudes" (Rhoades – Thompson 1978, 545). Cf. Netting 1981, 10–41 and *passim*.

[6]See for example Parish 2002, who, despite her definition of mountains as 'area above 1000 m', does not even include the Cretan ranges on a map titled "mountains of the world" (Parish 2002, 1–6).

[7]J. Moody *pers. comm.* 2011; Moody 2012, 233.

ticular environments. For example, there are great differences in the ecology of north- and south-facing slopes, which in turn affects choices of settlement location[8]. The detection of such micropatterns requires a thorough survey of a region and knowledge about site functions. One problem with developing a comparative approach is certainly that relevant data are not forthcoming. There are a number of different reasons for this. To begin with, it is undeniable that mountainous regions, almost by definition, are less densely settled and less easy to explore than lowlands. The fact that fewer people live there means that agriculture and construction work do not open up the ground as regularly as in the plains, which is very frequently the way in which sites are discovered in the lowlands[9]. Archaeological projects concentrating on mountain regions may be less attractive because of greater organizational and possibly monetary expenditure and lesser reward (and, in the case of the Mediterranean, because of their greater distance from the beach): folds, ridges and valleys may conceal ancient sites so they are not easily found unless one specifically goes and looks for them, and sometimes maybe not even then[10]. Adding to this, the prevalent modern notion of remote mountain areas being both culturally backward and, perhaps more importantly, largely irrelevant to history is not aided by the fact that fewer ancient written sources relate to the mountains than to the plains: documents from upland sites would have to be retrieved through archaeological exploration, or ancient writers would have had to go to these areas, both of which requirements were and are hampered by the aforementioned difficulties of travel (which in most cases must have been even greater in antiquity). So in essence, nothing much has changed since Fernand Braudel remarked: "l'historien est un peu comme ce voyageur. Il s'attarde dans la plaine, décor de théâtre où évoluent les puissants du jour; il ne paraît guère désireux de s'engager dans les hautes et proches montagnes. Plus d'un serait surpris de les découvrir, n'ayant jamais quitté les villes et leurs archives"[11]. The lack

[8] Price 1981, 73–76; Wilkinson 2003, 185.

[9] The problems encountered when surveying an unploughed mountain terrain are described by Martens 2005, 231–232.

[10] Cf. Wilkinson 2003, 185. The remoteness of upland sites can be beneficial for their preservation however, cf. Traunmüller 2008, 15. See also Efstratiou 1993, 135 for some problems of upland archaeology in Greece.

[11] Braudel 1966, 26. Braudel was himself of the opinion however that ideas, innovations and other advances of civilization often do not reach the mountains (Braudel 1966, 30).

of interest is reflected in the fact that monographs and conference proceedings focussing on mountain environments in general are far and few between[12]. In Germany, a tradition of 'Montanarchäologie' has become established, with a centre at the Deutsches Bergbau-Museum in Bochum. Although the geographical setting and environment of the sites is considered in recent research projects, the focus in this discipline is clearly on ancient mining and the past exploitation of geological resources.

Landscape archaeologists, always in search for features with potential meaning to ancient populations, should find mountains a rewarding hunting ground[13], but even they have more often concentrated on easier terrain[14]. (One could argue that this is partly because one main focus of Landscape Archaeology has always been on Britain and that a large part of the methods was first developed in this context, and Britain simply is not well endowed with mountains at all.)

Of course there are a number of examples of well-known archaeological sites in mountainous regions. The highland cultures of Central and Southern America have received much interest, with conspicuous centres such as Chavín de Huantar or the Inca metropolis at Cuzco, both in Peru, situated at elevations of ca. 3150 m and 3500 m respectively. However, although one would expect that the setting of these sites would have spurred the engagement in landscape studies with the aim of assessing how people coped with their highland environments, it seems to me that the topographical or landscape aspect has not actually featured very prominently

[12]Examples are Bergier 1989, Olshausen – Sonnabend 1996, Madson – Medcalf 2000, Giorcelli Bersani 2001a and Grimaldi *et al.* 2008. Not even participation in such conferences seems to be a sign of appreciation of the importance of mountain regions: it is quite sad to read in one of the contributions to Olshausen – Sonnabend 1996 a sentence like "Diese Marginalisierung des Gebirgslandes und seiner wirtschaftlichen Bedeutung durch die neuere Forschung soll hier gar nicht grundsätzlich in Zweifel gezogen werden" (Gehrke 1996, 71). The only specialized archaeological journal, Preistoria Alpina, focusses on the Alps. Even works alluding to mountains in their title do not necessarily occupy themselves with the significance of the landscape: although C. H. E. Haspels, in her thick monographic volume entitled 'The Highlands of Phrygia', briefly describes the geography and vegetation, she makes no attempt at environmental reconstruction; she fulfills the promise of the subtitle and delivers a presentation of 'Sites and Monuments' (Haspels 1971).

[13]Cf. Wilkinson 2003, 7: "Interestingly, the role of ideational interpretations becomes stronger, in fact unavoidable, when interpreting desert or mountain landscapes".

[14]To name a few random (but influential) examples: Tilley 1994; Aston 1985; Barker 1995. Cf. however the 'Mountains and uplands' section in van Leusen *et al.* 2011. For a slightly more systematic overview see the contributions in David – Thomas 2008.

in archaeological research in Latin America[15]. This, then, means that although elevated sites are important in this field, their actual mountain character is not taken into account, and it could be argued that even in this case, mountains are to a certain extent being neglected in archaeology[16]. Only rarely is the special setting integrated fully into the approach. The exploration project of the city and territory of ancient Sagalassos in Turkey, at about 1550 m altitude, is in many ways exemplary and offers many interesting insights into the economy of a mountain settlement[17].

Turning to the Mediterranean proper, the importance of mountains is seen by some as so great that they indeed define the region *by* its mountains: the Mediterranean "is a continental sea surrounded by mountains. More properly the Mediterranean comprises that intricate littoral between shore and summit. Where the mountains do not exist, as in Libya and Egypt, the Mediterranean as a cultural landscape vanishes"[18]. Despite their obvious geographical importance, the Mediterranean mountains have been largely ignored as far as archaeological research (for both prehistorical and historical periods) is concerned[19] even since F. Braudel dedicated the first twenty-odd pages of his most seminal book exclusively to the mountains. They have been the subject of a number of ethnographical

[15] Cf. Brady – Ashmore 1999, 124 (and their bibliography); Reinhard 1985, 300. An example of a landscape approach is Bauer 1998, as opposed to, for example, the contributions in Politi – Alberti 1999. My impression may be wrong however—see Patterson 2008.

[16] Cf. also the slightly dubious but in a way entertaining musings of Ovcharov 2005 about the site of Perperikon in Bulgaria.

Mountain areas and their inhabitants have received more interest in social and biological anthropology. The journal 'Mountain Research and Development' was founded in 1981; especially in its first decade, contributions focused almost exclusively on the ecology and social structure of societies in the Himalayas, the Andes or the Alps.

[17] To mention just two aspects: the fact that this region nowadays has frost in seven months and a mean temperature of −2 °C from December to February clashes with abundant evidence for olive cultivation from early Hellenistic times onwards and seems to imply that climate was different in the past (Waelkens *et al.* 1999, 705; Vanhaverbeke – Waelkens 2003, 18. 53–55). The analysis of fish remains has shown that they were imported not only from the Turkish coast, no less than 110 km away, but also from Egypt (De Cupere 2001, 135. 170; Degryse – Waelkens 2008, 299).

[18] Pyne 1997, 81.

[19] As lamented by Braudel 1966, 26; Langdon 1976, v; Barker – Bintliff 1999, 209; Fitzjohn 2007b, 14. Fitzjohn also points out that upland studies tend to treat these areas as purely responsive to influences from the coast. Of course it is not only the mountains, but the countryside in general that receives much less attention than the towns, see Osborne 1987, 9. For an exemplary discussion of the various roles which the mountains could play for a polis see Fowden 1988.

studies[20], and of course certain extraordinary sites have been excavated and now attract some visitors, academic or other, but the lion's share of archaeological and public attention still goes to lowland sites. This is as true for Crete as it is for elsewhere: the most famous and promoted attractions, the Bronze Age palaces, are situated in the coastal plains, not in the mountains, even though places such as Karphi or the Minoan villa at Zominthos, 400 metres above the modern settlement limit, certainly warrant attention[21]. True enough, two types of elevated or upland sites, which are both discussed in separate chapters, have received a lot of attention (by archaeologists) in Crete: the so-called peak sanctuaries of the Proto- and Neopalatial period and the LM IIIC 'defensible' settlements on more or less accessible summits. But in both cases, most examples are known only from survey rather than from thorough exploration, and the lengthy debate rests mostly on theoretical considerations.

Mountains therefore seem to be marginal to archaeological interest—and this has a reciprocal relationship with the idea of mountains as *being* socially and culturally backward. G. Coles and C. M. Mills found "that marginality has become a 'fuzzy catchall' which, while apparently offering explanation, actually serves only to disguise our ignorance of the complex environmental systems and economic and social choices facing past human groups", making the attribution of a region as 'marginal' suspicious of being caused by a feeling of superiority of one's own position. What a Middle European scholar distinguishes as an existence on the fringe may be tougher than his or her daily life in the library, but this does not mean that other people cannot accept and indeed embrace this challenge. Coles and Mills analyzed the way in which the term 'marginality' is used in archaeology and discerned three parallel, yet closely related meanings:

- *environmental* marginality exists in regions "where at least one of the requirements for the growth of an organism is either restricted in supply or

[20] Chang 1992; Hempel 1995; Halstead 1998; Nixon 2006. Quite a few of them relate to transhumance; for an overview see Waldherr 1999.

[21] For an analysis of factors influencing why more tourists visit the Psychro Cave than the settlement at Karphi see Wallace 2005b. The lack of a general evaluation of settlement in the mountains of Crete has also been lamented by Chaniotis 1991, 95. A recent counter-example is Beckmann 2012.

is sporadic in occurrence" and which therefore can become uninhabitable through a change in the availability of this requirement

- *economic* marginality is not inherent in the landscape, but the result of a subsistence strategy that involves high risk and can be seen as unsuitable for this kind of environment

- *social and political* marginality results from isolation of a group from the rest of society, be it because of geographical remoteness or because of (perceived) differences in religion, ethnicity or linguistics[22].

At least environmental marginality is not a fantasy of archaeologists however: mountains are frequently named as particularly vulnerable to climate change and anthropogenic impact[23]. It will be tested in the following chapters to what extent Cretan mountain regions were marginal zones in antiquity.

## 4.2 Mountains as borders and boundaries

> *To Cretans the high mountains have always been a well-known part of the island's culture. [...] High mountains are revered as a place of solitude and, on occasions, the last stronghold of the eagles of freedom. Although the average Cretan probably never sets foot in them, it is the sight of the mountains that has brought courage in the dark days of the past.*
>
> Rackham – Moody 1996, 193

Mountains are often compared with walls—like walls, they rise up vertically and act as spatial boundaries and obstacles to unhindered sight and movement. The significance of this characteristic is multifold. At almost any point in the Cretan landscape, if it is not the sea, it is the mountains that constitute the horizon. The importance of the horizon for the spatial orientation of man has been analyzed by O. F. Bollnow: as the interface of land and sky, it provides human beings with an

[22] Coles – Mills 1998, vii–x. See also Baillie 1998, 13–14.
[23] *E. g.* Denniston 1995; Stötter – Monreal 2010, 88. Cf. Garnsey 1998, 167–169.

indispensable point of reference. Without this line, the world would seem endless and leave the individual feeling lost; only the horizon unites the space around man to a finite and manageable surrounding[24].

The mountains, hence, have a dividing character in relation to what is on either side of them, but exactly because of this, they also have a uniting character in that they may give a sense of unity to the group whose vision they delimit[25]. With reference to a community in a highland valley, encircled by peaks, this is very obvious, even though the tendency of social groups in mountainous areas to be of limited size is not purely caused by reasons of a psychological nature: the topographical characteristics of mountains mean scarceness of living space and good arable land and hence limited carrying capacity[26]. But the mountains also promote a feeling of general distinction between upland people and lowland people and create separate social identities in the respective areas[27]. This is quite easily noticeable in modern Crete, and has been so for centuries. Sources from the Venetian occupation of the island for example make it clear that resistance against the foreign force centred, as in every other period of Cretan (and Greek) history, in the mountains. However, the mountains not only defined the geographical setting of the riots, but also the separation of natives and foreigners[28]. "Auf den Bergen ist Freiheit"[29] is a valid motto for Greece as much as anywhere.

[24] Bollnow 1980, 77.

[25] According to G. Simmel, natural boundaries like mountains, rivers or the sea do not lead to a feeling of restriction, in contrast to artificial political borders (Simmel 1968, 465–466). It has been suggested that in the case of the Inca state, administrative units were based on ethnic unity defined by common worship of one particular mountain (Reinhard 1985, 310). See also Price 1981, 369–370; Olshausen 1996, 10–11.

[26] Purrington 1984, 7. I wonder whether there might be a slight sense of eco-determinism in this. See also Guillet 1983, 563–564.

[27] See Braudel 1966, 34–36; Simmel 1968, 466; Brulé 1978, 147; Price 1981, 367; Graßl 1994, 206–207; Sonnabend 1999b, 161.

[28] Maltezou 1989, 63. Cf. Braudel 1998, 135: "ce haut pays sauvage, dangereux qui possédera l'île (devenue Candie), aux temps de la domination vénitienne".

[29] This is a quotation from the fourth act of Friedrich Schiller's 'Die Braut von Messina'. Price 1981, 368 has noted: "Highland populations usually pay more allegiance to their own inclinations than to those of the distant government." See also Cabanes 1992, 77; Wilkinson 2003, 186. For ethnographical studies of life in Cretan mountain villages, the attitudes and customs of the inhabitants see Saulnier 1980 (*non vidi*); Herzfeld 1985; Greger 1988; Ivanovas 2000; Vardaki 2004.

This aspect of the mountains was also felt in antiquity. For the ancient Greek poleis, mountains were the natural limitations of their territory and hence also zones of possible contact—friendly or hostile—with neighbouring states. These borders could be marked by sanctuaries[30]. It is therefore not surprising that mountains in one way or another featured in the polis's ideology and in its rituals and cults[31]. Because of their marginal or liminal character, mountains were also frequently chosen as the location for initiation rites of young men in ancient Greece[32].

Adjusting the notion of mountains as borders between city-states to the greater scale of the Roman Empire, Plinius the Elder stated that mountains were created in order to serve as boundaries between peoples[33]. This is still true, at least to a certain extent, today, though often more in political than in cultural terms: an example are the Alps, the main chain of which was chosen after the First World War to serve as the border between Italy and Austria, even though the majority of the population south of it (in South Tyrol) was German-speaking. Livius (21,35,8–9) lets Hannibal tell his soldiers that the Alps are not just the walls of Italy, but those of Rome[34].

Mountains can hence act as political and social borders, and especially the latter is connected to what may be called a cultural border, namely that—arguably—ideas and "des grands courants civilisateurs" spread easily across the flat land but "se révèlent impuissants, dans le sens vertical, devant un obstacle de quelques centaines de mètres"[35]. Braudel wrote this before the facilitation of contact with the rest of the world through widespread introduction of motorized vehicles and means of telecommunication including the internet, so that this effect, if it was ever true, must be greatly diminished today[36]. However, Horden and Purcell have claimed that contrary to common opinion the Mediterranean mountains were *not* impassable barriers, but that both commodities and ideas were indeed more of-

[30] Pedley 2005, 47. See also Chaniotis 1988a, 22–23; Langdon 2000, 468 with footnote 32; Sporn 2002, 68–73. 75. 364–366. On mountains as borders in general see also Price 1981, 374–376.

[31] Jameson 1989, 8. 16. See also de Polignac 1984, 42.

[32] Buxton 1994, 84. The initiation of Cretan ephebes by way of abduction into the mountains by an older lover is described by Strabon in his 'Geography' (Str. 10,4,21). For the (conjectured) initiation rites at Kato Symi see Chaniotis 2009, 61.

[33] Plin. *HN* 36,2 ("*ea quae separandis gentibus pro terminis constituta erant*").

[34] See Sonnabend 1999b, 161. Cf. Fellmeth 1996, 85.

[35] Braudel 1966, 30. Cf. Peattie 1936, 221–225; Simmel 1968, 466. See also Watrous 1982, 6.

[36] See however Jentsch 1984, 65 (still before widespread use of the internet though).

ten than not conveyed by land. According to them, "the main hindrance to the movements of people and goods by land has usually been social rather than physical"[37]. Such social marginality, with the mountains acting as delimitations of certain cultural traits or fashions, is claimed to have existed in Crete for Archaic pottery styles[38], although of course this may be more coincidence than actual phenomenon.

## 4.3 The economic significance of the (Cretan) mountains

> *When we use the label 'mountain' in a Mediterranean context, therefore, we are identifying a visually or geomorphologically distinctive landform. But we must be chary of making assumptions about the ecological or demographic structures to be associated with it: these cannot be taken for granted.*
>
> Horden – Purcell 2000, 82

In his appreciation of the importance of the countryside for the ancient Greek poleis, Robin Osborne notes one of the peculiarities of Greek hoplite warfare, namely that these soldiers could only fight on flat terrain, and goes on to state that since "it is these plains which it is most important for the city to defend[,] hoplites are the best instrument available"[39]. This statement is typical in its disparagement of mountainous areas and their significance for ancient communities which is so prevalent in archaeology and ancient history (see above). Admittedly, it has also been said that to be self-sufficient, a city would have needed mountainous terrain as pasture, the better soils of the plains being too valuable for agriculture[40]. This

[37] Horden – Purcell 2000, 130–132. Cf. Buxton 1990, 164–165; Barker 2005, 57. A maritime route nonetheless meant a 'shorter' distance between two places (Horden – Purcell 2000, 133).

[38] Erickson 2010, 224. Cf. Erickson 2010, 228. 233.

[39] Osborne 1987, 13. It is interesting to note that although Cretans were sought-after mercenaries in Hellenistic times, they were notoriously bad at phalanx fighting (see Pl. *Lg.* 1,625D and Plb. 4,8,11). I would like to thank Prof. Dr Stefan Link (Paderborn) for providing these references.

[40] Chaniotis 1991, 96; van Effenterre 1991, 403–404 with footnote 27; Chaniotis 1999b, 182. Cf. the assets of fragmented landholding (including hillsides) as described by Osborne 1987, 38–40. S.

however reduces the uplands to a mere backwater of inferior value, an almost irksome appendage which, not being fit for more important purposes, the city-dwellers use to graze sheep out of sight of their habitation. Whether this made a significant contribution to the economy of the lowland polis[41] is not really my concern—it certainly made a significant contribution to the economy, or rather the survival, of the mountain dwellers. For the mountains themselves were not depopulated in antiquity, and for this population self-sufficiency was as great a concern as for people in the plain, much greater than it is in the western world today. And, given that soil[42] is available, there is no reason why it could not have been achieved: even the frost-sensitive olive tree prospers up to about 750 m ASL (and a great number of very old ones can be found close to this upper limit, a hint to the role of upland cultivation in the past[43]). All other Mediterranean crops do fine in even higher regions, indeed sometimes better than in the plain because of more consistent water supply[44]. It seems that at least in purely agricultural terms, the Cretan mountains were not necessarily more marginal than the plains. Of course, agriculture in mountainous areas often means agriculture on slopes, but terraces can be employed to ease some of the difficulties involved.

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Alcock acknowledges the importance of mountain research: "one major texture to economic life in Crete is the distinction between uplands and lowlands, and the different uses to which each was put" (Alcock 1999, 176). For the dichotomy of mountains and plain in Greek and Roman antiquity see also Graßl 1996 (189 footnote 3–7 for references).

[41] Cf. the degrading statement by Gehrke 1996, 71. See also Moody 2012, 259: "If we include Eleutherna at 400 m, five out of the 21 sites looked at are from 'Middle Slopes 400–800 m'—higher than they need to be, given the resources commonly found on Cretan archaeological sites"; "numbers suggest that the second most active area was not 'Coastal Slopes' as might be expected, but 'Middle Slopes 400–800 m' ".

[42] Soil formation is not as intense in the mountains as in the plains, see Price 1981, 233–234; cf. Guillet 1983, 567.

[43] Rackham – Moody 1996, 80. The 750 m limit applies in modern climatic conditions—cf. Waelkens *et al.* 1999, 705; Vanhaverbeke – Waelkens 2003, 53–55. It has even been argued that "l'habitat permanent s'arrête à la limite de l'olivier" (Kolodny 1969, 196). See also Allbaugh 1953, 271; Beckmann 2012, 38.

[44] Cf. Bosanquet 1902, 237; Brulé 1978, 146; Hempel 1996, 35; Gehrke 1996, 73; Nowicki 1999a, 163. Cf. also Spratt 1865a, 175; Creutzburg 1933, 61. For vines, a limit of 1200 m is given by Brulé 1978, 144; cf. Netting 1981, 13. See also Chaniotis 1996b, 258 with footnote 9. NB that S. Beckmann's local informants denied that pulses would grow above 300 m asl (Beckmann 2012, 29 footnote 45).

**Upland agriculture and terraces** Agricultural terraces are plausibly argued to have existed since at least the Bronze Age[45], and even though conclusive evidence for Classical times is hard to come by—terraces are difficult or even impossible to date[46]—, it is not too bold to postulate their existence at that time, for pure necessity: cities and settlements depended on growing their own crops; many of them were located "in places where agriculture would hardly have been possible without terracing; therefore they had terraces"[47].

Landscapes of terraced hillsides, which may or may not be situated in the mountains proper, are a familiar sight in Crete, Greece and other parts of the Mediterranean (and the world, *e. g.* Asia). Although their purpose is often thought to be the prevention of erosion, it has been shown not only that there are several other possible reasons, but also that in fact they are effective only against sheet and gully erosion and actually encourage slumping[48]. O. Rackham and J. Moody also oppose the notion that abandoned terraces in all cases lead to slope erosion, insist that this depends strongly on geological conditions and therefore deny that it is the case in Crete[49].

Different types of terraces have evolved (see Fig. 4.2), but, with the exception of the pocket terraces for tree crops, no correlation between them and the crops planted on them can be observed. There is hence also no indication as to what crop a particular terrace was originally intended for; usage can change over the

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[45] See Clark 1990, 77. 79; Rackham – Moody 1992, 129; Krahtopoulou – Frederick 2008, 579. Apparently a recent survey around the Bronze Age town of Gournia in eastern Crete produced evidence for contemporary terracing (Bennet 2011, 65).

[46] See however the list and evidence compiled by Price – Nixon 2005, 672–673 and Fig. 4.1 for an example. See also Hayden 2004, 181–182.

[47] Rackham – Moody 1992, 129. Cf. Wallace's findings about 20$^{\text{th}}$ century Tapes (Wallace 2003, 610). Cf. also Brulé 1978, 144; Chaniotis 1996b, 262 with footnote 22.

[48] "*Slumping* is the downslope slippage of unconsolidated material moving as a unit or as several subsidiary units along a concave surface of rupture. [...] Slumping typically takes place along a zone of weakness where the area downslope has been disturbed and the basal support removed" (Price 1981, 194). For terraces and erosion see Rackham – Moody 1992, 124; Rackham 2003, 53 (pointing out the lack of correlation between terracing and erodibility in Mediterranean landscapes). Research by Krahtopoulou – Frederick 2008, 559 shows that abandoned terraces are affected by sheet wash and gully erosion. Cf. Allbaugh 1953, 246. See also Evans 2003, 143–144.

[49] Rackham – Moody 1992, 129. See also Price – Nixon 2005, 274.

**Figure 4.1:** Olive tree growing on terrace wall. Near Livaniana, Sphakia, April 2011

(if taken casual care of[50]) long lifetime of these structures. In some cases, their former or last use can be inferred: olive trees are virtually indestructible unless their roots have been dug out; they can stay behind for ages after active usage has ceased. Threshing floors (*alonia*) are a good indicator of cereal cultivation in an area; it is noteworthy that they can be used for processing pulses too[51]. It is due to the fundamental changes which have taken place in the Cretan economy in the

[50] "In our experience, maintaining terraces, once built, would have been a matter merely of replacing the occasional fallen stone, or of mending breaches after a 75-year flood" (Rackham – Moody 1992, 130). Cf. Foxhall 1996, 59–60.
[51] Rackham – Moody 1992, 125. 128.

last 70 years that many terraces in the mountains formerly used for growing grain are now abandoned[52].

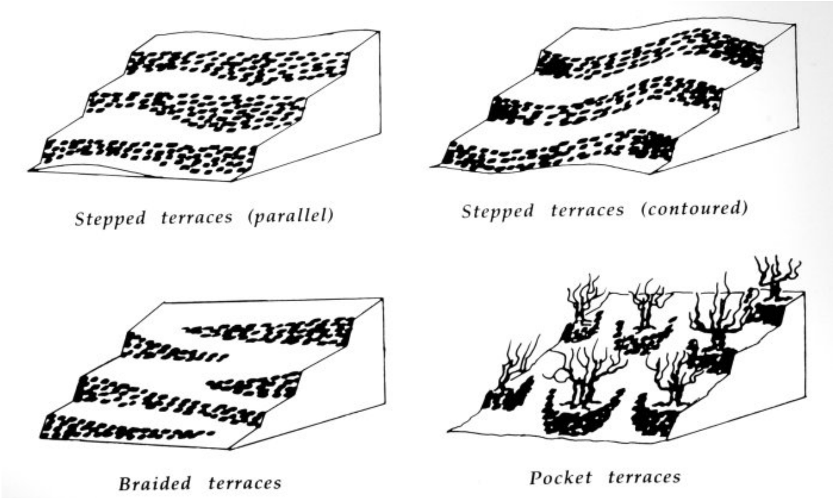


**Figure 4.2:** Different types of terraces (from Rackham – Moody 1996, 141 Fig. 12.1. Reproduced by permission.)

**Mountain plains** Mountain plains (*oropedia*) are a maybe less obvious but certainly just as important aspect of agricultural exploitation of upland terrain. Theophrastus (*Vent.* 13), in the 4th century BC, mentions cereal cultivation (and settlement) in the mountain plains of Crete[53]. There are about 25 such plains, often poljes or brought about by a combination of tectonics and karstification[54], in Crete, but the five biggest ones are Omalos and Askyphou in the Lefka Ori, Nida in the Psiloritis and Lasithi and Katharo in the Dikti range.

The Omalos plain constitutes about 6 km$^2$ of flat land at 1080 m ASL, above the Samaria gorge in western Crete. It is home to specimens of "Crete's most specifically alpine [...and] one of the world's rarest trees", *Zelkova cretica*, known as *ambelitsia*, from which shepherds' crooks in this part of the island are made[55].

[52]"In most areas it is clear that cultivation has at one time extended further into the hills than it does now. Much of the retreat of cultivation is very recent, the result of the invention of tractors, but in many places the process began at least a century ago" (Rackham 1990c, 103). Cf. Moody 1990, 58; Nowicki 1999a, 163.

[53]On this passage see Panessa 1991, 78–81.

[54]Rackham – Moody 1996, 28; Rackham *et al.* 2010, 270.

[55]Rackham – Moody 1996, 71.

There are also enormous old pollarded pear trees which seem to benefit from the moister and cooler climate of the western uplands[56]. The earliest traces of human presence date to the Final Neolithic or the earliest Bronze Age[57]. T. A. B. Spratt reported that the whole plain was cultivated with oats, and terraces on the slopes around testify to more agricultural activities than are visible today[58]. In those days, Omalos was inhabited from March into early winter—and not only by shepherds, for Spratt saw "warm huts for men and cattle" there[59]. Like the other bigger *oropedia*, Omalos has a seasonal river which disappears in a swallow-hole (*χώνος*). These drains can get blocked (by geology or plastic bags), and it appears this was the case in Venetian times, since on maps from those days, Omalos is indicated to be a lake[60].

Askyphou (see Fig. 5.3) may have been exploited as early as the Final Neolithic and is today a permanently settled polje situated on the eastern slopes of the Lefka Ori, next to a natural corridor between the north and south coasts. Its elevation is ca. 730 m ASL and its extent ca. 2 × 3.5 km. The mountain plain is one of the few areas of arable soil in this very mountainous area of Crete. Vines and cereals were and are grown here: the wine from Askyphou was praised as the best of the island by Pashley in the mid-19th century, and O. Rackham and J. Moody confirmed that this was still true in the 1990s[61]. In one site from the Turkish period, no less than eight wine presses have been recorded, testifying to the importance of this economic branch[62].

The mountain plain of Nida (1370 m ASL; ca. 1.5 × 3 km) is overlooked by the Idaian Cave and was planted with cereals until the Second World War; a threshing floor at Zominthos, some 300 m lower, testifies to cereal cultivation far above the

[56] Rackham – Moody 1996, 83. 148–149. Wild pear trees in Omalos are also mentioned by Spratt 1865b, 177.

[57] Rackham *et al.* 2010, 275.

[58] Spratt 1865b, 176; Rackham 1990b, 84; Rackham – Moody 1992, 125. According to Sekunda 2000, 340, the growing cycle lags behind that of lower altitudes by a whole month.

[59] Spratt 1865b, 178. He also conjectured that the plain would have belonged to Kantanos or Lissos in antiquity (Spratt 1865b, 182).

[60] Rackham – Moody 1996, 28. For field systems in Omalos see Rackham *et al.* 2010, 275.

[61] Pashley 1837, 188; Rackham – Moody 1996, 80. 147. Olives do not prosper because the plain is a frost hollow (Rackham *et al.* 2010, 275).

[62] Nixon *et al.* 2000, site 7.27. For the archaeology of Askyphou see below, chapter 5. See also Sekunda 2000, 342.

modern settlement limit[63]. Today, it is used as pasture, but also seems to be a rewarding hunting ground for wild greens. Finds from the Idaian Cave prove that people visited this place at least since the Late Neolithic. In Greek antiquity, Nida at times belonged to the territory of the city of Axos (though Gortyn may well have raised claims, too, just as in more recent historical times, when violent fights broke out between Anogia and Vorizia (on the north and the south side of Psiloritis respectively) over possession of the plain until in 1870 the dispute was settled in favour of the former[64].

According to K. Nowicki, the beautiful Katharo plain (1120 m ASL; see Fig. 4.3), just above Lasithi, has been owned by the people from Kritsa (on the east side of Dikti) at least since the Venetian period[65]. In the 1970s, at any rate, people from Kritsa went to live in the Katharo in the summer to graze their flocks and sow grain in autumn which would be harvested in the next summer; barley is still grown nowadays. L. V. Watrous speaks of a seven month-period of habitation in Katharo[66]. The presence of fruit trees is worth mentioning.

Lasithi (850 m ASL) in the Dikti range is the biggest of the Cretan mountain plains, and its history is better known than that of the others (see below, chapter 7). The first traces of human activity date to the Late Neolithic but may not have been continuous through the ages: for example, it is not clear whether the plain was cultivated in Classical and Hellenistic times; farming may have been prevented by flooding, a problem that was solved only in Venetian times by way of construction of drainage channels, though there may already have been attempts by Roman engineers[67]. An extensive survey by L. V. Watrous enabled the mapping of site locations for all chronological phases, but more elucidating in this respect are the Venetian records reflecting the struggles of the foreign power to rule mountain folk and to exploit the island economically. Decrees in the 14$^{th}$ century banned settlement in the mountain plain, but in 1465, the Venetian Senate ordered the Cretans to cultivate wheat in Lasithi; herding was explicitly banned to ensure maximum yields from the level area. However, "[b]ecause of local opposition to the plan,

[63] Chaniotis 1999b, 187. Cf. Halstead 1990b, 64. See also Rackham *et al.* 2010, 277.
[64] Kirsten 1951, 133; Marinatos 1956, 243–244.
[65] Nowicki 1996, 28.
[66] Watrous 1974, 288; Beckmann 2012, 76.
[67] Watrous 1982, 24. 28–29. Cf. however Rackham – Moody 1996, 150.

**Figure 4.3:** The Katharo mountain plain seen from the east (May 2009; photo courtesy of Torben Keßler)

almost fifty years passed before part of the plain was cleared of forest in 1514"[68]. Even then the Lasithiotes continued to cause trouble: an official inspection in 1572 encountered uncontrolled burning of the trees growing on the mountainsides and refusal to pay the government for the use of the wood[69]. Today, some wheat and barley are still grown in Lasithi, as are pulses, but the plain is more famous for its potatoes and its fruit orchards: apples, pears, cherries, plums, almonds and walnuts all flourish (and blossom beautifully in spring). The villages which line the edges of the plain are permanently inhabited, constituting the highest year-round settlement in Crete. In the summer, tourists flock in to see the Psychro Cave and a picturesque piece of 'typical rural Crete'.

[68] Watrous 1982, 25.
[69] Watrous 1982, 27.

**Mountain produce** As we will see in more detail, the special qualities of their environment enabled mountain inhabitants to produce exclusive commodities that were in high demand in lowland regions. In this respect it is possible to point out analogies to current debates about those elevated regions and their ecocultural value and function. A recent official publication concerning the 'Mountainous Areas of the European Union' states that 17% of the EU's agricultural area is situated in what (in EU terminology) is defined as mountains. Besides the production of foodstuffs of "unrivalled quality and authenticity", the significance of mountain cultivation and forestry is seen in the creation and preservation of a cultural landscape, which in addition to its economic importance has an essential role in cultural identity. Moreover, ecological benefits such as protection against natural hazards and maintenance of biodiversity are mentioned. The report also draws attention to some problems of upland farming, namely higher production costs (because the area is too steep for machinery or requires special equipment), greater distance to markets (which means higher transport costs), lower fertility of soils and climate[70].

Because of such restrictions, carrying capacity in the mountains is limited: there is only so many people that can be fed. However, it has been pointed out that there is also a population *minimum*, "a population level beneath which labor shortage prevents agriculture in all but the garden spots"[71]. The high-quality products mentioned in the EU leaflet are derived from this limited (but possibly exclusive) exploitation of the environment: pasture for (depending on the region) cattle or sheep and goats results in valued dairy products such as milk ('Alpenmilch' from the Swiss, German and Austrian Alps), butter, cheese ('Bergkäse' from Austria, Switzerland, the Cevennes *et cetera*) or yoghurt (in 2011, the sheep's milk yoghurt from around Anogia was sold in supermarkets in Iraklio for about EUR 2 per 200 g tub) as well as wool, often of special breeds. The flora brings about the distinct taste of mountain honey, and wild herbs are collected for medicinal or cosmetic purposes or for tea. In present-day Crete, sheepbreeding for dairy products and meat is the greatest economical sector in the mountains (the

[70]European Communities 2005, 7. 9.
[71]McNeill 1992, 6. Price 1981, 436–437 speaks of a minimum carrying capacity needed for stability.

official statistics list 1.6 million sheep in Crete, of which only ca. 230,000 males)[72]. Wool must have been the more important product in the past, but the popularity of synthetic fabrics has caused the price to plummet. In addition, globalization in the economic sector means that Cretan, Greek and European wool in general cannot compete in price (and, although certainly not in all cases, in quality) with merino from the world's largest wool industry, Australia[73]. In Crete and Greece in general, sheep are therefore today kept only for dairy products and meat. The wool is burned or left to rot in plastic bags by the roadside[74].

Lots of the activities in upland regions mentioned here are believed to preserve (at least to a certain amount) traditional practices and to go back almost unchanged to early times[75]. The list of obvious products from the Cretan mountains in antiquity compiled by A. Chaniotis reads therefore much as it would today: timber, honey, beeswax, medicinal plants, cheese and wool[76]. Another perishable can potentially be added to this list: in historic times, before refrigerators and freezers, snow was collected in the Cretan mountains, where in some places it does not melt until summer, and shipped to places as remote as Alexandria[77].

**Beekeeping** Honey was (apart from (dried) fruits such as figs, dates or raisins) the only sweetener known to Greeks and Romans, but like propolis it was also

[72] Hellenic Statistics Authority 2008. Most of them are of the Zackel type, though a lowland Sphakia type, a mountain Sitia breed (which may be ancient) and perhaps also an Anogia variation are present as well (Ryder 1983, 322). Oppian (3rd century AD) mentions yellow sheep with four horns and very rough wool in the Mesara (Opp. *C.* 2,375). The amount of land used for agriculture has dwindled in the second half of the 20th century, whereas pastures seem to have remained relatively stable (Hempel 1995, 216).

[73] Already in the 1970s, a year's shearings from a ewe in Greece were worth no more than her milk yield of 4–5 days, see Koster 1977, 258. The lower price of Australian wool is made possible by the gigantic size of the flocks, which make it cheaper to lose a certain number of animals through inadequate treatment such as mulesing than to look after them properly. See also Koster 1977, 294 for other effects of commercial flockkeeping.

[74] Cf. Nixon – Price 2001, 409.

[75] See for example Kanta 1983; Blitzer 1990; Fitton 2002, 21. In 1953, L. G. Allbaugh found that "little change has occurred in the work and life of most Cretan farmers since Biblical times" (Allbaugh 1953, 16). A more balanced approach is proclaimed by Beckmann 2012, 9–10.

[76] Chaniotis 1996b, 263. Timber will not be discussed here again.

[77] McNeill 1992, 124 with footnote 63; Grove – Rackham 2001, 132; Panagiotopoulos 2007, 23; Sakellarakis – Panagiotopoulos 2006, 68 with footnote 64. Cf. Spratt 1865b, 152.

an esteemed all-purpose remedy[78]. Before the development of fuel from mineral oil, bees were essential suppliers of wax—for lamps and candles[79], but maybe even earlier it was used for ointments and cosmetics, for metal casting with the lost wax-method (*cire perdue*) and, as early as the Bronze Age, as finds from the Ulu Burun shipwreck show, for writing tablets[80]. Professional beekeepers are recorded in the Linear B archives in Pylos (Ea series), the Gg series from Knossos lists large jars of honey given as offerings to a number of deities, and C. Davaras has convincingly argued for the interpretation of ideogram *168 as a ceramic beehive[81]. In Greek and Roman times, Crete was strongly connected to the products of beekeeping: some ancient authors seem to suggest that bees were introduced to Europe via Crete, and according to Plinius (Plin. *HN* 11,14,33. 21,46,79), Crete was famous

[78]See *e. g.* Plin. *HN* 20,23,54. 20,26,68. 22,50,107–109. 22,73,152; Varr. *R.* 3,16,23. Cf. Crane 1999, 510–511. 550. For an overview of the manifold uses of honey in antiquity see also Balandier 1993.

[79]Residue analysis of lamps from Mochlos has shown that in contrast to common opinion, it was not only olive oil that was used as lamp fuel; indeed, it has been suggested that olive oil was too valued a commodity to be mundanely burned as an illuminant (Evershed *et al.* 1997; Evershed *et al.* 2000). See Crane 1999, 524–525 for a short history of candles.

[80]For the diptych from the Ulu Burun wreck see Payton 1991. For writing tablets in antiquity see Symington 1991; Crane 1999, 535–536; Hurschmann 2001.

[81]The ideogram occurs in tablets PP and U7505; see Davaras 1986. Both Columella (Col. 9,6,2) and Varro (Varr. *R.* 3,16,17) declare terracotta the worst material, being too hot in summer and too cold in winter, but their favoured fabric, cork oak bark, was not available in Crete (cf. also Crane 1983, 200: "hives of wicker are used today in Crete, except that pottery is used in the mountains where willows do not grow"; cf. Fig. 4.4). In the area of Anopolis in Sphakia, roofs for beehives are today cut out of the bark of living cypress trees (Rackham – Moody 1996, 60; J. Moody *pers. comm.* 2011). See Crane 1999, 203 Table 24.1A for a comparison of Roman writers' opinions on materials. Bucket-shaped upright beehives, which are argued to have existed in Minoan times, were made from the allegedly problematic terracotta, too, but with their (conjectured) movable top bars would represent considerable sophistication and much easier harvesting; for differing opinions on this question see Graham 1975, 74–75; Crane 1983, 196–202; Crane 1999, 402–404; Harissis – Harissis 2009, 20–21; Moody 2012, 254. For the Ea and Gg series see Chadwick 1976, 124–126. For beekeeping in Aegean prehistory see Harissis – Harissis 2009, 6–7. 9–17 and *passim.* While I do not doubt E. Crane's expertise on beekeeping, her statements about Crete and Cretan archaeology unfortunately contain several misunderstandings, cf. Crane 1999, 46 ("Mount Dikte (Ida)"). 189 ("[Crete] came under direct influence from Egypt"). Furthermore, without wishing to appear to underestimate the importance of beekeeping in this period, Harissis and Harissis' interpretation of iconographic evidence for beekeeping, *e. g.* the derivation of the double-axe motif from an abstract sketch of a honey bee (Harissis – Harissis 2009, 68–70 with Fig. 58) is going a bit far. Similarly, the identification of exotic Cretan honey in Egyptian records as suggested by Leonard 1981, 98 does not rest on a firm basis (Prof. Dr Diamantis Panagiotopoulos *pers. comm.* 2011).

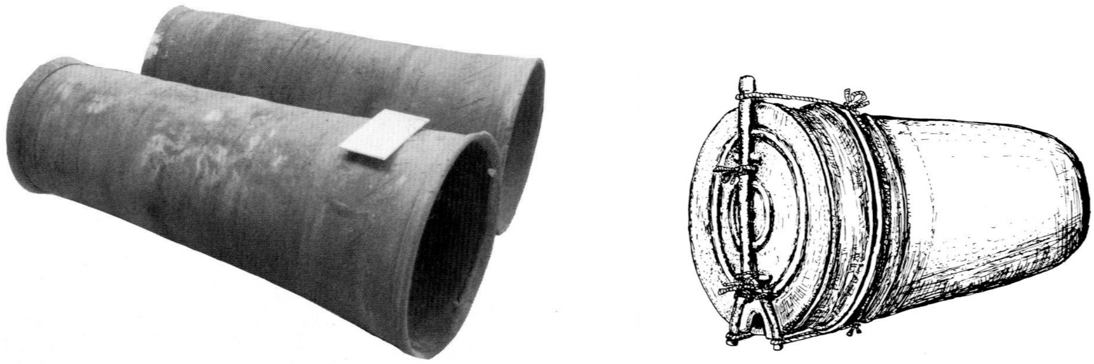

**Figure 4.4:** Left: 'Cannon'-shaped terracotta beehives, open at both ends, in use in Crete in 1979 (from Crane 1983, 48 Fig. 29). Right: Reconstruction of an ancient Greek terracotta beehive from Attica and mode of closure. Flight entrance at the bottom (from Jones *et al.* 1973, 447 Fig. 19)

for its honey[82]. A number of Cretan poleis minted coins with the depiction of a bee on one side—maybe because they took pride in their honey production: Praisos (450 m ASL) in eastern Crete, Aptera (ca. 150 m ASL) east of Chania close to the bay of Souda, and the members of the league called *Orioi*, mountain-dwellers, in western Crete (see chapter 5), namely Elyros (which has not been securely identified yet but has been suggested to be modern Rodovani in Sphakia; see Fig. 5.9), its neighbour Hyrtakina (680 m ASL), and Tarrha at the mouth of the Samaria gorge[83]. Beehive sherds were found in great numbers in the Sphakia survey which covered the territory of Tarrha[84], and beekeeping is particularly conspicuous in this area today. The link to the mountains is made explicit in the story of the baby Zeus being fed in the Idaian Cave, 1400 m high on Mount Ida (Psiloritis),

[82]See Fraser 1951, 51–52; Chaniotis 1996b, 258–259 with footnote 10 (for references). For beekeeping in ancient Greece see also Crane 1999, 196–202 (with further references).

[83]Elyros: Wroth 1886, 36 no. 1–2 with Pl. 8,15; Svoronos 1890, 141 no. 1 with Pl. 12 no.s 9–10; 142 no. 2–6 with Pl. 12,10–13. Hyrtakina: Wroth 1886, 50 no. 1–2 with Pl. 12,5; Svoronos 1890, 197 no. 1–2 with Pl. 18,7–8; 198 no. 3–6 with Pl. 18,9–10. Tarrha: Svoronos 1890, 321 no. 1 (*agrimi*?) and 2 with Pl. 30,27–28. Praisos: Wroth 1886, 72 no. 13 with Pl. 18,3; Svoronos 1890, 290 no. 36–37 with Pl. 28,9–11. In the case of Aptera, the representation of a bee on the coins (Svoronos 1890, 16 no. 12 with Pl. 1,14. 16; 19 no. 33–35 with Pl. 1,32–33; 22 no. 51 with Pl. 2,9) seems to be derived from the cult of Artemis, whose head is on the obverse and whose priestesses were called 'bees' (Ar. *Ra.* 1273). I would like to thank Anne Dunn (Nottingham) for pointing this out to me.

[84]See Francis 2006.

with honey by the nymph Melissa (=bee). Both Varro (Varr. *R.* 3,16,13–14) and Columella (Col. 9,4,2. 9,4,6. 9,14,19) stress that oregano, Greek savory, but above all thyme make good honey—all these are phrygana plants abounding in the Cretan mountains. In Crete in the 1990s, around 4500 beekeepers kept between 80,000 and 90,000 hives which produced 850–950 tons of honey and 3.5–4.5 tons of beeswax every year[85]. These numbers, though not exceeding average production, seem to reflect the popularity of the flora, especially the aromatic phrygana species, with the insects (even though it should be noted that the number of colonies in an area is more dependant on suitable nesting sites (which of course in this case can be supplied in almost indefinite number as long as the labour force to look after them is available) than on food)[86].

**Herbs** 'Mountain tea' or *malotira*, the dried flowers of the endemic *Sideritis syriaca*[87] from Psiloritis and the Lefka Ori is nowadays sold in upland villages such as Anogia and on the market in Iraklio, next to phrygana herbs like thyme, rosemary or *δίκταμο* (dittanny), and cheap they are not. They are valued not only for their aromatic taste, but also for their healing virtues[88]. These properties were well known in Roman times and probably long before that, and it has even been suggested that such herbal remedies may have been one of Crete's major export commodities in the Bronze Age, although direct evidence is missing[89]. Classical

[85] Hempel 1995, 218. The connection between mountains and beekeeping was also put forward—in a completely different context—by Ventris – Chadwick 1973, 302.

[86] Crane 1983, 17–18. See Crane 1999, 192–193 for traditional beekeeping practices in Crete.

[87] It grows in elevations from 800–2000 m; see Turland *et al.* 1995, 100.

[88] Hempel 1995, 219; Alibertis 2007, 133–134. 139. 147. 149.

[89] A number of spices are mentioned in the Linear B tablets from Knossos—most prominently coriander in curiously large amounts, all in all more than 7500 litres (Chadwick 1976, 119–120; Sarpaki 2001, 215–216),—but among them is no obvious mountain plant. The list of species in Andreadaki-Vlasaki, 2000, 173 is wrong. See also Leonard 1981, 97–99; Knapp 1991, 42; Sarpaki 2001 and the evidence from the Chrysokamino Metallurgical Site (see p. 284). The treatment of this question by McGeorge 1987, 411–412 is rather lax. It has been suggested that the EM vessels known as 'teapots' might have been used for herbal tea (Fitton 2002, 20). Saffron, which seems to be the focus of some of the frescoes in Akrotiri Xeste 3 and is recorded in the Knossos archives, may have been another valued export article (as first suggested by Evans 1935, 718; see Amigues 1988, 236 and Merk-Schäfer 1998, 151–155 for its medicinal applications and Waterhouse 2003 for what saffron was *not* used for; Leonard 1981, 98 thinks that it was used for dyeing only). *Crocus sativus* does not grow in the wild and could have been cultivated at any elevation where winter temperatures do not exceed −10 °C (Crop & Food 2003). See however Amigues 1988, 228. 230 and Day 2005, 52 for opinions on 'wild' saffron and see also Shaw 1993, 674 with footnote 58;

Greek authors (Theophrastus, Hippokrates) mention the medicinal uses of a number of (Cretan) plants, and there may have been a prospering trade with these mountain products[90], but it is from Galenos that we hear something about the scale on which this knowledge was exploited. If we are to believe his writings in the second half of the 2nd century AD (XIV p. 9–10), the Roman emperor employed *βοτάνικοι ἄνδρες* in Crete who supplied him, the city of Rome and other places with plants for medicinal purposes[91]. It seems most likely that these men would have been Cretan natives who were hired to apply their intimate knowledge of the local flora in the service of the emperor[92]. A.-M. Rouanet-Liesenfelt suggests a "fashion" for herbs of Cretan origin since the time of Nero, but from Plinius' remark *"praecedente persuasione illa quicquid in Creta nascatur infinito praestare ceteris eiusdem generis alibi genitis"* (Plin. *HN* 25,53,94; "there is the established conviction that whatever simple grows in Crete is infinitely superior to any of the same kind to be found elsewhere"[93]) makes it clear that this was more than a temporary phenomenon[94]. What is cause and what effect is hard to tell, but it is certainly not by chance that according to Galenos (XIV p. 2), the personal physician (*ἀρχιατρὸς*) to Nero, a certain Andromachos, was a Cretan by birth.

Crete is praised as the favoured origin of a great number of other medicinal plants by Plinius, and two famous species are hard to find outside Crete, namely Diktamos and *τράγιον* (see Plin. *HN* 13,36,115. 25,53,92)[95]. The latter has not

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Day 2011b, 380–382. The best summary of the botanical and archaeological evidence for saffron in the Aegean is Negbi – Negbi 2002. See also Sarpaki 2001, 203–205.

[90] "Throughout the entire period of Greek antiquity there seems to have been people whose only job consisted in the digging and preparing of certain roots and, presumably, the gathering of herbs for medicinal purposes" (Raven 2000, 33). See also Meißner 1996, 352–353.

[91] See Chaniotis 2008, 88. Cf. Cels. 3,21,7–8. According to Galenus, the bundels of herbs arrived in Rome protected by wrapping papyrus, the ancient equivalent of bubble foil, made from the parts of the papyrus plant which are too coarse to be written on; this material would presumably have been imported from Egypt (Rouanet-Liesenfelt 1992, 179–180; for possible papyrus in Crete see Warren 1976).

[92] Rouanet-Liesenfelt 1992, 186 thinks they were slaves. B. Meißner also noted that there is hardly any information on the actual production of these goods (Meißner 1996, 353–354).

[93] Translation by W. H. S. Jones. Cf. Thphr. *HP* 9,16,3.

[94] Rouanet-Liesenfelt 1992, 178. Cf. Gal. XIV p. 79.

[95] For the problems associated with identifying plants mentioned in Plinius and the shortcomings of Bostock 1856 in this respect see Jones 1956, 485. See also Jones 1951, xvi-xviii. Cf. Riddle

been identified with any known plant yet[96]. Diktamus (*diktamo* or *erota*; botanic taxon *Origanum dictammus*) was explicitly connected to Mount Ida by Vergil[97]. The plant is characterized by round woolly leaves which, as Theophrastus knew (Thphr. *HP* 9,16,1), are loved by goats and make them invulnerable, and which are valued as painkillers for women in childbirth. Originally a plant of the gorges, it is today cultivated and sold as tea[98]. Another drug famed in antiquity was *ladanum* (Hdt. 3,112; Dsc. 1,97,3; Plin. *HN* 12,37,73. 26,30,47–48; Cels. 3,21,7. 5,12. 6,1), which is the dried resin-like exudation of *Cistus creticus.* It is a little surprising that Plinius does not mention Crete as a possible origin of this substance, since the rock-rose is probably native to the island and nowadays grows in abundance in heights from sea level to 1200 m[99]. The greatest of all plants also comes from Crete: "*Inter omnes herbas lithospermo nihil est mirabilius. [...] nascitur et in Italia, sed laudatissimum in Creta"* (Plin. *HN* 27,74,98–99; cf. Dsc. 3,141). Plinius delivers a veritable encomium to this plant, but its identity can unfortunately not be ascertained: several species of Lithospermum (gromwell) grow in Crete today,

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1985, xxv-xxvi (and cf. the evaluation of Dioskourides' knowledge of plants by Rackham 1996, 36).

[96] Rackham – Moody 1996, 129. The limited hints to the identity of the plants have not stopped suppositions: Liddell – Scott give "a plant smelling like a he-goat; (1) *Hypericum hircinum*, (2) *Pimpinella tragium*"; Jones 1956, 543 suggests the former or *Pistacia lentiscus*; Chaniotis 1991, 107 thinks of *Pistacia palaestina*, which does not even grow in Crete (cf. Turland *et al.* 1995, 36), and Effenterre – Rouanet-Liesenfelt 1995, 242 claim it grows "au bord de la mer". See also André 1985, 262–263.

In comparing, as I do in the following paragraph, the accounts of ancient authors with what is known about Cretan vegetation today, I am hoping to appease O. Rackham's complaint that it is "wrong to be preoccupied (as many scholars are) with ancient *attitudes* to and what was said about nature and not with what nature was really like" (Rackham 1996, 17) by uniting the two approaches.

[97] Verg. *Aen.* 12,411–412; George 2006, 231–232.

[98] Rackham – Moody 1996, 36. 71. Indeed, it has been suggested that Galenus' explicit praise of herbs from the *πεδιάς* (XIV p. 79) refers to the Pediada, the plain between the Psiloritis and Dikti massifs, where Diktamos is cultivated today (Rouanet-Liesenfelt 1992, 184 footnote 39). See however also Beckmann 2012, 40. For the pharmaceutical potency of Diktamos see Merk-Schäfer 1998, 181–184.

[99] Turland *et al.* 1995, 55; Rackham – Moody 1996, 71; Alibertis 2007, 56; Moody 2012, 253. *Ladanum* may even have featured prominently in the palatial economy at Knossos, see Sarpaki 2001, 210–212. For a photo see Sarpaki 2001, 263 Fig. 2.

in locations between 0–800 m, 200–1150 m and 900–1900 m respectively; the *Lithospermum officinale* suggested by a number of authors is not one of them[100].

In the case of two other plants, *Idaeus rubus* (Plin. *HN* 24,75,123) and one simply called *Idaea herba* (Plin. *HN* 27,69,93), it is not clear at all whether he is referring to the Ida in Crete or to the mountain of the same name in the Troad[101]. The only argument that could be put forward in favour of the Cretan mountain range is that Plinius names Crete more often than Asia Minor as the origin of valuable herbs[102].

Be that as it may—of greater significance in this context are those species which, even though identification is not always secure, must have been collected exclusively in the mountains[103]: *theangelis* cannot be identified but must be a

[100] See Lenz 1859, 533; Bostock 1856, 253; Jones 1956, 518; André 1985, 147; Aufmesser 2002, 213. Cf. Turland *et al.* 1995, 40; Chilton – Turland 1997, 14. The only one of the plants mentioned by Bostock in this context that does grow in Crete is *Coix laycryma* (Turland *et al.* 1995, 167). Alibertis 2007, 38 thinks it is *Lithodora hispidula*, which grows at low altitudes.

[101] The types of *Rubus* found in Crete nowadays do not seem to differ from those from other places, see Turland *et al.* 1995, 136; Alibertis 2007, 225. W. H. S. Jones identified Plinius's *"Idaeus rubus"* as the species *Rubus idaeus*, the common European raspberry, which is confined to the mountains in southern Europe and said to be named after Mount Ida in the Troad rather than its Cretan namesake (Blamey – Grey-Wilson 1989, 176; Huxley 1999, 10). The claim that Plinius referred to Cretan Ida was made by George 2006, 232.

[102] Mount Ida in the Troad is mentioned in 27,3,12.

[103] In contrast to the statements by Rouanet-Liesenfelt 1992, 177–178. 184, it is more than just one plant which grows exclusively in the mountains; the *θλάσπις* (Dsc. 2,156; Plin. *HN* 27,113,139; mostly (and so by Rouanet-Liesenfelt) identified as *Capsella bursa-pastoris*) however is not one of them (see Turland *et al.* 1995, 80). Of the other identifications suggested in Jones 1956, 542 only *Lunaria annua* grows in Crete, at 200–700 m (Turland *et al.* 1995, 84). *Sinapis alba*, put forward by Chaniotis 1991, 107, grows in elevations of up to 700 m ASL but also in more modest heights (Turland *et al.* 1995, 84–85). I moreover do not agree that occurrence below 1000 m means "donc pas dans la montagne" (Effenterre – Rouanet-Liesenfelt 1995, 243); Rouanet-Liesenfelt 1992, 184 even argues that Galenos assigned superior quality to herbs from the Pediada plain. Plants growing at both lower and higher elevations and said to be available from Crete include: storax, probably *Styrax officinale* (Lenz 1859, 551; André 1985, 252; see Merk-Schäfer 1998, 392–395 for its pharmacological value)—the Cretan variety is the one least favoured by Plinius (*HN* 12,55,124–125. 12,90,81. 24,15,24)—at 50–600 m (Turland *et al.* 1995, 146); the *asplenon* mentioned in Plin. *HN* 27,17,34, believed to be *Asplenium ceterach*, which is identical with *Ceterach officinarum* and grows at 0–2000 m (André 1985, 29; Chilton – Turland 1997, 9); Heraclium, a type of Cretan oregano (Plin. *HN* 20,62,170. 20,69,177), which is praised for its pharmaceutical effects, but "Pliny here confounds several distinct plants, and [...] the whole account is in hopeless confusion" (Bostock 1856, 268 footnote 26); an unidentified plant which grows in wild and woody areas ("*ubicumque vero asperis et silvestribus nata*"; Plin. *HN* 21,29,53); a type of nard also known as *agrion* or *phu* (Plin. *HN* 12,26,45; Cels. 3,21,7), identified by Jones 1956, 530 and André 1985, 198 as *Valeriana phu*, which however does not appear in Turland

mountain plant, since Plinius explicitly mentions its presence in the Cretan Dikti range (Plin. *HN* 24,102,164). If *tragacanthus* (Thphr. *HP* 9,1,3. 9,15,8; Dsc. 3,20; Plin. *HN* 13,36,115) is *Astragalus creticus* as tentatively proposed by H. O. Lenz and J. Bostock, it was gathered in considerable elevations, since it grows exclusively on open rocky slopes at 1200–2200 m[104]. Similarly doubtful is the praised Cretan *Daucus* (Plin. *HN* 25,64,110–112), which has been suggested to be a species of *Athamanta*. *Athamanta macedonica* today grows on calcareous cliffs—Plinius speaks of "rocky soils that face south"[105]—, especially in the Lefka Ori, in elevations between 1450–1800 m[106]. A species of hemlock (Plin. *HN* 25,95,151–154) native to Crete is *Conium maculatum*, which prefers locations between 300–1250 m and is highly toxic but has a number of pharmaceutical uses[107].

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*et al.* 1995 (nor does the *Asarum europaeum* put forward by Chaniotis 1991, 107); *gladiolus* which according to Plinius is white (Plin. *HN* 21,69,115)—the only species recorded in Crete is *Gladiolus italicus* growing at 0–650 m (Turland *et al.* 1995, 178; see also André 1985, 111) which is pink and not a medicinal plant (see Alibertis 2007, 289; the suggestion of *Gladiolus segetum* in Jones 1956 is hence also invalid); *Pseudobunion* (Plin. *HN* 24,96,153) which is said (by Jones 1956, 532; Chaniotis 1991, 107) to be *Pimpinella cretica* and has been recorded in rocky places at 0–1000 m; *acoron* (Plin. *HN* 25,100,157), for which Jones 1956, 487 suggests *Acorus calamus*, which has pharmacological potency (Merk-Schäfer 1998, 62–64) but does not seem to grow in Crete today, or *Iris pseudoacorus*, which is also favoured by Chaniotis 1991, 106 and does occur (Turland *et al.* 1995, 178). Aniseed (Plin. *HN* 20,73,187) was cultivated, not collected in the wild, hence its inclusion in the book on garden plants; cf. Rouanet-Liesenfelt 1992, 178; Turland *et al.* 1995, 152. Plinius also mentions the qualities of Cretan onions (Plin. *HN* 19,32,104), which reminds me of G. Sakellarakis in 2006, proudly presenting and serving to the excavation crew onions from Zominthos, *i. e.* from the mountains.

[104] Lenz 1859, 723; Bostock 1856, 202 footnote 93; Turland *et al.* 1995, 103; Alibertis 2007, 155. The species *Astragalus tragacanthus* (which produces a natural edible gum coded E413 in the EU) mentioned in Rackham 1945, 166a and suggested by Jones 1956, 543 has not been recorded in Crete, nor has the *Astragalus gummifer* suggested by Chaniotis 1991, 107. For the pharmacological potency of Astragalus spp. see Merk-Schäfer 1998, 89–92.

[105] Translation W. H. S. Jones. The rest of Plinius's description, especially that Cretan daucus resembles fennel, seems to speak against *Athamanta*, whose flowers are white, whereas those of fennel are yellow.

[106] Turland *et al.* 1995, 148. Cf. Jones 1956, 504; André 1985, 87. The species *Athamanta cretensis* suggested by Chaniotis 1991, 106 is not recorded in Turland *et al.* 1995, 148.

[107] Turland *et al.* 1995, 149, Alibertis 2007, 252. Cf. Jones 1956, 499. See also Merk-Schäfer 1998, 142–146.

Marinatos 1956, 250 found *Cerastium glomeratum* in the entrance of the Idaian Cave, claiming that this plant was used for curing problems with the spleen. I have not found any confirmation of the alleged pharmaceutical use of this species, which according to Turland *et al.* 1995, 46 grows in flat clayey areas, fallow fields or bare and disturbed ground from 0–1050 m, in West and Central Crete.

It seems that herbs were of much greater importance as mountain products than mineral raw materials, for several of which extraction is conceivable but not well researched or recorded for Crete. A. Chaniotis lists wood, stone and metals, especially iron and "bronze". There is no secure evidence for the exploitation of metal deposits in Classical and Hellenistic times, but copper (not bronze!) and gold mines seem to have existed in Roman times in Kantanos, Kampanos and Sklavopoula, all in the south-western Lefka Ori[108]. Evidence for two postulated copper and iron mines in the Asterousia mountains is more than tentative[109]. As far as the Bronze Age is concerned, however, an evaluation of available information about the whole island has led geologists to conclude "that a significant metal extraction (copper, lead, and silver) from the local ores in Bronze Age times is very unlikely"[110]. As regards stone, traces of ancient exploitation are so far not known from the uplands proper, even though local quarries may have existed. A marble quarry which is believed to have been used in Greek times was discovered near Chamaizi, and several other, albeit small, outcrops are known on the south and east coasts. Two further quarries at Phalasarna and Praisos were seemingly used in Hellenistic times[111]. In Roman times, coloured marbles for imperial buildings were probably always imported[112].

As mentioned above, the most important sector of mountain produce today and in all likelihood also in antiquity is connected to stock-rearing of sheep and goats, which will be dealt with in detail in a separate chapter (chapter 10.

[108]Davies 1935, 266–268 and Sanders 1982, 33 each cite these three only.

[109]Faure 1968, 181–182; Sanders 1982, 22. 159–160. See Faure 1968 and Faure 1980 *passim* for other mineral deposits in Crete.

[110]Stos – Gale 2006, 304. Cf. the optimistic statements by Faure 1980.

[111]Durkin – Lister 1983, 83 with footnote 83. 96. For Minoan quarries—on the coast—see Soles 1983; Papageorgakis *et al.* 1992; Waelkens 1992, 7–11 (with further references).

[112]Sanders 1982, 34. Plain polishable stones would have been supplied by local quarries however, see Paton – Schneider 1999, 280. 292 with footnote 54; Harrison 1990, 149–150.

## 4.4 Mountains in religion and cult

> *If some particular landscapes are responsible for sanctuaries being established, it is also the case that some particular divinities demand one sort of terrain rather than another.*
>
> Jost 1996, 219

Mountain cults, it has been claimed, are in all religions by far the most important form of nature-connected worship[113]. Related rituals and what might be said to be their cultural legacy in everyday habits are widespread and can be traced from ancient times until the present day. Nonetheless, the topic has hardly received adequate attention. The only cross-cultural study specifically of mountain cults is still von Andrian's "Der Höhencultus asiatischer und europäischer Völker" with its supplement "Heilige Höhen der alten Griechen und Römer" by Rudolf Beer, both published in 1891 and certainly largely outdated today; J. Schmidt's account of the sacred mountains of the Greeks and Romans[114] is a rather superficial collection of literary quotations from all times. Despite the almost global character of the phenomenon, and as with so many cult places and sometimes from inside a society as much as from outside of it[115], it is hard to put one's finger on *why* exactly certain people choose to worship (on) mountains[116], and on why other societies have *not* done so. Paul Fickeler's explanation is symptomatic in this respect; he rather vaguely attributes the development of mountain cults to the "Wesen

[113] P. Fickeler 1975, 81; Rutkowski 1985a, 345; Edlund 1987, 44; Panagiotopoulos 2008, 124. Cf. von Andrian 1891, xxxiii: "Es gibt [in Asien und Europa] kaum ein hervorragendes Gebirge, welches nicht unter irgend einer Form Gegenstand einer religiösen Verehrung gewesen wäre." Even Colin Renfrew's critical summary of do's and don'ts of an archaeology of cult names mountain tops as predestined cult places (Renfrew 1985, 19).

[114] Schmidt 1939. A. Golan's rather random global musings on the Cosmic Mount in his book on "Prehistoric Religion. Mythology. Symbolism" cannot, I am afraid, be considered a reliable or even scientific account (Golan 2003, 229–237). The lack of a fundamental study of the topic is also lamented by Grötzbach 2004, 457.

[115] See for example the inspiring study by Lucia Nixon about outlying churches in the Sphakia region in south-western Crete (Nixon 2006, 23. 98 and *passim*).

[116] It has rightly been criticized that the distinction between 'sacred mountain' and 'mountain sanctuary' is often handled laxly. Whereas 'mountain sanctuary' clearly denotes an elevated cult place whose sacredness is not transferred unto the geographical elevation, 'sacred mountain' should only be applied where sacredness is attributed to the whole mountain and the mountain as such is revered (Grötzbach 2004, 457–458).

der Bergnatur im allgemeinen und ihrer vielfältigen individuellen Eigenheiten im besonderen, und zwar ihrer Bedeutung für das körperliche und besonders geistig-seelische Leben der Menschen"[117]. Mircea Eliade has stressed the connection of the 'up' with the sky, heaven and the divine and of the 'down' with the earth and the human sphere. According to him, looking at the infinite, unreachable sky suffices to feel a religious experience, and he concludes: "Everything nearer to the sky shares, with varying intensity, in its transcendence"[118].

Another question to ask in this context is to what extent geography and topography influence religious beliefs. Even though it is dangerous to project one's own awe in view of or on top of a spectacular mountain peak onto past people and just *assume* that they could not have helped but feel the same (see below), it seems not unreasonable to expect that the environment did influence religion at least to some extent[119]. It has even been argued that this relationship is a mutual one, in that the environment (including climate, geomorphology and settlement pattern) shapes beliefs and in turn believers shape their environment: "Religion ist

[117] Fickeler 1975, 81. Cf. Price 1981, 7; Horden – Purcell 2000, 413, who name the strangeness of the exposed rock as one defining aspect and then add: "The other, related, quality of the more remote and cold mountain-tops is precisely their remoteness, their frightening detachment from the normal conditions of life". Cf. also Bernbaum 1997, 248: "What is the value, then, of thinking about them? It is simply this: the contemplation of sacred mountains, with their special power to awaken another, deeper way of experiencing reality, opens us to a sense of the sacred in our own homes and communities—a sense that we need to cultivate in order to live in harmony with our environment and with each other. In looking up to the heights and reflecting on the world around them, we discover within ourselves something that enables us to lead deeper and more meaningful lives." Cf. further Lowenthal 1978, 387: "Heavenly proximity, wilderness purity, hydrological utility, extensive panoramas, scenic configuration, architectural resemblances, stimuli to bravery and lessons for freedom are among the many motives since advanced for admiring mountains." See also van der Leeuw 1956, 41–42; Spratt 1865b, 158.

[118] Eliade 1971, 101. Cf. van der Leeuw 1956, 54; Eliade 1987, 105. Much like Christopher Tilley's phenomenological approach to landscapes, Mircea Eliade's phenomenology of religion is often criticized for being subjective, eclectic and even unscientific (Prof. Dr Thomas Meier, *pers. comm.* 2012; Waardenburg 1997, 740–741). See also Berner 1997, 350–353 (with literature).

[119] Cf. Marinatos 1993, 115: "It is not surprising that mountaintops, the beauty of which produces feelings of awe even in today's visitor removed from the immediacy of religious experience, became foci of worship in antiquity. Expression of religious feeling is, to a great extent, induced and shaped by the natural environment." Cf. Peschlow-Bindokat 2009, 57. For moderate and balanced views of the question see Otto 1989; Gehlen 1995, 67–75; Dillon 1997, 114. See also Jeremias 1919, 32–33. E. Olshausen does not restrict the religious significance to the peaks: "Ein eigener kultureller Bereich ist die Religiosität, die bei der Bergland-Bevölkerung, bedingt durch die besondere Abhängigkeit von der umgebenden Natur, vielfach von sehr starker Motivation getragen ist" (Olshausen 1996, 10).

deshalb immer Produkt des Raumes wie der Überwindung des Raumes zugleich. Was überwiegt, hängt ganz entscheidend von dem durch die Tradition vermittelten Psychomilieu, der Umweltwahrnehmung, ab"[120]. One could also wonder whether man chooses to make a certain location sacred, or whether it is perceived as inherently holy, *i. e.* through divine choice, and only 'found' and then made visible by man[121]. A useful distinction is the one put forward by E. Grötzbach; he speaks of 'sacralized natural phenomena' on the one and 'created memorial and cult places' on the other hand and stresses the fact that there is no clear delimitation between the two, since the latter can go hand in hand with the former[122]. The concept of historical-religious sacredness, which connects a certain event or personality to a certain place and regards the locality as sacred from then on, is obvious in Christian and Jewish religion as much as in Hinduism and Buddhism. However, the continuity implied by the suggested increase of sacredness through adding the two concepts starts out from a false premise: Lucia Nixon has convincingly argued that the coincidence of Minoan peak sanctuaries and Late Roman basilicas does not represent continuity, but rather an "overlap in locational grammar"[123].

[120] Hoheisel 1985, 123. 154. Cf. Schwind 1973, 9: The geography of religion "untersucht jenen Bereich des vom Heiligen bestimmten menschlichen Tuns, der sich im Diesseits raumrelevant objektiviert". See also Deffontaines 1973; Sopher 1967, 24–46; Gualtieri 1983, 161–162.

[121] Cf. Troll 1975, 251: religious geography aims to investigate "wie der Mensch die Gottheit in der Landschaft sichtbar gemacht hat". In contrast to this: Messerschmidt 1989, 89. See also van der Leeuw 1956, 445–448; Eliade 1987, 103; Edlund 1987, 30. H. Rust distinguished between natural-magical sacredness, which is intrinsic to a place, and historical-religious sacredness. He claimed that the first kind of sacredness was irremovable and continuous, whereas the second was subject to the prevalence of the religious system it belongs to. A combination of the two is possible and leads to an intensification of sacredness (Rust 1933, 134; Fickeler 1975, 55–56). However, it should be very clear that 'sacredness' is always and by all means an attribution made by humans; there can be no such thing as a place that is (perceived as) sacred to everyone no matter what his cultural and religious background is (cf. what has been said above about the perception of landscapes, p. 39).

[122] Grötzbach 2004, 458. Cf. what has been said in this paragraph with M. P. Nilsson's statement: "Die Heiligkeit der Stätte ist die Vorbedingung für die Erbauung des Gotteshauses; darin besteht zwischen uns und den Alten ein Unterschied, der gewöhnlich leider übersehen wird, so daß man der Kontinuität der Kultstätten nicht gerecht wird. Bei uns wird ein Platz dadurch heilig, daß man ein Gotteshaus auf ihm erbaut, und die Kirche wird durch einen besonderen Akt eingeweiht, wodurch die Stätte mit Heiligkeit bekleidet wird. Bei den Alten ist umgekehrt die Heiligkeit der Stätte der Anlaß zur Errichtung eines Gotteshauses" (Nilsson 1967, 74).

[123] Nixon 2006, 93. Clearly, the same hilltops can be selected for different purposes. Or, as Rackham – Moody 1996, 187 remarked: "Almost as many peak sanctuaries have telecommunication stations as have chapels!" Cf. D. Levi's horrendous reasoning (Levi 1981, 44). See also Horden – Purcell 2000, 408. 465.

Although we today may feel that we can to some extent empathize with religious feelings overcoming human beings on mountain tops, it has been pointed out that this is, in western thought, a comparatively recent development. As has been recounted above, Petrarca is often named as the first instance of someone perceiving his environment as landscape, but his appreciation of the mountain as such did not catch on: mountains continued to be seen as ugly and monstrous[124]. Admiration for mountains developed only slowly and in the 18th century found its expression in poems (for example by William Wordsworth) and paintings (for example by Caspar David Friedrich)[125]. With time, "from loathed excrescences on the original smooth globe, mountains came to be inspiring locales, magnificently wild and irregular"[126].

A number of concepts crop up with some regularity with regard to mountains as elements of religion and cult: firstly, a common idea is that, due to their physical height, mountains can be regarded as a bridge to the sky which they carry and hold up, and as such they are symbols of infinity and eternity. Secondly, the mountains are not only closer to the place where the divine powers dwell, but they themselves are often thought to be the abode of deities. Lastly, it is not unusual to find that a mountain can be regarded as an individual with supernatural powers, a kind of demon, which can be either good or evil[127]. Furthermore, one can distinguish the way in which reverence is expressed: worship can be performed either through keeping away from the mountain—this can be chosen deliberately or enforced by topography—or, conversely, by going there[128].

Mountains can be shown to feature prominently in cult and religion in regions where they are conspicuous, something that certainly applies to Crete. Several common themes recur frequently in association with mountains all over the world.

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[124] The Alps for example were described by English 17th century writer John Evelyn as the place where nature "swept up the rubbish of the earth to clear the plains of Lombardy" (quoted after Rees 1975, 306).

[125] Nicolson 1959; Rees 1975, 310. See also Groh – Groh 1991; Mathieu 2006.

[126] Lowenthal 1978, 387. Cf. Peattie 1936, 4–7; Schweizer 1982, 43–46.

[127] von Andrian 1891, xiii. xv; Buffettrille 1996, 77. 84; Pommaret 1996, 42; Schicklgruber 1996, 120; Roller 1999, 42–43. Cf. Eliade 1987, 105–107; Brady – Ashmore 1999, 133. On the widespread notion of natural features as *axis mundi* (a term coined by M. Eliade) see also Eliade 1987, 36–37. 49; Taçon 1999, 37. 40; Sinha 1995, 9; Grötzbach 2004, 459. See however also the cautious remarks of Korom 1992, 116 and *passim*.

[128] Fickeler 1975, 56. 81–82. Cf. *e. g.* Reinhard 1985, 315.

Even where they (or parts of them) are used as pasture or for hunting, they are almost universally regarded as distinctly different from the more densely settled plains: they are liminal zones, the geographical or at least notional borders of the human world. This area is where the ancestors and the spirits of the dead live, and going there presents the danger of disturbing them and prompting them to turn against the intruder[129]. The gods living in and on the mountains do not seem to mind visits as much; in fact, they seem more ready to show themselves to mortals in the mountains than elsewhere[130]. Offerings on a mountain also mean the gods do not need to leave their home (be it mountain, be it heaven) to enjoy what they are given[131].

The notional connection between mountains and water, based on actual hydrological facts, is a particularly widespread phenomenon. All over the world, the mountains are regarded as the source of rain and freshwater (positive), and hence also often as the place of origin of thunder, lightning, wind and storm (negative)[132].

It is remarkable that it is often not absolute height that makes a mountain or a peak sacred. As with Minoan peak sanctuaries (see below, chapter 11), more decisive appear to be visibility, accessibility or other social factors such as local legends or relative closeness to human habitation[133]. These factors are important for building and keeping up ties between the sacred space and the community; all cult needs a focus.

For (western) adventurers and mountaineers, the symbolic significance of the highest peaks is not officially religious, but certainly spiritual, in that they have

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[129] Helbig 1975, 134; Reinhard 1985, 309. 315; Saunders 1994, 173–174; Castro – Aldunate 2003, 76. 78.

[130] Cf. the Old Testament, where the mountains are first and foremost the very place for encounters with God, *e. g.* 1 Kings 19,8–13; Ex. 19,3–34.

[131] For potential prehistoric burnt offerings on central European mountain peaks see Krämer 1966.

[132] Deighton 1982, 1–8. 39. 109; Haas 1982, 27. 30. 48. 52. 94; Reinhard 1985, 306; Carrasco 1990, 72; Evans – Berlo 1992, 8; Saunders 1994, 173–174; Barnes 1999, 117; Desideri 2001, 22; Zuidema 2002, 243–244; Castro – Aldunate 2003, 77; Renfrew – Bahn 2008, 67. On this subject see also Parish 2002, 5; Grötzbach 2004, 460; European Communities 2005, 3; Wiegandt 2008. Cf. Otto 2001, 34–35; Peschlow-Bindokat 2009, 57; Moody 2009b, 248–249.

[133] This phenomenon has also been noted by Grötzbach 2004, 459. See also Nowicki 2012, 151. 153. Of course, their visibility also meant that mountains were used as geographical markers, see Rives 2007, 92.

the "capacity to recapitulate the existential structure of human life. [...] The mountain, to put the matter another way, has revelatory power"[134].

### Greece

Religion and world view can be argued to be inseparable. The question of mountains in cult and religion is entwined with the way these geographical entities were perceived. As has been said above, to the Greeks, an *ὄρος* did not necessarily have to be very high (and therefore very close to the sky) to deserve this designation. Nonetheless, it has been claimed that although there may well have been differences in the perception of topographical elevations by Greeks from different regions, "the celestial aspect of Greek religion made mountains important to everyone"[135]. The name *Ἱερὸν ὄρος* was applied to several topographical features in the Greek world, for example a town on the Sea of Marmara, which according to Strabon (7, fr. 55) was the religious centre of the Thracians, and a city on the south coast of the Black Sea was also known by this name[136].

In the Iliad, mountains are once characterized as the *μήτηρ θηρῶν* (mother of the wild animals; Il. 8,47). Despite this personifying appellation and in contrast to other societies, the Greeks normally preferred to associate rather than to identify deities with mountains[137]. Neither this nor the sacredness of a mountain, if that is indeed what the term *Ἱερὸν ὄρος* implies, meant that ascent was forbidden (this is true for cult-related mountains in both the Greek and the Roman sphere), at least we do not have any indication that such rules existed[138]. In fact, Dio Chrysostom (D. Chr. 12,61; 1st century AD) even considered it 'Barbarian' to

[134] Gualtieri 1983, 165. Cf. Price 1981, 21–23. For a more extensive synthesis of mountain cults and their shared characteristics see Widmann 2011, although I would now take a more critical approach to some issues.

[135] Langdon 2000, 461. Cf. Sonnabend 1996, 155: "Wenn der antike Mensch mit Bergen in Berührung kam, dann war ihm das aus Furcht, Scheu und Respekt resultierende Empfinden des Göttlichen besonders präsent". See also Nicolson 1959, 38–39.

[136] von Bredow 1998; Olshausen 1998; Langdon 2000, 465.

[137] Buxton 1990, 165; Jost 2003, 998. Cf. Langdon 2000, 463: "Greek mountains were never inherently sacred but were regarded so only when there was felt to be a divine presence on them". Cf. however also A. I. Steinsapir's remarks about the cult of Zeus Tourbarachos (Zeus of the Blessed Mountain) in northern Syria (Steinsapir 2005, 59 endnote 40).

[138] According to M. K. Langdon, the term was used in public documents to denote "sanctuary-owned mountainous land that was susceptible to bounding and leasing as much as mountains on public or private land" (Langdon 2000, 465).

worship a mountain; arguably "Greek religion lacked the animism and mysticism needed for conferring this kind of independent divine status on heights"[139]. The one exception may have been Mount Helikon in Boeotia, although the only evidence is a votive relief showing a male figure with rough looks thought to represent the personification of the mountain itself. The Helikon, reaching 1749 m in height, was known as the home of the Muses, although the altar on its summit belonged to Zeus[140].

The main role of mountains in terms of cult seems to have been to act as a special location[141]. Evidence comes both from written sources and actual remains of cult places and ritual activities on mountains. What made mountains an apt location for rituals for the Greeks? The manifest suggestion that mountain shrines represented an attempt to come closer to the gods in the sky is somewhat contradicted by the fact that, just as in the case of Minoan Crete, the sanctuaries were only exceptionally situated veritably on the very top of a mountain. More frequent was a location on the slopes like for example the temple at Bassai (1150 m ASL)[142]. To reconcile the two factors, it has been argued that the highest peaks may have been perceived as too windy and inhospitable[143]. As in other societies, social and practical reasons were seemingly more decisive than pure topographical factors.

Although there was certainly a distinction between 'culture' and 'wilderness', the mountains as such were not seen as dangerous or attributed with negative notions[144]. This notwithstanding, they were, for several reasons, perceived as liminal areas. In a physical sense, they often constituted the political borders of the city-state, and these borders, whether they ran through plains or mountains, could

[139] Langdon 2000, 464.

[140] Langdon 2000, 464. For research about Mount Helikon see Hurst – Schachter 1996.

[141] This does not, I believe, contradict M. K. Langdon's opinion that "[t]he principal motivation for processions to mountain shrines [...] was no different from that which prompted organized groups of worshippers to take themselves to non-mountain sacred sites", namely to obtain a deity's blessing (Langdon 2000, 468).

[142] Jost 1992, 58; Jost 1996, 218. On the perception of such sites see Bek 2007, 208.

[143] Jost 1996, 218. Cf. Edlund 1987, 62 and Peatfield's argument for Minoan 'peak sanctuary' locations (see below, p. 400).

[144] Langdon 2000, 467. See also Meißner 1996, 351. 360. 369 ("Die Überzeugung der Griechen von der Rauhheit und Unzivilisiertheit der Berge macht aus dem Bergland eine weniger das Überleben als die Kultur bedrohende Umgebung.")

be marked by sanctuaries. Morphologically, there is no distinction between border sanctuaries and those located in the city. The character of these sacred places would then have been defined more by their function as a border shrine[145] than by their topographical setting. Interestingly however, mountain passes apparently were a favoured location for such sanctuaries, allowing easy access from both sides and highlighting their role as meeting places[146].

Not all elevated sanctuaries had such a distinct territorial and political significance. Another liminal aspect of mountains was their being perceived as notional boundaries—and hence locations of contact—between human and divinity: in ancient Greek stories and literature, deities are frequently encountered in lonely rugged upland terrain, reflecting (or inducing) the real presence of sanctuaries in the mountains[147]. Again, in terms of cult itself, there does not seem to have been a noticeable difference between the countryside and the mountains; the opposites were *asty* and *chora*, the latter simply included the mountains as one element[148]. It is interesting to note that there was no special protective deity for mountain life as for other natural spheres[149]: the deities worshipped on mountains all have sanctuaries in cities and plains, too; even their epithets are mostly toponyms or non-mountain-specific. Having said that, certain deities did have a closer connection to the mountains and seem to have been more frequently worshipped in these areas than others: Hermes and Apollon, whose spheres of activity included the

[145] "At a distance from the city, extraurban sanctuaries laid claim to the land between them and the urban nucleus, and they signaled the unity of town and country. Many served as markers of frontiers between adjacent poleis or between a Greek polis and a barbarian neighbor" (Pedley 2005, 47. 53). Pedley contrasts this type of sanctuary with nature sanctuaries, which could mark the location of some outstanding natural feature such as mountain tops (Pedley 2005, 39). See also Chaniotis 1999c, 426–427; Langdon 2000, 462. 469; Sjögren 2008, 214. At least in Crete, Hermes seems to have been associated with borders and elevated places more frequently than other gods; sanctuary locations include Lato, Myrtos Pyrgos, Kato Symi and Hermaia Akra (Sporn 2002, 332).

[146] Jost 1992, 59; Chaniotis 2006, 200. Cf. Prent 2005, 566–567.

[147] As R. Buxton has put it: "Any hunter or herdsman on an imaginary Greek mountain will probably meet a god" (Buxton 1994, 91); examples are Teiresias and Athena on Mount Helikon (Call. *Lav. Pall.* 70–130), Aktaion and Artemis on Mount Kithairon (Ov. *Met.* 3, 138–252) and Anchises' fling with Aphrodite on Mount Ida in the Troad (*h. Ven.* 74–167). See also Audring 1989, 72; Larson 2001, 9; Quantin 2005, 33.

[148] Cf. Guettel Cole 1996, 199. See also Audring 1989, 71.

[149] A phrasing like "die Götter des Gebirges" as used by A. Chaniotis (Chaniotis 1991, 94) should therefore be avoided.

protection of transhumance and pastoralism, Artemis with her responsibility for the hunt (cf. Od. 6,102–104), Dionysos, Demeter, Pan (the god of herding and hunting who is "perpetually in search of a nymph"[150]), the nymphs and the ominous 'Mother' goddess (Kybele)[151]. The appellation *'Oreioi Theoi'* was used by Arrian (*Cyn.* 35,3) for Artemis, Apollon, Pan, the nymphs and Hermes. The epithet *"oreios"* is further attested for Dionysos, Zeus, Demeter, Kybele and Maia[152]. Pan and Kybele were sometimes associated in cult, since both were deities of the countryside and of wild, uncontrollable nature. The cult of Kybele was thought by the Greeks to originate in Phrygia. There, 'Kybele' originally was just one of several epithets of the Mother Goddess, derived from the name of a mountain full of springs and water with which she was identified. For some reason or other, it became the main name of the deity in Greece (the first known use is in Pindar (Pi. *Fr.* 80 (*non vidi*)). The extent of her association with mountains in Greek belief and customs is somewhat unclear, however: although she was hardly if ever connected to any sacred mountains in Greece, she was also known as *μήτηρ ὀρεία, 'mother of the mountain'* (*e. g.* E. *Hipp.* 144; Ar. *Av.* 746). It seems that "[t]he association with mountains and wild spaces is more theoretical than actual in the fifth and fourth centuries, for no rural shrines to Meter on the Greek mainland during this period are known; Meter's identification with mountains was not a reference to one sacred place, but a general description of a deity of wild and unknown country. [. . . ] And she was the Mother of the mountains, although in the rather vague sense of a divinity outside the settled landscape, not the guardian

[150] Buxton 2004, 181. Mount Maenalus may have been considered sacred to Pan in its entirety, see Paus. 8,36,8.

[151] Jost 1992, 59–61; Buxton 1994, 86; Jost 1996, 219; Larson 2001, 8–9. 36 and *passim*; Sporn 2002, 321. 332. In the case of Hermes, the connection may also be boundaries and initiation (see Marinatos 2003). As for Demeter, the first of the three days of the annual festival of the Thesmophoria was (in Athens) called *ἄνοδος*, 'ascent', maybe because the sanctuaries of the goddess were often (but not always) located in elevated places (Parker 2002, 440; cf. Guettel Cole 1996, 205 with footnote 26, but also Larson 2007, 71). On Pan see Borgeaud 1988. For elevated sanctuaries in Late Archaic to Hellenistic Greece see Baumer 2004, 13–17. 71–72. See also Osborne 1987, 166–171. 190–192, although he refers to the countryside in general, not exclusively to mountainous areas.

[152] Frank 1939, 941. See also Langdon 2000, 466 with footnote 27.

of a specific place"[153]. The Mountain Mother was also sometimes identified with Demeter[154].

The most prominent deity in mountain shrines however was Zeus. The association was partly based on the god's function as controller and producer of the weather and its phenomena such as clouds (in Homer, Zeus is often characterized as *νεφεληγερέτα*, cloud-gatherer (Il. 1,510), which is allegedly an even older epitheton or role[155]), in which the numerous mountain tops of Greece would often be hidden. A connection of mountains and freshwater sources (*πολυπῖδαξ*) is also expressed already in the Iliad (8,47). It includes springs, rivers and rain and is not unique to Greece[156]. Only very rarely though was a mountain shrine dedicated to this aspect of the god exclusively, nor was the rain god worshipped only on peaks[157]. But the connection was so strong that people ascended the mountain to pray for precipitation[158]. With special regard to the sanctuary of Zeus *ὄμβριος* (Rainy Zeus) on Mount Hymettos, J. Pedley has suggested that the majority of worshippers in these elevated locations "were evidently folks who had a paramount interest in rain, that is, farmers and their families". Besides the religious (and existential) aspect of prayer, he stresses the social function of these shrines, particularly as a place where the rural population would meet, chat and

[153] Roller 1999, 144–145. All other information in this passage from Roller 1999, 68–69. 125 with footnote 23. 177; Munn 2006, 73–79. See also Roller 2009.

[154] For example by Euripides (E. *Hel.* 1301–1307).

[155] Cook 1940, 30–31. It stuck around though—Marcus Aurelius narrates how the Athenians prayed: "Rain, rain, dear Zeus, on the fields of the Athenians" (M. *Ant.* 5,7). See Burkert 2011, 199.

[156] Desideri 2001, 22.

[157] Langdon 1976, 81–86. R. Buxton nonetheless suggests some sort of differentiation in religious topography, namely a (loose) association of Zeus with *ὄρη* and of Athena with acropoleis (Buxton 1994, 85). On Zeus as rain-maker see Cook 1940, 30–43. 284–338; Nilsson 1967, 117. 391–401; Larson 2007, 15–17. The exact relation of the deity to rain was seen as not unambiguous by Cook 1940, 321. 333. 451–452, whereas Nilsson argued that sky and mountain are really the same in respect to weather (Nilsson 1967, 393). On the cult of Zeus Lykaios on one of the summits (1334 m) of Mount Lykaion in Arkadia see Cook 1914, 63–88; Kreutz 2007, 123–130 (stressing the weather connection); Larson 2007, 17–18; cf. Paus. 8,38,7. On the cult of Zeus on Mount Olympos (2917 m) see Cook 1914, 100–117. On the mountain cults of Zeus in general see Cook 1914, 117–186, including an account of the notion of the mountain as the Throne of Zeus (124–148), and Cook 1925 App. B (mountain cults of Zeus in Crete: p. 925–947). Cook should always be read with caution though, see Larson 2007, 28. See also Teixidor 1977, 33; Kritsas 2006, 192–195.

[158] Cook 1940, 31–32.

make arrangements[159]. Nonetheless, city dwellers would visit, too, although perhaps mostly on a less 'individual' basis in the context of organized processions from the city, as described by Pausanias (8,38,8; 8,39,5). A curious parade took place once a year at Mount Pelion in Thessaly: the elite citizens sacrificed sheep and walked up to the sanctuary clad in the animals' fleeces[160]. The festival of the Daidala in Plataiai (Boeotia) as described by Pausanias (9,3,7) culminated in a procession unto Mount Kithairon and a *hieros gamos* of Zeus and Hera on its summit. The mountainous setting has rarely been the focus of studies of this event, but W. Burkert has connected the Daidala more or less directly to Minoan peak sanctuary cult[161]. These occasions were no real attempts to mingle with, let alone emulate, mountain people though: "On est loin dans ce cas du farouche isolement des montagnards"[162]. It should also be noted that the popularity of such mountain cults varied over time, at least in some regions of Greece, and that the connection of these variations to climatic change or phenomena has been viewed with caution[163].

The gods' mountain *per se* of course was the mighty Olympos (which may be pre-Greek for 'mountain'[164]), rising to 2917 m height, in Thessaly. Already Homer described the Olympos as the abode of the gods (Il. 1,221) that no mortal could enter—even today access is difficult and often impossible—and used its name synonymously with 'sky'[165]. Interestingly, the abode of the gods, above the clouds, was pictured as especially pleasant since there would be no rain or snow (Od. 6,42–44)—Zeus did not pursue his weather-making activities at home. This goes well

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159 J. G. Pedley contrasts this with the ostentatious display characteristic of urban sanctuaries (Pedley 2005, 51–52). Cf. Jost 1992, 59; Baumer 2004, 17.

160 Beer 1891, 19–20; Nilsson 1967, 396; Bradley 2000, 27; Larson 2007, 16 (with references to ancient sources).

161 Burkert 2011, 51. 211 with footnote 109. See also Kirsten 1950, 2322. D. S. 5,72,4 mentions a festival of the *hieros gamos* of Zeus and Hera in the territory of Knossos but does not describe its topographical setting; see also Burkert 2011, 170. Cf. Hes. *Th.* 1008–1010.

162 Jost 1992, 67.

163 See de Polignac 2002. For a list and discussion of processions to mountain sanctuaries in ancient Greece see Langdon 2000, 469 (with references).

164 Langdon 2000, 466 (with references).

165 See also Burkert 2011, 199. For a contrasting opinion see Beer 1891, 4–9. I am not at all convinced by W. B. Kristensen's idea that the belief of the Olympos being the home of the gods was not brought about by its height and its top sticking through the clouds, but rather by its representing an omphalos, a place where cosmos and earth live, a world in miniature (Kristensen 1968, 108).

with a statement in an ancient source (Solin. 8,6) mentioning an altar on the summit of the mountain: inscriptions in the ashes are reported to remain legible for a long time, thereby illustrating the lack of wind at this height[166]. Archaeological exploration so far has hardly been exhaustive, but the only altar found as yet is not located on the very top, but on a slightly lower peak[167], which has led to the suggestion that in antiquity this was thought to be the highest summit[168].

### Forbidden access

In contrast to all cult activities carried out *on* hills and summits stands the other form of mountain worship: a mountain regarded as holy in itself and thereby making it a sin to ascend it. Although hard to detect archaeologically, it cannot be ruled out that this form of cult existed in ancient Crete. A negative proof is possible of course: artefacts or architecture on a peak indicate clearly that people frequently ascended the spot. A ring of cult places around a mountain and no remains on top on the other hand would strongly suggest a climbing taboo. No such tradition is known from historical times in the Mediterranean—it is most frequently encountered in the religious traditions of the Far East, but examples from elsewhere also exist. Interestingly, in the Himalayas, where the concept is particularly omnipresent, the mountains most sacred to the locals are not the ones with the greatest absolute height, but those that have gained a special meaning because they are central to the settlement area or because of other factors such as their special shape[169].

[166] Scherf 2000, 1192.

[167] The only source cited for this assertion is a 1922 report by an amateur who collected some sherds which originate, "wie uns archäologischerseits mitgeteilt wird, [...] meist [...] aus den späteren Jahrhunderten des klassischen Altertums". His conclusion "Damit ist ein starker Opferdienst in antiker Zeit für diesen Nebengipfel erwiesen" (Scheffel 1922, 129) follows promptly but hardly rests on a solid basis.

[168] Kramolisch – Meyer 2000. See also Höper 1992, 214 footnote 9.

[169] See Bernbaum 1997, 8; Gratzl 2000, 178–182. For a more detailed account of the topic see Widmann 2011, 166–168. For mountain cults in the Himalayas see Michaels 2003; Norbu Sherpa 2008, 161.

## 4.5 Mountains: conclusions

Despite their often being neglected and scientifically marginalized in archaeology, mountains were and are meaningful to past (and recent) societies in many ways. Although most Greek poleis had a territory that incorporated mountainous areas and in Crete, many cities were situated in the uplands, written sources from both ancient Greece and Roman times state that the mountains were not viewed fit for human habitation; they were the home of the wild, the barbarians—and the gods. Especially Zeus as the lord of rain and weather was often worshipped on mountain tops, but mountains in general were often described as the setting of human encounters with deities. In this sense they were seen as liminal zones. For assessing the cult places that crop up in the case studies, this is a useful background. Sanctuaries in such areas often also marked the boundary between two city states and probably served as important meeting points for people from either side of the divide. This social aspect should be kept in mind in the following chapters. The role of ridges as natural boundaries, if such a thing can exist, may well have been more psychological than real: they would have delimited sight and thereby may have created a feeling of unity, but they were not unsurpassable when it came to the movement of goods or ideas. Despite the skeptical view emerging from the sources, it is also clear that mountainous areas played an important economical role: as pasture, for which the plain was too precious, but also for special produce such as herbs and honey. All these ideas, largely derived from non-Cretan sources, will be tested against the archaeological evidence from the island in the following chapters.

# Part II

# Geographical case studies

# Chapter 5

# Sphakia and western Crete

Western Crete is graced with a long-standing notion of having been less populated in antiquity than the central and eastern part of the island and as having always been remote, underdeveloped and socially marginal[1]. Although this idea has often been refuted in more recent times, a look at the available maps does not offer much support for a more balanced picture: the number of mappable settlements is still not large. Because of the relative scarceness of material, the lion's share of archaeological studies in Crete is concerned with the better-explored east, thereby forwarding further the impression that there isn't much to be got west of Psiloritis—a vicious circle. Despite some recent efforts, it is still not clear how much of the western half of Crete really *was* settled or exploited in the past. Survey has shown that human activity did extend to the west coast in early times[2], but few sites have been excavated, and (with two exceptions[3]) none of them are situated in the Lefka Ori which dominate this part of Crete. Chania, on the north coast, was a Minoan town with, probably, a palace. On the adjacent Akrotiri peninsula, all environmental zones show signs of human activity from the Final

[1] See for example the maps in Pendlebury 1939, 36. 46. 79 *et cetera*. Cf. Hood 1965, 100: "It would seem that the west of Crete was quite extensively populated during the Neolithic period, and throughout Early, Middle, and Late Minoan times; but that this region, mountainous, and in those days no doubt heavily forested, was economically poor and perhaps somewhat backward compared with the centre and east."

[2] Nowicki 2002, 9 Fig. 1. 47–51; Hood 1965, 103 Fig. 2: Minoan settlement near Elafonisi.

[3] These are two cave sites: Prases Ellinotrypa (Faure 1964, 30 no. 9. 62 reported 'Subneolithic or EM' sherds) and Topolia Agia Sophia (see Warren – Tzedhakis 1974, 300 Fig. 1 no. 17 and no. 20).

Neolithic onwards[4]. The focus here, however, is on the Lefka Ori and the area above 400 m.


**Figure 5.1:** Sphakia survey: regions (merged from two figures in Nixon *et al.* 2000. Reproduced by permission). 1: Trypiti Gorge – Samaria. 2: Madares. 3: Agios Ioannis – Papadiana – Aradena. 4: Anopoli. 5: Ilingas – Loutro – Livaniana 6: Chora Sphakion – Sphakiano Gorge – Mouri. 7: Askyphou – Niato. 8: Frangokastello

Doubtlessly the best-researched area in western Crete is Sphakia, on the south coast and its hinterland, to the east of the Samaria gorge. Most of what is known about the archaeology (and environment) of this area is the achievement of a survey project (see Fig. 5.1) conducted in the 1980s and 1990s under the direction of Lucia Nixon, Simon Price, Oliver Rackham and Jennifer Moody, whose findings have so far been made available to the public in a number of articles and on the internet in the form of a database and environmental information[5].

Half of the deme's terrain lies above 1200 m ASL, and like most of the south coast, the land rises rapidly from sea level to these heights: it is only 8km from the south coast to the summit of Pachnes, at 2452 m the second highest peak in

[4]See Moody 1987, 294; Raab 2001, 86–149.
[5]Nixon *et al.* 2000. Site numbers given in this chapter refer to the ones in the database. For the origin of the name 'Sphakia' see Sekunda 2000, 340.

Crete. Some of these mountains retain their snow-cap long into summer[6]. Because of the nature of the terrain, the only transregional road, from Chora Sphakion to Chania, leads through the gorge of Imbros, the natural corridor connecting the north and south coasts (see Fig. 5.2).

**Figure 5.2:** Imbros Gorge (April 2011)

The only other route from Sphakia to the outside world runs along the coast, east to Sellia. Sphakia therefore *is* a remote area even today, and it is not surprising that its inhabitants have a reputation for being particularly wild and untameable[7].

[6]Nixon *et al.* 1988, 159; Moody *et al.* 2003, 44.
[7]T. A. B. Spratt was told that "a Sfakian will rob his own father" (Spratt 1865b, 157).

Like certain parts of the Psiloritis or even more so, the area has often become a refuge for those who did not agree with the respective governing force, and one of Crete's greatest heroes, Daskalogiannis, who led the revolt against the Turks in 1770, famously was a Sphakiote from Anopoli[8].

Although permanent settlement is not to be found above 800 m, land use ranges far beyond this boundary. Farmable land is far from abundant, making the flat areas of the mountain plains of Anopolis, Asphendou, Askyphou and Omalos all the more valuable (there are four more plains at higher altitudes which are not farmed)[9]. Springs are less numerous in this part of Crete than elsewhere, and cisterns have been constructed to make up for it[10]. The Madares, at 1700–2000 m in the northern half of the Lefka Ori, are too high to have forests or be suitable for agriculture—they consist of Plattenkalk and are full of sinkholes—and are therefore used as pastureland for sheep and goats in the summer. Traditionally, the flocks are led up here by the men of the villages—the 'up' is not for women, for practical as well as social reasons (the latter may have evolved from the former). While the women and children stay in the villages and look after the grain or other crops, the men of a kin take it in turns to stay with the animals (400 sheep on average, plus a few goats to guide them) from May or June, when the snow melts, to October at the latest[11]. The Madares are dotted with *mitata* in which the shepherds sleep and make the milk into cheese. It has been estimated that the fuel needed to boil the milk is 6 kg per *mitato* every day, brought up to the Madares on muleback and adding up to a total of 10 tons of cypress wood needed in Sphakia every year just for cheesemaking—an amount that is "not negligible considering the slow growth"[12]; whether this is enough to postulate the decimation of a former denser tree cover must nonetheless as yet remain an open question. At least in the last couple of hundred years, the Madares definitely served the purposes of

[8] See also Damer 1988, 295–296.

[9] Nixon *et al.* 1988, 159. 163–164. See also Rackham *et al.* 2010, 279–280. The coastal Frangokastello plain, despite its stony and marginal character, was planted with cereals until the 1970s (Nixon *et al.* 1994, 259; Rackham *et al.* 2010, 280).

[10] Rackham – Moody 1996, 41. Cf. Grove – Rackham 2001, 359: "Domestic water has seldom been a difficulty, except in the district of Sphakiá which lives out of cisterns, and in the city of Herákleion where there is only wine and *rakí* to drink". Cf. Damer 1988, 297.

[11] Rackham – Moody 1996, 160 (see 24 Fig. 3.9 for the sinkholes); Nixon 2006, 89.

[12] Rackham – Moody 1996, 160.

stockbreeding, and with great effect: in the late 17th century, a fastidious northern traveller praised the product from this milk as the "best cheese made in any of the Southern parts", and he seems to have shared this preference with other people, since the dairy product was exported to France, Italy and elsewhere[13]. This could have happened directly from the Madares *mitata* to the north coast, across the mountain range: at least in the summer, when there is (and was) no snow on the mountains, the Lefka Ori were crossed to reach the north coast—a steeper but much shorter route than through the Imbros gorge. This is reflected in a (Turkish?) *kalderimi* leading from Anopolis through the High Desert[14] at a height of 2150 m; a second mule track starts from Agios Ioannis and crosses the Lefka Ori at Mount Zaranokephala[15]. This is the area from which the highest evidence of cultivation and the highest summer habitation in Crete comes: in the Katsiveli basin at 1930–1960 m there is a *mitato* (site 2.19), and around it enclosures, consisting of walls and Berberis hedges, which "are the remains of fields from which a potato crop used to be snatched in the brief growing season. They, as well as the surrounding mountain, are the private property of the family operating the mitáto"[16]. This is not a particularly favourable place in other respects either: "It is a puzzle that sheep and goats flourish as they do on this vegetation. Plant cover is sparse, growth slow, and much of the vegetation is poisonous [...], unpalatable (like *malótyra*), or spiny to a degree which deters even flock-goats"[17]. The Madares are also used for beekeeping as well as for the collection of fuel and timber[18].

It was at one point thought that the higher parts of the Lefka Ori may have been glaciated during the last Ice Age and that they would have lost their soil cover as a consequence[19]. Although further investigations ruled out the possibility of glaciation, it might still be feasible that the periglacial conditions with great

[13]Nixon *et al.* 1989, 212–213; Nixon *et al.* 1994, 258. Cf. Spratt 1865b, 153. 157. The quality of Sphakiote cheese, one hears, has not deteriorated over the centuries.

[14]For a description of this part of the Lefka Ori see Rackham – Moody 1996, 192–193. One of the *mitata* belonging to a family from Anopolis is Kolokythas, requiring a nine-hour march across the High Desert (Rackham – Moody 1996, 160), which makes me wonder how shepherds manage to make their flocks go there.

[15]Rackham – Moody 1996, 156.

[16]Nixon *et al.* 2000, site 2.19 (photo description).

[17]Rackham – Moody 1996, 191. See also Vogiatzakis – Griffiths 2006

[18]Nixon *et al.* 1988, 163–164; Rackham – Moody 1996, 190.

[19]Nixon *et al.* 1988, 167.

amounts of snow effected massive soil erosion[20]. However, it has also been noted that the soils that are left today are more vulnerable than elsewhere in Crete because the erosion-preventing crust of mosses and lichen does not develop well and what is there falls victim to agriculture and goats' hooves. *Terra rossa* is then washed down the slopes by rain; the lighter yellowish sediment, which arrived airborne from the Sahara or elsewhere, is blown away by the wind. Wind erosion has also affected some abandoned agricultural plots, many of which exist nowadays, since in Sphakia too, cereal cultivation has almost vanished altogether in the last century, after a climax in the 18th century. As elsewhere, this development is attributed mainly to changes in the social and economic structures in Crete—"there are now easier ways of making a living"—, although climate is said to may have played a role as well[21]. The fact that some grain still *is* grown in the area suggests that the former was more decisive however[22]. Having said that, even at the times of greatest effort, the yields may not have been sufficient, as for at least 600 years, there existed a trade network with the Mesara, in which grain from the plain was bartered for Sphakiote timber. This establishment of old was given up only after the Second World War, together with cereal cultivation in Crete[23]. Yellow asphodel, which prefers abandoned farmland, abounds in Sphakia but was not mentioned by early botanists[24], again demonstrating the transformation that the Cretan landscape has gone through in the last decades. Today, people may still produce their own wine and *rakí*, but they buy their flour in a shop and make a living from two kinds of sheep, both of great importance: those with bells, which graze the mountain pastures, and those without[25], who come from Germany, Britain and elsewhere to look at the Sphakiotes and hike the Samaria gorge.

One problem with the data recorded by the Sphakia Survey Project is that a great number of sites could not, in the field, be dated more precisely than to

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[20] Nixon *et al.* 1990, 216. Cf. Hempel's findings about the significance of snow and thawing on slopes (Hempel 1984a, 27; Hempel 1992, 6).

[21] Nixon *et al.* 1988, 168.

[22] According to the old landlord in one of the *kafenia* in the village of Ammoudari in the Askyphou plain, wheat is grown as fodder for animals, not for human consumption (April 2011).

[23] Tumasonis 1983, 303–304.

[24] Rackham – Moody 1996, 136.

[25] Nixon 2001, 89. According to Damer 1988, 297, "[p]ractically every family in Sfakiá has vineyards, and makes its own wine".

the broad categories ‘Prehistoric’, ‘Graeco-Roman’ and ‘Venetian-modern’, and it is in these broad categories that they are registered in the database. This is due to the nature of the evidence, which consists largely of chronologically unspecific coarse ware sherds. The site description often does give more concrete dates, but they have to be taken as tentative. Finds processing will eventually ease this problem, since there have recently been significant advances in dating these fabrics relatively precisely[26], but unfortunately the complete survey has not received its final publication at the time of writing[27]. Because of these circumstances and because many of the more precise dates are based on the presence of only one or two sherds[28], all patterns suggested here must be regarded as preliminary and subject to change. The analysis of the fabrics has already revealed a close correlation of clays with the geology of the region, such as the rarity of phyllite components (cf. p. 58 Fig. 3.1). A great proportion of the vessels seems to have been locally made[29].

A pollen core from Asi Gonia, on the eastern edge of the Lefka Ori, has shown that in the 5$^{th}$ century AD, the area had a fairly dense tree cover, mostly oak. In the Venetian period on the other hand, demand for timber seems to have led to a reduction in woodland[30].

## 5.1 Neolithic

Before the Sphakia survey, Palaeolithic artefacts had been reported from the Samaria gorge[31]. The survey team duly went to check and found that the alleged tools were in reality geofacts and that moreover, geomorphological activity in southern Crete is so intense that it would have destroyed all evidence in the meantime. They concluded that “[a]ny evidence for the late Pleistocene occupation of Crete is more likely to be found on the more placid north coast”[32]. It seems like

[26] See Moody *et al.* 2003. See Erickson 2010, 24–25 for why coarse ware chronology is so difficult.
[27] Publication was planned for 2012 (Jennifer Moody *pers. comm.* 2011).
[28] Moody *et al.* 2003.
[29] Robinson 2006, 49–50; Moody *et al.* 2003, 58.
[30] Atherden – Hall 1999, 190. On the vegetation of Lefka Ori see also Vogiatzakis *et al.* 2003.
[31] Nixon *et al.* 1988, 162. 171.
[32] Nixon *et al.* 1990, 214–215. Cf. Nixon *et al.* 1994, 256. A Palaeolithic date suggested for the rock shelter at Skordoulaki in the Asphendou plain (720 m ASL) was not based on tools, but on

a slight irony of fate that the first definite and indubitable traces of Palaeolithic human presence in Crete come not only from the south coast, but from Plakias, only about 30 km to the east of Chora Sphakion, and from the island of Gavdos just off the coast[33]. Indeed, pre-Neolithic stone tools have been found by specialist Peder Mortensen near Loutro, but their Lower to Middle Palaeolithic date has been doubted by the Plakias team[34].

Neolithic presence is defined by pottery and stone tools; in most cases such sites have been assigned an FNL/EM date. The majority of chipped tools found is made from local material, namely black chert. In addition, a smaller number consists of obsidian, perhaps from Melos, which is noteworthy since it indicates trade links with the outside world[35]. Sites with definite FNL/EM presence are conspicuously clustered in regions 4 and 8 (see Fig. 5.1). Those in the Frangokastello plain (region 4) are mostly situated below 400 m, though in many cases it is not clear whether the sherds represent actual habitation sites or just remains of other activities. Site 8.41 (Frangokastello Olive Grove), just 18 m above sea level[36], has been identified as evidence of prehistoric houses, and at least some of the pottery has been dated to FNL-EM I, so apparently coastal settlement did occur in this period. However, the uplands played an at least equally important role: In the very east of the survey area, both the Asphendou and the Askyphou mountain plain have evidence for FNL-EM I presence; in the case of Asphendou (8.14, 8.15), these sites were at first not even registered as prehistoric[37]. In Askyphou, site 7.23 sits on a rather tall knoll (later crowned with a Turkish fort) above the plain, perhaps avoiding building on the precious flat arable land (see Fig. 5.3).

rock engravings, for which, however, a much later date seems more likely (Nixon *et al.* 1989, 205 with references; Nixon *et al.* 2000, site 8.12). Paul Faure reported an EM-LM I cave sanctuary to Diktynna from this location (Faure 1972, 406–413).

[33] Kopaka – Matzanas 2009; Strasser *et al.* 2010; Strasser *et al.* 2011. The tools from Plakias are dated to the Lower Palaeolithic (ca. 130,000 BP) and the Mesolithic (ca. 11,000-9,000 BP).

[34] Mortensen 2008; Jennifer Moody *pers. comm.* 2011. Jennifer Moody also explained that the reason these tools were not spotted during the Sphakia survey is that they are very hard to recognize without trained eyes and that moreover, stone tools found with potsherds may have been assumed to belong to the same, later period.

[35] Although "their presence at an early date [...] in a supposedly remote area is of great interest" (Nixon *et al.* 1988, 170), it should be clear that there is no need to infer *direct* trade links with the Cyclades.

[36] See Price – Nixon 2005, 684 Fig. 12 for the location.

[37] See above, footnote no. 32, for the Asphendou Skordoulaki rock overhang.

**Figure 5.3:** The Askyphou plain (looking north-east). The ruins of the Turkish fort are on the hill to the right (April 2011)

Further west, many sites have been recorded in the uplands of Anopolis, an area that seems to have been a favoured settlement location through all times. The craggy Agia Aikaterini ridge (the location of the later city of Anopolis) at circa 660 m commands a view over the sea and coast, access to which would have been possible (if tiresome), but it was elevated enough to provide protection against attacks from the sea. The fertile mountain plain (240 hectares, see Fig. 5.4) behind the ridge is perfectly hidden from view; behind it rise the steep slopes of the higher mountains towards the Madares. The Anopolis area has yielded traces of Final Neolithic occupation in a number of spots (Kambia (at the eastern end of the ridge): 4.45, 4.47, 4.51; Riza (on the northern slope of the ridge))[38]. Remains of two prehistoric houses, where some of the associated ceramic material belongs

[38] These are mentioned in Nixon *et al.* 1988, 171 but, in the case of Riza, do not crop up in the site database, where Riza (4.10) only has Turkish-modern evidence. Paul Faure mentions

**Figure 5.4:** The upland plain of Anopolis as seen from the Agia Aikaterini ridge to its south (April 2011)

to this early period, are located on the Agia Aikaterini Ridge (4.22). The same date has been assigned to an unspecified number of houses at Troulos, on a steep cliff above a narrow strip of beach. The outlook qualities of this spot (524 m ASL) are illustrated by the suggestion that the 19$^{th}$ century Turkish remains belong to a watchtower. Artefacts were scattered over an area of 13,500 m$^2$. The fragments of open vessels are FNL-EM I, as are the abundant chipped chert and obsidian tools, while the "bone, characteristic of food remains" is undated but most likely belongs to the later phase[39].

The mountainous hinterland was exploited too: Aradena terraces (3.17, 610 m) to the west of the Anopolis plain has pottery and stone tools, some of which are

'Subneolithic' sherds in a cave called Korakoskydaki (Faure 1964, 61); the survey crew found only Turkish sherds (site 4.23).

[39] The Turkish pottery includes lots of table and cooking wares.

made from obsidian. Further east, the 'Cistern Site' (4.34) at 704 m, on the slopes in front of the Vigla (1415 m) and Kerdokefala (1720 m) summits, was found to have a FNL/EM phase. Only one Neolithic sherd scatter has been found in the Madares, so that it seems unlikely that they were used as pasture on a regular basis. Pirou Kontradi (2.04) at 1778 m may hence have been a "resting spot?" on the way across the mountains to the north coast rather than a seasonal habitation.

As tempting as it is to speak of settlement patterns, one must not forget that the period labelled 'Final Neolithic' alone constitutes more than 1000 years; combining it with 'EM (I)' adds another 350 years, so not all sites found necessarily existed at the same time[40].

## 5.2 Early Minoan

As mentioned above, Early Minoan sherds are in most cases lumped together with Final Neolithic activity[41]. There are very few sites which are distinctly EM; two of them are near later Anopolis, in the aforementioned locations Kambia and Riza, where some wall remains have been associated with the sherds[42].

The area of modern Aradena (site 3.20; 580 m ASL) in region 3 has a site with Early Minoan pottery. Another one, Diakymi (site 3.09) is situated on a coastal slope, 45 m above the sea; the function of neither site is clear. Early Minoan sherds have also been seen in the Frangokastello plain (site 8.47). Krzysztof Nowicki reported EM sherds at Kolokasia Kastro[43] but this has not been confirmed by the survey.

Pottery attributed to EM II-MM has, with one exception, only been found in regions 7 and 8, *i. e.*, in the east of the survey area. There is a crazy outlier in the very west of Sphakia, at the mouth of the Tripiti gorge at ancient Poikilasion, today completely void of settlement save for a remote church and the odd icon stand (the village at Peradoro (site 1.06; 404 m) was deserted already in the early 19$^{th}$ century; Thomas A. B. Spratt described how a "wild fig, of good quality, grows

[40] Haggis *et al.* 2007b, 692; Momigliano 2007, 7: FNL: 4500–3000 BC, EM I: 3000–2650BC.
[41] For example sites 4.22, 4.51, 4.44 and 4.48 (Moody *et al.* 2003, 61).
[42] Nixon *et al.* 1988, 171.
[43] Nowicki 2000, 213.

abundantly upon the hills above; and fir timber is also sometimes exported from here by the Sfakians, this being the only spot in Crete that produces it"[44]).

A type of pottery dated to EM II-MM was found on a hill near the mouth of the Asphendou Farangi (Patsianos Kephala, site 8.30[45]) and on the coast, especially at Agios Astratigos (site 8.38)[46], but also in a possible Minoan village at Thermokipi (site 8.53) and, in the same area, on a hilltop site near Skaloti (site 8.72; 133 m).

### 5.2.1 Debla

Two or three houses with EM I/II pottery and potentially a second Hellenistic-Roman phase have been excavated at Debla, at 540 m on a northern foothill of the Lefka Ori[47]. The terrain is unfavourably rocky and windy, and there is no freshwater source in the vicinity, so that—unless a spring has dried up—water for humans and animals must have been brought up from a well head, cistern or reservoir at a lower elevation. This may be reflected in the ceramic assemblage, which consists mainly of jugs. A number of coarse-ware, chaff-tempered tubs may have been used for temporary storage of water or grain.

The walls of the buildings were constructed from local limestone boulders joined with earth; the roof is conjectured to have been made from plant material and a clay cover. The floors consisted of compacted earth "put in to level the uneven bedrock"[48]—an interesting detail in view of findings from other Cretan sites, where the size and sharpness of irremovable obstacles in rooms and pathways is often astonishing[49].

Grain impressions have been identified as emmer (*Triticum dicoccum*), barley (*Hordeum* sp.), oat (*Avena* sp.) and brome grass (*Bromus* sp.). The latter is a 'weed' that may have been harvested and consumed as an additional crop[50]. Grain was grown in this part of the mountains at least until the end of the 19$^{\text{th}}$ century;

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[44] Spratt 1865b, 245. Cf. Pashley 1837, 263.)
[45] The wrong number is given in Moody *et al.* 2003, 65.
[46] See Price – Nixon 2005, 684 Fig. 12 for the location.
[47] It was briefly mentioned in Faure 1969, 189–190 with Fig. 8–10. Unless stated otherwise, all information on Debla is taken from Warren – Tzedhakis 1974.
[48] Warren – Tzedhakis 1974, 335.
[49] Cf. below, p. 320 footnote 253. See also Hayden 1995, 127.
[50] On 'weeds' and other wild plants and their uses in ancient Crete see Moody 2012, 252.

disused *alonia* and terrace walls are the remaining testimonials. The presence of oats is particularly noteworthy, since they are rarely found in archaeobotanical assemblages from the Aegean at such an early date. It is not clear though whether they were planted on purpose or "grew casually in cornfields"[51]. However, the obsidian tools found do not include sickle blades which would have been needed for cereal harvesting. Two quern-stones were found and may, with a number of abraded river pebbles, have served for grinding grain. It should be noted that neither of these two pieces of evidence proves cereal cultivation in this place beyond doubt: people would always have needed grain to live, and could have carried small quantities up to the huts. What soils were available at the time of settlement is not clear because *terra rossa* covered the Early Bronze Age remains and must therefore have formed after they had been abandoned; but the stamped earth-floor inside the building was not dissimilar to modern conditions. The argument brought forward for denser tree cover is rather weak.

Most if not all animal bones found associated with EM pottery are from ovi-caprids, some of them definitely goat. The age profile has been reconstructed from the teeth, all of which are deciduous and the animals would hence have been between two and five years old at the age of slaughter, indicating an interest in wool, meat and fat[52]. I fail to understand why this should indicate a summer herd though, as the analyst announces[53]. As for the lack of cattle bones, the terrain may have been unfavourable (though see p. 380); but one might have expected bones of wild animals, the absence of which has been noted. Two clay spindle whorls are seen as evidence "that spinning and thus weaving also were practised at the time of the settlement". I do not have the slightest doubt that this statement is true and that people did weave in the Early Bronze Age—but certainly not at Debla, since not a single loom weight has been found there, and this activity cannot simply be conjectured out of the blue, no matter how much yarn was produced with the help of a grand total of two spindle whorls.

The site commands a wide view above the plain of Chania and the Akrotiri peninsula. Only the uplands can have been an option for economic exploitation:

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[51] Greig – Warren 1974, 130–131.

[52] Moody 2012, 239. The milk teeth of sheep are replaced in pairs between the age of two and five years (Hillson 1986, 202–204).

[53] Cf. Klippel – Snyder 1999, 53.

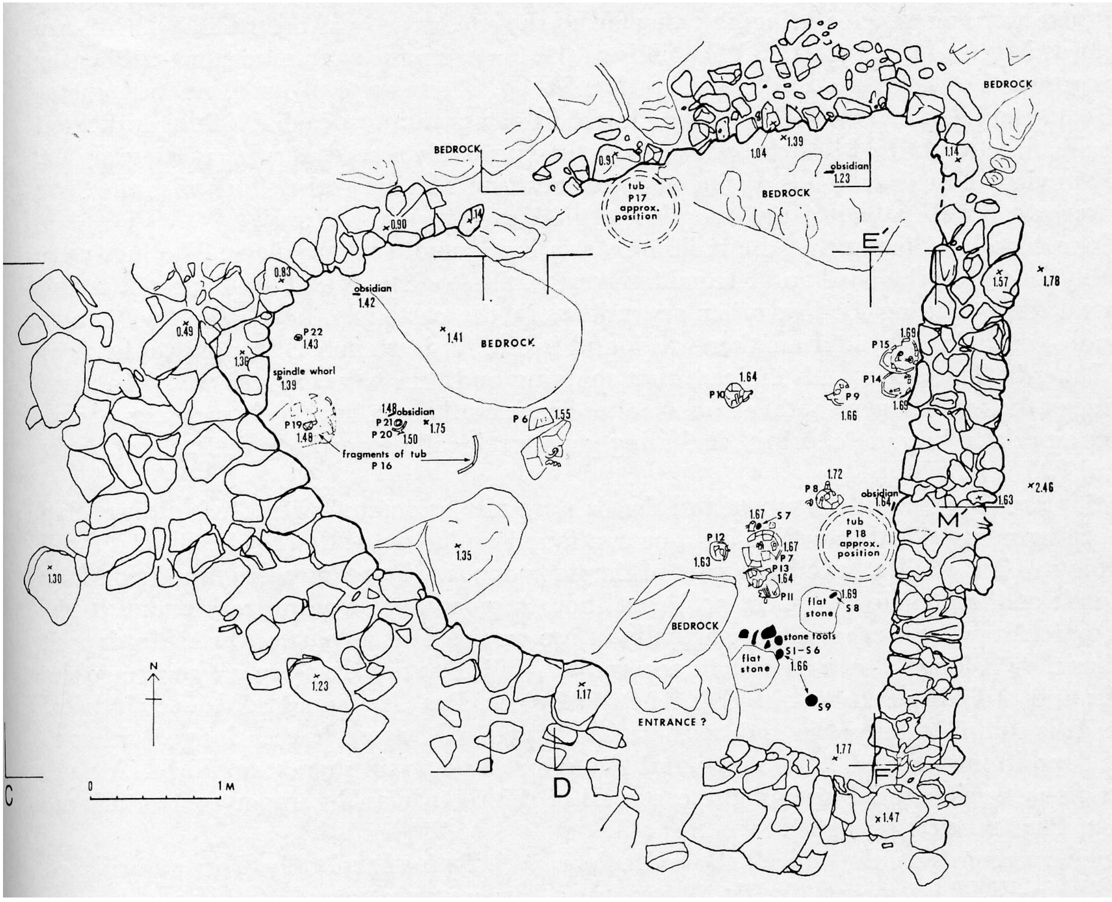


**Figure 5.5:** Plan of the 'Triangular House' at Debla (from Warren – Tzedhakis 1974, 311 Fig. 13)

the plain is too far away. The evidence has been interpreted as representing "a little community of mixed farmers keeping goats and probably sheep, and growing barley, oats, and wheat" and "occupying the site on a seasonal basis, during the summer"[54]. A small number of olive stones has not been assigned a secure date. It is conceivable that the two or three structures were the equivalent of a modern Cretan *mitato*, serving the needs of a shepherding family during the summer pasture. They might have grown cereals in these uplands, but it is equally imaginable that they brought a summer's supply up here.

[54] Warren – Tzedhakis 1974, 336.

## 5.3 Middle and Late Minoan

The real extent of Middle and Late Bronze Age settlement in Sphakia is hard to determine; sherd scatters classified as 'prehistoric' may or may not represent activity spots from these periods[55]. Two sites attributed to Middle Minoan proper are doubtful: one is Logare, at 588 m near the Samaria gorge; judging from the database entry, the whole record has to be treated with some caution. The other one is the aforementioned dump at Birmani (site 7.12) in the Askyphou polje[56].

The sites with a type of pottery securely dated to MM and LM are clearly concentrated in regions 5, 6 and 8. This changes dramatically however if one looks at the numbers of 'Prehistoric' sites registered in the database: region 5, 6 and especially 8 still have numerous sites, but so do the Madares and, even more so, the region of modern Anopoli (region 4). It is therefore at this stage impossible to say if or to what extent the Madares were used at this time, and whether Anopoli was permanently settled[57]. The one site in the Madares with Proto- to Neopalatial material is situated at 1826 m ASL (Gavanoplago, site 2.29). One of the two certain sites in region 4 is Agia Aikaterini Ridge (the site of the Classical polis), where the (at least) two houses mentioned above may have been continually occupied since the Final Neolithic. Both region 2 and 4 have quite a few sites with Neo- to Postpalatial sherds of a fabric often used for pithoi; unfortunately, information about the type of vessel has not been published yet: if fragments of pithoi were found in the Madares, this could provide the best argument yet for the existence of transhumance, since storage (and carrying a pithos up a mountain) would indicate sojourns of prolonged time. Sinclair Hood reported MM II/III-LM I tripod feet from near the mouth of the Asphendou Farangi, to either side of the gorge near Patsianos, and interpreted them as "one or two isolated houses in this area"[58], which, of course, is rather daring.

One of the few sites with a reasonable interpretative potential is site 8.78 at Agia Marina, in the central Frangokastello plain (26 m ASL). The terrain slopes

[55] An early report of the survey pottery stated that the majority of prehistoric material belonged to MM-LM I however (Nixon *et al.* 1988, 171).
[56] Moody *et al.* 2003, 65.
[57] The evidence from site 4.43, which has MM II-LM III sherds, is nonetheless scant.
[58] Hood 1967, 53 with Fig. 3 no. B.2 and B.3.

gently down to the sea. Over an area of 350 × 900 m, there was a general potsherd scatter and chipped stone as well as worked pebbles, and 15 distinct separate concentrations of MM-LM pottery (“tripod feet, conical cups, cooking dish rims, decorated pithos, spouted vessels, and a bull figurine”, some of it MM IIA and MM III), measuring about 10 × 15 $m^2$[59]. Some of them were associated with wall remains, and the whole locus has been interpreted as a possible village, the sherd concentrations marking individual habitation units. The survey team compares these findings with site 8.34 (“Disco site (Hood B8)”, situated between Frangokastello and the church of Agia Pelagia), although at least from the available description the pottery accumulation seems much less patterned[60]. Not far from the latter location is site 8.50. The area of the churches of Agias Nikitas and Agias Charalambos just above the beach and about 500 m east of Frangokastello has seen much and manifold activity throughout the millennia. The location is favoured by a water supply from a stream (which seems to have dried up now), and a spring is situated to the south-east of the site[61]. Since the sea level in this part of Crete was higher in the Bronze Age, it would have been directly on the sea. In Late Minoan times, perhaps a little earlier, there seems to have been a settlement here whose remains (*i. e.*, a sherd scatter) cover an area of 150 × 250 m. The assemblage includes tripod feet as well as drinking and storage vessels. It may have been so large that Thermokipi (site 8.53) could have constituted its “outskirts”. Thermokipi is actually larger than the former site though (180 × 325 m) and has earlier (EM II-MM), MM II-LM III *and* later (Neo- to Postpalatial; GAC) pottery, making it seem—from what is published so far—like the more successful location. It is set further back from the sea, but has access to the same river. Fifteen separate sherd scatters have been recorded, which however, as has been pointed out, need not necessarily be contemporary. The bulk of the pottery belongs to the domestic class, among it some definite pithoi, strengthening the settlement argument.

[59] 42 sherds belong to the ‘Mixed Metamorphic Hamburger Fabric’ alone, used for tripod cooking pots in MM II to LM III; one of the ‘index sherds’ of ‘Silver-Blue Spotted Fabric’ has been dated more closely to MM II-LM IA (Moody *et al.* 2003, 67. 81–83).

[60] The first sherds were noted by Hood 1967, 56. See Price – Nixon 2005, 684 Fig. 12 for the location.

[61] Nixon *et al.* 2000, site 8.50 photo description.

Another potential settlement has been identified at Komitades (site 8.02) which has so far not been dated more precisely than 'PH' (prehistoric). It is a site situated on a gentle south-south-east facing slope, 190 m above the sea, overlooking the Frangokastello plain. All pre-Venetian-modern pottery is prehistoric and confined to a distinct patch measuring 10 × 20 m. The scatter is hence interpreted as remains of habitation even though no wall remains can be seen overground; a modern village nearby shows that this is a successful location.

Birmani (site 7.12) in the Askyphou mountain plain is the dump of a modern well dug to a depth of more than 20 metres. The pottery, which is mainly MM I-II, has been found associated with bones of cattle, sheep and young sheep or goat, "some showing signs of butchery marks" and also indications of burning[62]; the presence of cattle bones is especially noteworthy. As in some other cases, Lioklima in Askyphou (site 7.28) was during the survey not recognized as a prehistoric site, but finds processing identified some of the pottery as MM II-LM I or LM III transport vessels. Since the mountain plains in Sphakia may have experienced alluvial events that covered most ancient evidence[63], it is difficult to judge whether the mountain plain was permanently settled or—in view of the type of container found—just a transitory area on the route between the north and the south coast.

The only hint that palatial influence covered this area of Crete comes from a possible appearance of later Tarrha (at the mouth of the Samaria gorge) as *'ta-ra'* in the Linear B records from Knossos[64].

## 5.4 LM IIIC and Early Iron Age

The Bronze Age/Iron Age transition period sees a fundamental change in settlement pattern to upland areas: the number of sites above 400 m is bigger than ever before, and not a single one of the few sites below this level is actually situated on the coastal plain[65] (see below). There is definite evidence for use of the Madares and region 3, but a main settlement focus seems to have been in the Anopoli area,

[62] Additional information: Jennifer Moody *pers. comm.* 2011.
[63] Jennifer Moody *pers. comm.* 2011.
[64] McArthur 1993, 149.
[65] There are three sites in the plain for which dating as yet is not more precise than 'Neopalatial-Postpalatial': 8.09, 8.33, 8.47(?).

both in the area of the later polis (site 4.21) and the surrounding terrain (sites 4.13, 4.16, 4.18, 4.25, 4.63, 4.64), although nothing more can be said about these sites.

At the same height and to the north-west of Anopolis is later Araden (sites 3.17 and 3.20; 580 m ASL), where activity seems to have been resumed at the Bronze Age/Iron Age transition (LM III-EIA).

At the present state of publication, there is not enough known to conjecture, as Krzysztof Nowicki has done, "that during the Dark Age much of the population moved to this remote, but well defended by nature area [*i. e.* inland Sphakia]. A combination of topography and economic factors, however, meant that people had to live in small hamlets or isolated farmsteads scattered over the mountains, with a few proper settlements in places which were inhabited also during later periods. Such a situation may have been responsible for [the] disappearing of much of [the] archaeological evidence from the period in question"[66]. This is one way of explaining the absence of evidence from the region. In fact, the only larger settlement in the Sphakia region, Kolokasia Kastro (site 8.31), which was actually discovered by Nowicki, was in all likelihood abandoned after LM IIIC-G or slightly later, thereby contradicting his own statement (unless this already counts as "later"[67]). However, with its setting it certainly falls within the range of 'defensible settlement' topography: to the north of the hamlet now called Agios Georgios and to the east of the Asphendou Farangi it occupied the J-shaped summit (ca. 100 × 330 m) of an almost unapproachable precipitous hill (see Fig. 5.6), rising 520–630 m above the Frangokastello plain, over which it commands a terrific view. The Asphendou polje to the north can also be seen from here. Three ruined buildings are associated with LM IIIC-Geometric (or Archaic) potsherds; there is very little later material. A large fortification wall barring the northern part of the summit may date to the Byzantine period[68].

Further away from the coast, the small mountain plain of Spilioulakkos (site 8.83), at 980 m ASL, above the modern village of Argoules in the very east of the survey area, has LM IIIC-PG cooking pot ware, perhaps indicating at least a short

[66]Nowicki 2000, 210.
[67]But cf. Nowicki 2000, 213.
[68]Nowicki 1992, 119; Nowicki 2000, 210–213. See Nixon *et al.* 2000 for further references.

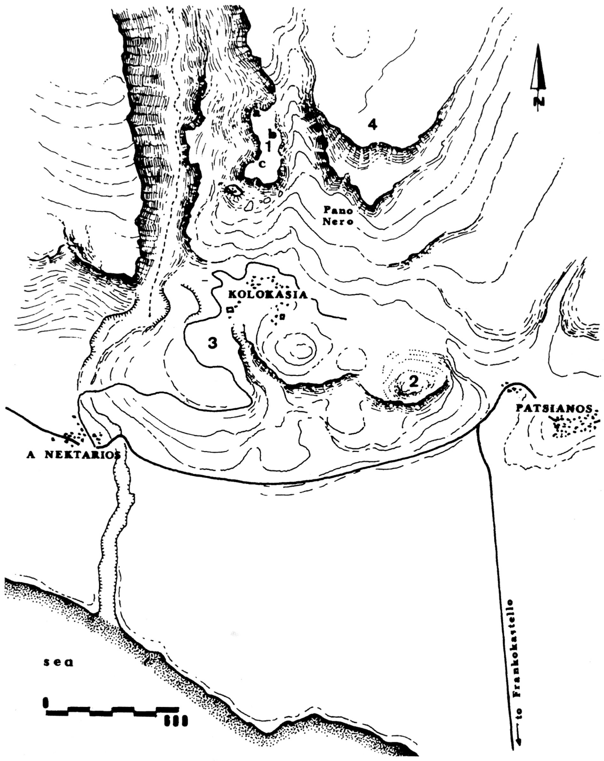


**Figure 5.6:** Map of the area around Kolokasia Kastro (1) (from Nowicki 2000, 210 Fig. 124)

human sojourn here; the spring may have made this place attractive. Biri Avlochi (site 7.09) in Askyphou at 712 m was a small settlement (five or six structures) in Byzantine-Venetian times, whereas its Early Iron Age function is uncertain. In the case of the Madares sites, their location may at least give a clue to what they were *not*: for it is hard to believe that there could ever have been permanent settlement there. Some of them seem to have had a longstanding tradition of occupation, such as Potamous Kitrogianni (site 2.01; 1586 m) which was in use from LM IIIC to the Archaic/Classical period[69]. Not only are these sites situated close to or even above the tree limit (1650 m)—but what is more, most of them are at or close to locations which still have *mitata* today[70].

[69]Moody *et al.* 2003, 54.

[70]Rackham – Moody 1996, 162. Besides Potamous Kitrogianni, these sites are: Klisidia (sites 2.12 (1742 m), 2.13 (1766 m, *mitato*), 2.14 (1838 m)), Gavanoplago (site 2.29, 1826 m) and Livada (sites 2.30 (1820 m, mitato), 2.32 (1776 m)). See also Wallace 2010, 72.

23 out of 30 sites are situated above 400 m; of the ones that are not, only very few cannot be called hidden[71]: one is Patsianos Kephala (site 8.30) on a hill below Kolokasia Kastro. While Krzysztof Nowicki classified it as a 'defensible settlement', the survey team defined the prehistoric function as unknown, and early pottery does not seem to have been abundant. If it was a settlement it must have been rather conspicuous, though in return it offered an outstanding view over the coastal plain and access to both agricultural and grazing lands would have been given[72]. (In Geometric to Hellenistic times, a village seems to have made use of these advantages; perhaps the people from Kolokasia Kastro relocated here[73].)

Another site, 1.02, is at an absolute height of 360 m but must undoubtedly have been visible from the sea, since it is located on the coastal slopes facing the water. The slopes as such are so steep though that one wonders whether people would actually have settled here permanently; on the other hand this very steepness and the view would have provided some protection to a settlement. Two other sites in this region, at different heights, conform to the general hideaway pattern: Logare (1.35) is located at 588 m near the Samaria gorge, well inland. At the bottom of this cleft is site 1.19, just outside a deserted settlement which is described as follows: "Medieval village of Agia Roumeli (1.29), near the mouth of the Samaria Gorge, but far enough inland to be invisible to passing pirates."[74] If this was a concern in the Dark Ages, the location was ideal.

## 5.5 Archaic and Classical

The centuries from the end of the Dark Ages to the beginning of the Hellenistic period are not well documented in Sphakia; the surface survey has not changed this situation but rather made it more evident. What little there is that could be Archaic or Classical could also be earlier or later. The safest bet so far is a type of coarse ware assigned to GAC, but with a potential range from LM III to Early Roman. This class has a curious distribution pattern: it is found at

[71] Without more detailed information about their location, this is hard to tell for site 5.01 (above a gorge; it could have been hidden from the sea if it was on the back slope) and 4.63 (370 m ASL).
[72] See Nowicki 2000, 213–214.
[73] Wallace 2010, 245.
[74] According to Davidson Weinberg 1960, 91, this was still the main village in 1959.

singular elevated sites in regions 2, 4, and 6, at one seaside location in region 5, and has its focus on regions 1 and 8. In region 1, it is present for example at the mouth of the Samaria gorge at Agia Roumeli, whose identification with ancient Tarrha by Robert Pashley[75] has never been doubted. Some trenches were dug here in 1959 and the material found, mainly from a number of graves, had a date range from the 5th century BC to the 5th century AD. Similar to neighbouring Poikilasion[76] and Lissos to the west, it is quite surprising that a polis should have been founded in such an unlikely place: in all three cases, the only access is along very rugged coastal footpaths, across the mountains on a narrow and slippery path—or by boat. Whereas Lissos and, at least for a while, Poikilasion too, may have had an excellent natural harbour (the one at Lissos is now silted up), opinions about the situation at Tarrha vary[77]. However, what is most striking about the position of Tarrha is that it is "spectacularly lacking in a hinterland" and has no cultivable land at all—it cannot have been self-sufficient[78]. Its mainstay may have been a specialization in cypress export, as was the case in the 14th century AD[79]. Provisions that were brought in the mid-fourth century BC include shelled almonds, which were found in a grave, burned together with animal knuckle bones[80]. The survey has traced a curious oscillation between settlement on the shore and habitation further inland: Tarrha is an 'itinerant' site. According to J. Moody and her colleagues, the Prehistoric, Archaic to Hellenistic settlement lay (in different spots) inland, near old Agia Roumeli, whereas in Roman and Late Roman times, the coastal location was preferred[81]. Although it is tempting to connect abandonment of the city with the massive uplift of the island, this has been ruled out by the investigators[82]; however, they assumed a 5th-6th century

[75] Pashley 1837, 263–264.

[76] The survey team do not count Poikilasion as a proper polis since according to them it was not nucleated; cf. however their thoughts on polis status in different periods (Moody *et al.* 1998, 89. 92); on this issue see also Rackham – Moody 1996, 94; Wallace 2010, 340–341.

[77] Cf. Kirsten 1942, 130 and Davidson Weinberg 1960, 91, and see also Price *et al.* 2002, 195. 197–198 (with reference to the 2nd century AD *Stadiasmus Maris Magni*). For the harbour at Lissos see Platon 1992, 168 Fig. 22.1. 170.

[78] Rackham 1990, 108–109; Rackham – Moody 1992, 129.

[79] Rackham 1990c, 108–109 (with reference to C. Buondelmonti). Cf. Thphr. *HP* 2,1,2. See also Kirsten 1942, 130.

[80] Davidson Weinberg 1960, 93.

[81] Moody *et al.* 1989, 89.

[82] Price *et al.* 2002, 198. 200.

date for the paroxysm, which has now been revised (by others) to 365 AD[83]. The fortification walls were at first thought to reflect the fact that access would have been difficult for potential military aid, too, making self-sufficient protection even more urgent[84]. The exposed and vulnerable position on the shore is evident—but new investigations have yielded evidence that the aggressor against which the walls were supposed to shield the city were not pirates, but the sea itself: relative sea level would have been about 6 m higher than today[85]. This is in concordance with the lack of traces of violent destruction, prompting the excavator to conclude that it was "changes in communication" that led to the abandonment[86]. Considering its unpromising setting, it is quite remarkable that Tarrha survived for a whole millennium at all (and is settled again today).

All three poleis would have had a freshwater supply: Lissos from a spring, Poikilasion and Tarrha from the river that flows through the respective gorge (which however, nowadays, dries up in early summer; this may have been different in antiquity[87], N.B. that this would have ruled out another communication route). It was known before the survey that the city of Poikilasion (site 1.02) was located between Lissos and Tarrha, near the mouth of the Trypiti gorge, but it is now clear that it was inconveniently placed (at least in Hellenistic times) on the slopes, about 1 km inland. It is perched at a height of 360 m on the western side of the chasm[88], facing south-south-east. All arable land is situated below this elevation. Before the great tectonic uplift in the 4$^{th}$ century AD, it would have had a natural harbour; however, the site was not given up after the paroxysm when the landing place was lost, which indicates that people were still able to survive without sea-borne trade and/or fishing. The land has great potential for pastoralism and beekeeping, as is reflected by the Hellenistic coins showing the head of a goat on one side and a bee on the other (which it shared with other cities in the area, see below). Nonetheless, the location is impractical enough to have provoked the conclusion that defensibility must have been a main concern and given priority in

[83] Shaw *et al.* 2008, 269. See also p. 461.
[84] Davidson Weinberg 1960, 91.
[85] Nixon *et al.* 1989, 210; Price *et al.* 2002, 175. 197–198.
[86] Davidson Weinberg 1960, 100.
[87] Rackham – Moody 1996, 41.
[88] T. Bechert doubts this, but his reasons (and, for what it's worth, the rest of the book) fail to convince (Bechert 2011, 68–69).

the choice of settlement location[89]. A scatter of Classical to Roman pottery on a nearby slope may mark the location of some of the city's tombs (site 1.03). At 310 m near the mouth of the gorge sits a temple (site 1.05) with Classical to Roman material. The Byzantine or Early Venetian church of Prophitis Ilias (site 1.04) in the same spot marked the boundary between the territories of Agia Roumeli and Sougia and was highly visible from both land and sea[90]. The same congruence of ancient pagan temple and Christian church location can be seen further east: near the upper end of the Samaria gorge, there is a sanctuary frequented from Archaic to Roman times (site 1.17) at 705 m, in a location later occupied by a church of Agios Nikolaos (close to the modern National Park border)[91]. As discussed in section 4.4, this cannot be taken as a sign of continuity of cult. Further east, there are two more Classical to Hellenistic poleis: Araden and Anopolis[92], the former situated on the western side of a 130 m deep gorge which before the building of a steel bridge with loose wooden planks in 1986 was traversable only by means of a zigzagging *kalderimi* down one side and up the other (see Fig. 5.7). What can be seen on site is about as much as what is known about Araden: next to nothing. It may have been an 'itinerant site', too; it seems that Archaic-Classical material is more abundant in a location away from the Byzantine and later village where most Late Roman sherds are clustered. E. Kirsten described houses with floors hewn into the bedrock and walls erected on bedrock socles and attributed them to the "Greek period"[93]. The polis status of Araden is not attested before Hellenistic times[94].

Araden's neighbour Anopolis seemingly developed out of an earlier settlement in the same long-favoured location on the Agia Aikaterini ridge (ca. 660 m ASL), which would have been visible from the sea and whose hinterland comprises a hidden fertile plateau (see Fig. 5.4). The amount of knowledge about this city is slightly bigger than in the case of Araden, but still infinitesimal. It has never been

[89]Nixon *et al.* 1989, 207. See also Price *et al.* 2002, 197.
[90]Nixon 2006, 28. 57. 83.
[91]See also Sporn 2002, 316–317.
[92]Stephanus Byzantius even identified the two with each other and located Araden on an off-coast island (Hirschfeld 1895, 370).
[93]Kirsten 1951, 130.
[94]Moody *et al.* 1998, 90, but see Rackham – Moody 1996, 94 and Wallace 2010, 340–341 for thoughts on the 'polis' issue.

**Figure 5.7:** The gorge at Aradena with the *kalderimi* leading down into it, as seen from the south (April 2011)

excavated and the stone piles visible on the surface inside and outside a circuit wall (see Fig. 5.8) do not allow the reconstruction of an overall plan, but the remains are scattered across an area of ten hectares and it is generally thought to have been the main site of the region from the Archaic period onwards[95]. Sacked in the late third century BC by an unknown force—Araden is an obvious suspect[96]—, it was liberated not long afterwards by one of its own citizens and went on to sign

[95]Nixon *et al.* 1994, 256. This size has been classified by the survey team as "small for a *polis* in international terms, but significant locally". A plan of the city area, allegedly drawn by the survey team (Moody *et al.* 1998, 91), has not been published yet. J.-N. Svoronos apparently never visited the area, for he did not know where to locate the city (Svoronos 1890, 5). E. Kirsten attributed most of the walls to the Middle Ages (Kirsten 1951, 129).

[96]Nixon *et al.* 1989, 207. This suspicion is probably not based on E. Kirsten's remark about this settlement in the 1940s: "Das heutige Dorf Aradena, dessen Bewohner als Räuber berüchtigt sind [. . . ]" (Kirsten 1951, 130).

**Figure 5.8:** The western part of the city-walls of Anopolis, seen from south-west (April 2011)

the treaty of Eumenes in the second century BC; its coins are rather crude[97]. The surroundings of the city were not void of human-made elements: besides the *asty* itself, there were both larger and smaller outlying settlements[98]. Two houses dated to the Geometric to Hellenistic period are situated at 'Gonia cistern' (site 4.18), at 726 m to the north of the Anopolis plain. There are tombs dated to the Archaic to Roman period (sites 4.24; 4.26), and a tower lower down towards the sea at 426 m indicates some concern for defence (site 4.07).

Another substantial Archaic to Hellenistic settlement is at Livaniana Acropolis (site 5.01) above the Aradena gorge and not far from its mouth, which may have

[97] Svoronos 1890, 5–6 with Pl. 1,6; Nixon *et al.* 1989, 207. The Eumenes inscription from the temple of Apollon in Gortyn is SIG $^{3}$II 627.

[98] Nixon *et al.* 1994, 257.

contemporary terraces nearby[99]. The survey team conjectured that in the Classical period, there would have been more potentially arable land than today[100].

At the northern edge of the Frangokastello plain, at an absolute height of 78 metres, a distinct scatter of (probable) Archaic to Hellenistic material with a terrace wall of possibly the same date has been recorded at Patsianos Olive Grove (site 8.45)[101]. Not far from this, on a hill ca. 160 m above the plain, sat a settlement (site 8.42) with Classical-Hellenistic material, among it some beehive sherds. Although the site offers an excellent view across the plain, it was felt to be necessary to install a watch tower[102]. Patsianos Kephala (8.30) seems to have been continuously or repeatedly occupied from Geometric to Late Roman times, including the 6$^{th}$ century BC which is almost completely missing in assemblages from other parts of Crete[103].

Apart from these centres, the area of modern Sphakia has not produced many signs of settlement or activity. Region 3 has extremely little evidence for human presence before the Hellenistic-Roman period. At the Bronze Age/Iron Age transition, there were four upland sites, but after that, the whole area seems to have been deserted. Remarkably, in H/R, all sites are located above 400 m, with the sole exception of Diakymi (site 3.09), which had a brief revival, maybe as a field-house, but was abandoned yet again before Late Roman pottery styles.

The pattern of upland disuse is the same in region 2: the Madares seem to be largely abandoned in general all throughout Greek and Roman times. The three sites that have been found (sites 2.13, 2.14, 2.21) interestingly are in locations with no evidence for earlier or later use; an exception to this is Potamous Kitrogianni, which has evidence for usage from LM IIIC to the Archaic or even Classical period[104]. The survey results indicate that the abandonment of this region continued through the Byzantine and even the Venetian period; there is a sudden upsurge in Turkish times, when the number of sites jumps to twenty. There is evidence for possible Archaic to Roman activities in the mountain plain of Ni-

99 Price – Nixon 2005, 672.
100 Nixon *et al.* 1988, 168.
101 Price – Nixon 2005, 672.
102 Francis *et al.* 2000, 453.
103 See Erickson 2010 *passim*.
104 Moody *et al.* 2003, 54.

ato (site 7.01) at 1226 m, although Theophrastus' remark (Thphr. *Vent.* 13) and scientific data suggest that in the fourth century BC it became too cold to use the mountains[105]. The only pre-Venetian traces in the Asphendou mountain plain come from Classical-Hellenistic times and are very sparse (site 8.13, Skordoulaki Enclosures).

At least during the Venetian centuries upland exploitation may have been hampered by the effects of the Little Ice Age. This would have continued at least through the first 100 years of Turkish rule, so that a more precise pottery chronology from Madares sites would be helpful to determine whether climate may have been a factor. The Little Ice Age cannot be blamed for the lack of mountain activities in the Byzantine periods however, hence other reasons must have been decisive.

## 5.6 Hellenistic and Roman

The Hellenistic and Roman periods are the best documented phases in Sphakia. Mention must be made here of what seems to have been a *koinon* of several cities in south-western Crete called the *Ὄριοι*—'mountain dwellers'. Their territory was called *Oreia*, although it has been suggested that this may have been the traditional name under which the area was known and from which the *koinon* then took its name[106]. Little is known about them; it is not even clear which cities belonged to the federation, the only evidence coming from a fragmentary treaty, some coins and a mention in Polybius. The treaty is engraved on a stele found at Lissos (interestingly, the *asty* of Lissos is at sea level, not in the mountains at all) and documents an agreement between the *Orioi* and King Magas of Kyrene (ca. 280/270 BC). The deities invoked to validate the deal are Diktynna plus the other gods worshipped in her sanctuary at Lissos, those of Poikilasion and Zeus Kretagenes. The federation minted coins bearing the representation of a goat on one side and a bee on the other, and the legend *"OP"* in the late 4$^{th}$ to early 3$^{rd}$ century (see Fig. 5.9). Indeed, it has been suggested that the league emerged

[105] Rackham – Moody 1996, xvii. See also chapter on climate, p. 73.

[106] van Effenterre 1948, 120–126. See Sekunda 2000, 337–338 for ancient references. See also Stefanakis 2000 (*non vidi*).

because of common territorial and economic interests: they "shared knowledge of the passes through the Oreiam they may have shared ports, and they may also have shared rights to upland grazing or to cultivate the upland plains. Shared common knowledge of the terrain will have made individual defence impractical, and will have supplied the impetus which eventually led to the formation of the League of the Oreioi"[107].

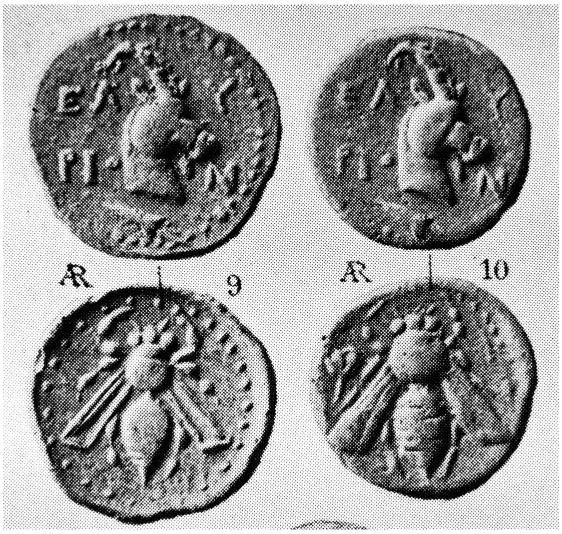

**Figure 5.9:** Coins of Elyros, one of the members of the federation of the *'Orioi'*, showing the head of a goat and a bee (from Svoronos 1890 Pl. 12 no.s 9 and 10)

Because such coins were struck in Lissos, Tarrha, Elyros, Hyrtakina and Kantanos, it is generally assumed that these cities were part of the league[108]. Polybius (4,53,6) mentions that the *Orioi* took part in the Lyttian War in 221–219 BC. Although the official union probably lasted 'only' about 100 years, the cities seem to have shared, as K. Sporn has demonstrated, common religious ties[109].

Since none of the cities of the *Orioi* has been explored to any satisfying extent, they will only be touched upon here. Their settlement history is not known. Lissos, which has been briefly described above, is said to have been destroyed by an earthquake in the early 2$^{nd}$ century AD[110]. Elyros was once the biggest

[107] Sekunda 2000, 346.
[108] See Sporn 2002, 298–299 (with references). Sekunda 2000, 338 points out that not all members necessarily minted coins.
[109] Sporn 2001, 317.
[110] Platon 1992, 171.

city in south-western Crete and according to Pausanias (10,16,5) situated in the mountains, but its remains, on a bump east of modern Rhodovani, have never been excavated. The location, at 450 m ASL, was favourable: the terrain is fertile, there is a river to the south, it offers a wide view around, and it had a harbour in Sougia on the coast[111]. It has been suggested that 6th century BC material in a number of caves in this area could testify to seasonal movement of herds[112], although in my view it could just as well represent any other non-permanent activity[113].

Hyrtakina, south of the village of Temenia, has been called an "inland power", and an open-air sanctuary to Pan may be a testimony to the mountainous environment. Although the location may have been settled from the times of Orientalizing pottery onwards, it was only in the Hellenistic period that it acquired any importance. It was deemed necessary to surround the city with a strong double wall[114]. Hyrtakina was among the four Cretan cities receiving grain from Kyrene to help them through the famine of 330–326 BC, so it seems even the uplands were badly struck (although no other elevated city is mentioned)[115].

In Tarrha at the mouth of the Samaria gorge, settlement moved to the east side of the cleft in Roman-Late Roman times[116]. Similarly little is known about the development of the other Archaic and Classical Sphakian poleis in Roman times. Araden signed the contract with Eumenes in 183 BC, may have achieved city status in Roman times and had one of the first bishop's sees of Early Christian Crete[117]. The continuity at Araden is strange when compared to Anopolis, where occupation is said to have ended in the Late Hellenistic period for unknown reasons[118]. In view of the continuity of Araden, the conjectured motivation, namely the pull of the new coastal centre at Phoinix[119], seems not enough. It is quite odd to imagine a whole

[111] Svoronos 1890, 140–141; Sporn 2002, 304–305.
[112] Sjögren 2003, 84. 144. From Faure 1964, 147 and Faure 1967, 134 it seems to me that Sjögren's "Hyrtakina cave" and "Papadiana: Kaminia" are really one and the same site which appears to have been a sanctuary, possibly to Demeter and Kore, rather than a habitation site.
[113] On this question see also Tomkins 2009, 128.
[114] Davaras 1976, 148; Sporn 2002, 300–304. See also Wallace 2010, 331.
[115] See Tod 1948, 273–276.
[116] Nixon *et al.* 1990, 217. See also Kirsten 1951, 130–131; Sanders 1982, 165 (no. 16/3).
[117] Sanders 1982, 12 Fig. 4; Nixon *et al.* 1988, 162; Nixon *et al.* 1989, 209–210. See also Kirsten 1951, 130.
[118] Price *et al.* 2002, 198–200. I. F. Sanders reports terra sigillata sherds however (Sanders 1982, 165 (no. 16/6)), but this was not confirmed by the Sphakia survey.
[119] Nixon *et al.* 1989, 208. See also Nixon *et al.* 1994, 258; Moody *et al.* 1998, 91.

city just being given up—there must have been strong causes, though at the present state of affairs, without excavation, it is impossible to say whether abandonment followed destruction or whether other causes led to orderly retreat or migration elsewhere. If climatic or other environmental reasons played a role, again it is surprising that they would not have effected the neighbouring Araden—unless one considers a total mismanagement of the land controlled by Anopolis and a more sustainable strategy on the part of Araden[120]. However, although the former city of Anopolis on the ridge no longer existed, agricultural use continued: several terrace walls can at least tentatively be dated to the Hellenistic-Roman period, if not earlier[121]. Similar Roman or Late Roman field systems were recorded on the plateau south of Agios Ioannis, just west of Araden[122]. There are twenty known Late Roman sites in the Anopolis plain, which are believed to reflect economic exploitation of the area by Phoinix. The Byzantine to Turkish villages were also situated on the lower slopes around the plain[123]. Maybe the location on the ridge was a demonstration of power that could only be kept up for so long.

Phoinix, which was (probably) founded as a port for Anopolis and Araden, became the main settlement in their (or at least in the former's) place[124] (see Fig. 5.10). It prospered through Roman and Late Roman times even after its western harbour went out of function due to the great tectonic uplift of four metres. The area of the former shore was seemingly given over to agricultural or pastoral use, as two wells and three cisterns far from any other built structure suggest. The town was still well or even better served by its east harbour, whose beach remained the only safe landing place for ships in winter on the south coast of Crete until the 19th century AD[125]. Whether they came over the mountains or by sea, a surprisingly wide range of foreign ceramic wares indicates that Sphakia was not shut off from the outside world and took part in international trade[126].

[120] See Mackil 2004 for some thoughts on the issue. Cf. Erickson 2010, 242–243.
[121] Nixon *et al.* 1989, 209; Price – Nixon 2005, 672–686. Paul Faure mentions Roman sherds and 'a rock shaped like an altar' in a cave called Korakoskydaki at Anopolis (Faure 1964, 61. 188); only Turkish sherds were found here during survey (site 4.23).
[122] Rackham *et al.* 2010, 269.
[123] Moody *et al.* 1998, 91.
[124] Pashley was told by the locals that Loutro, in analogy to Anopolis above it, used to be called Katopolis (Pashley 1937, 193; cf. Spratt 1865b, 254–255).
[125] Price *et al.* 2002, 198–200.
[126] Nixon *et al.* 1989, 209.

**Figure 5.10:** View across the Loutro peninsula from the Agia Aikaterini ridge to its north-east (April 2011)

In the Frangokastello plain, the preferences for settlement locations changed: whereas Greek and Early Roman habitations were erected at the foot of the fault-scarp that constitutes the northern edge of the plain, Late Roman farmsteads sat in the plain proper, albeit on low bumps above the cultivated land[127]. This development is said to be connected with the foundation of Early Christian churches in the plain[128]. The size of the individual lots has on these grounds been calculated to be between 10 and 25 hectares, "which seems about right for a plain that is pretty infertile"[129]. Late Roman sites are also said to be typically marked by carob trees,

[127] Grove – Rackham 2001, 299. For Roman settlement in the Frangokastello plain see also Hood 1967, 53–56.
[128] Francis *et al.* 2000, 429. 455.
[129] Nixon *et al.* 1994, 259.

which apparently were a popular crop in that period and seem to have survived the centuries[130].

The suggested shift to the coast is complemented by the aforementioned general scarcity of evidence for upland use. A Late Roman settlement at more than 600 m elevation (site 1.16), variously interpreted as a "summer residence" and a "refuge site"[131] must have been quite a lonesome affair, though this might have been even more pronounced at a possible farm (site 1.32) at 625 m. This is due more to the terrain than to absolute elevation, since there are H-LR houses at Patrou Kephali (site 4.02) in the Anopoli plain at 642 m, too, which would have been more easily accessible.

Evidence for Hellenistic-Roman activity in the high mountains is sparse and awaiting confirmation. Whereas the scarcity of material could point to only occasional human presence on the way across the mountains to and from the north[132], *mitata* at all three sites testify to the pastoral use of the area in later times: they are located in the Livadha basin at 1800 m (site 2.28/2.30/2.32), at a similar height at Klisidhia (site 2.13), and at 1932 metres in the Katsiveli basin (site 2.21). Jennifer Moody and her colleagues have argued that use of the Madares complemented use of the Anopolis area: in times when the latter was not densely settled, it could be exploited as pasture. In the periods of nucleated settlements and agriculture in the Anopolis plain, the flocks had to be grazed further up the mountains, in the Madares[133]. The question of upland usage may also be dependent on the extent of settlement territories, and they may have been controlled by Anopolis but not by Phoinix—which could have been a political 'fact' as much as a social perception. Moreover, the claims to land of Cretan poleis were constantly changing, so that until the Roman conquest, exploitation of mountainous terrain may have varied with ownership[134]. At any rate, the lack of archaeological material in the uplands

[130] Nixon *et al.* 1994, 260; Rackham – Mood 1996, 166; Grove – Rackham 2001, 299; Rackham *et al.* 2010, 282.

[131] Summer residence: Nixon *et al.* 2000. Refuge site: Nixon *et al.* 1990, 218.

[132] Nixon *et al.* 1989, 211; Nixon *et al.* 1990, 217.

[133] Moody *et al.* 1998, 91. Cf. Nixon *et al.* 1994, 258: "We may perhaps suggest that activity in the Madhares (up) continued only as long as Anopolis (middle) was an important local centre, but that it ceased in the Late Roman period when Loutro (down) became more important."

[134] Moody *et al.* 1998, 91–93. They also make the valid point that "cities and territories do not necessarily shrink in tandem".

does not seem to support the idea that "the opening up of new markets in the early hellenistic period created conditions stimulating the growth of transhumance in the White Mountains"[135].

Region 6 has a particularly interesting site pattern above 400 m: after the abandonment of Mouri (1010 m, site 6.02) at the end of the Bronze Age, the upland zone is unsettled until the Roman to Late Roman period, when a possible house or *mitato* appears in the location of the remote hamlet Kaloi Lakkoi at 1144 m (site 6.11). This activity, however, does not seem to have lasted through Byzantine times. Mouri apparently was a more successful location: it was reoccupied during the Venetian rule and survived as a village into modern times.

Soil loss seems to have affected at least some fields, namely those on the limestone plateau around the village of Agios Ioannis (west of Aradena) "at some time between the Roman period and the age of the oldest pines"[136]. In the Frangokastello plain, many ancient remains must have been buried by an erosion event that happened after the erection of the earliest Byzantine chapels[137]. At least after this development, agricultural land was so scarce that "almost every slope with even a little soil" up to an elevation of 1100 m was terraced[138]. It would not be surprising if the majority of terraces had been used for grain, as the large number of now disused *alonia* suggests; Venetian records name Anopolis as one of the main cereal-growing areas of the island[139]. However, in the Askyphou plain, which would have made good flat arable land, only one site of the 5$^{th}$-7$^{th}$ century AD has so far been identified, "near the modern neighbourhood of Goni, which may represent a central place controlling the plain at this time"[140].

Cult sites, whether upland or coastal, are not well documented in Sphakia and, it has to be said, in western Crete as a whole; only one peak sanctuary west of Vrissinas is known so far[141]. This is in stark contrast to the central and eastern

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135 Sekunda 2000, 346.
136 Grove – Rackham 2001, 261. 288.
137 Grove – Rackham 2001, 299.
138 Nixon *et al.* 1989, 210–211.
139 Nixon *et al.* 1989, 212.
140 Nixon *et al.* 1990, 218.
141 Agia Kyriaki Gremnakas is situated on the south-western tip of Crete, west of Palaiochora, see Nowicki 2007, 10–13. Cf. the catalogue in Rutkowski 1988, 78–95. Cf. also Moody 2004, 253. It did not share in the intervisibility connecting the peak sanctuaries of Vrissinas, Atsipades and Spili Vorizi (for which see Soetens *et al.* 2006, 318 and p. 394). For Vrissinas see Faure 1969,

part of the island which abounds with peak and cave sanctuaries both prehistoric and later, and from where some Greek and Roman temple sites are known, even though the architecture *in situ* has largely vanished. One site in Sphakia plausibly connected with cult is the Agiasmatsi Cave (8.61), at 296 m above the Frangokastello plain[142]. Although some LM III material has been reported and it was at first thought that the cave was a cult place in the Bronze Age[143], the survey team have found that the main phases of ritual use must have been the Hellenistic and Early Roman period. The mouth of the cavern faces east, and there is a stalagmite in the centre of the inner chamber. In contrast to many other Cretan caves, Agiasmatsi does not seem to have ever functioned as a burial place, maybe because of the soil conditions. There is some Minoan cooking ware, but this is not enough to determine what the cave was used for at the time. The same is true for the following periods: "The Archaic to Classical finds include a few cups, bowls, saucers, a basin, a lamp and a pyxis. These are lightweight and eminently portable objects that could represent anything from a lovers' tryst to a personal shrine". Remains of Classical to Hellenistic cups and a pithos indicate that these visits, whatever their nature, were more than occasional and must have made it worthwhile to go to the lengths of maneuvering storage vessels up the slope. Nonetheless, the damp conditions inside which prevail even in summer in addition to the limited size of the chamber render permanent habitation impossible. The absence of ritual shapes in the ceramic assemblage makes a cultic function at this time equally unlikely. This seems to have changed in the (later?) Hellenistic and Early Roman period, when the assortment of pottery sizes seems rather unusual, consisting mainly of ladles and lamps with multiple nozzles. Bones of pigs and cow may hint at (ritual) meals consumed in the cave or its vicinities. A votive plaque allegedly showing Pan was seen by Paul Faure, who conjectured a cult of this god

185; Davaras 1974. For a seemingly Archaic to Classical 'peak sanctuary' in western Crete see Nowicki 2008c, 17-23; Davaras 2010, 83–84. On the scarcity of permanent sacred structures in ancient Sphakia see also Nixon 2012, 187–189.

[142] Unless stated otherwise, all information and quotations on Agiasmatsi are taken from Francis *et al.* 2000.

[143] Faure 1967, 135–137.

and "une ou plusieurs Nymphes"[144]. Although this has not been confirmed, the cave is seen as "one of the major religious foci of the local sacred landscape". The cultic activities at the Agiasmatsi Cave did not persist long: there is no Middle or Late Roman material—apart from fragments of beehives, which are further indicators of a change in function. In the middle of the 19th century the cave served as a refuge for the rebels[145].

Judging from the material retrieved by the survey, beekeeping seems to have been an important aspect of the Sphakiote economy at least from Classical times onwards. There are several "beehive sites", some of them connected to habitation structures (site 6.25: H/ER house with beehive site, 240 m ASL), and the fragments of clay beehives from Sphakia represent one of the largest assemblages in Crete[146]. Beekeeping equipment—scored ware from hives and extension rings—was distributed across all parts of the survey area save for the mountains proper, where there is not enough food and shelter for bees[147]. It has to be said however that out of 14 beehive sites from all periods recorded in the survey, only three are situated above 400 m, only one of which is pre-Turkish (Geometric-Roman Moti in the upper Samaria gorge at 460 m (site 1.36))[148]. The comparatively large number of bee-enclosures in Sphakia is explained by the particularly windy nature of the region[149]. The tube-shaped horizontal hives in Sphakia (cf. Fig. 4.4) were made from a special coarse ware fabric also used for amphorae, which is porous and may have been deliberately chosen to counterbalance some of the disadvantages of clay in temperature regulation; it would also have been easy to produce in great quantities and impact-resistant when the hives were being moved around[150]. The rim diameters of these hives range between 17 and 36 cm, which is smaller than on the Greek mainland[151]. Lids to close the hives could have been made from

[144] Faure 1969, 200. In Sicily and Magna Graecia, lamps with multiple nozzles are typical for the cult of Demeter (Hinz 1998, 48–49). I would like to thank Cathrin Grüner (Lehrstuhl für Klassische Archäologie Würzburg) for pointing this out and providing the reference.

[145] Cf. however Fielding 1953, 99: "every cave of any size in Crete is associated with some patriotic exploit which has since imbued it with legend".

[146] Francis 2006, 380.

[147] Francis 2006, 380. 385.

[148] Moody 2012, 254 mentions beehive sherds found at 1226 m.

[149] Rackham – Moody 1996, 152.

[150] Moody *et al.* 2003, 89–90. Cf. Francis 2006, 383–384.

[151] Francis 2006, 381.

clay, wood or wicker (see Fig. 4.4)[152]. The extension rings, which are unique to ancient Greece, would have rendered it possible to remove individual combs attached to the top of the ring without the use of smoke to drive the bees out. This would have resulted in honey of higher quality, as Plinius (Plin. *HN* 11,45) makes clear[153]. The importance of bee products in this part of Crete is reflected in the depiction of bees on the coins of the *Orioi*, known from Elyros, Hyrtakina, Lissos, Kantanos and Tarrha. As regards Tarrha, in the vicinity of which beekeeping equipment was particularly abundant, a connection has also been conjectured to the worship of Apollon in the city, whose son Aristaeus kept bees[154]. However, it seems to me more likely that the league adopted the bee as its emblem for a reason that all members could relate to, and beekeeping is not far-fetched. In the case of Ergastiria, unknown before the Hellenistic period, the settlement's prosperity in the 1st century AD has been linked to beekeeping on the basis of the large number of beehives found and an empty patch of land surrounded by a wall which is interpreted as a bee enclosure[155].

In general, it can be said that the interpretation of site function is not much more yielding for historic periods than it is for prehistory. Having said that, houses seem to be easier to identify in the field from Greek times onwards: they are a well-represented category, particularly of course in the Anopolis city area, but also in the more rural area of region 3. This may be simply because they are younger, or because construction techniques changed and made them sturdier—although obviously it is totally unknown how many rural structures of historical periods are missed during survey because their construction resembled the old style: maybe the Greek and Roman houses that are found are the richer, more distinguished ones, and the less conspicuous humble ones are being overlooked. The function of the site of Debla, which was reused in Hellenistic-Roman times, may have been a watchtower on the northern flank of the Lefka Ori.

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152 Moody *et al.* 2003, 89.
153 Francis 2006, 380–381. Cf. Crane 1983, 48.
154 Francis 2006, 386. According to Pausanias (10,16,5), "the Elyrians say [. . . ] that Apollo mated with [the nymph] Acacallis in the house of Carmanor in the city of Tarrha" (translation by W. H. S. Jones). On the temple see also Nixon 2012, 194.
155 Francis 2006, 386.

As for exploitation of natural resources, the only known quarry in Sphakia is in region 5 at only 42 m above the sea and has been tentatively dated to the Venetian period. The local Plattenkalk is no good for ashlar blocks, but it is unclear how much building material was imported in antiquity[156].

The environmental conditions in (Late) Roman times are reflected in the Asi Gonia pollen core, from the eastern edge of the Lefka Ori: "It may well be that the Roman occupation from 69 BC to AD 330 had led to a reduction in woodland cover in the area surrounding the site, as the period is known to have been one of expanding agriculture. However, in late Roman/Early Byzantine times, there was a shift of settlement from the higher ground towards the coast"[157]. The pollen data also show however that the extent of 'forest' would have varied over the last 1500 years.

## 5.7 Summary

Sphakia, one of the most iconic regions of Crete, situated in the island's otherwise highly under-researched western part, has been subjected to intense survey focussing on both archaeology and landscape. Although only preliminarily published at the time of writing, it has still proved a fruitful case study area. Nonetheless, due to the limitations of the available record, all results must be regarded as preliminary; the presence of material in a certain location is a much safer piece of evidence than its absence[158].

The majority of FNL-EM I sites (13 out of 18) is situated above 400 m and somewhat clustered in the Anopolis area. What has been called a 'flight to the hills' in other areas of Crete is to a certain extent counterbalanced by a focus of settlement below 400 m in the Frangokastello plain, some of which was situated just above sea level (site 8.41). However, as has been said before, the timespan enclosed by 'FNL-EM I' is easily long enough to account for a period of coastal safety which, for all we know, could have lasted 500 years. The Madares at this

[156] Nixon *et al.* 1989, 207.

[157] Atherden – Hall 1999, 190.

[158] Jennifer Moody (*pers. comm.* 2011) thinks that the surfaces of the mountain plains in Sphakia may date to the Roman period or later. The Frangokastello plain has evidence for a buried Bronze Age land surface, see Rackham *et al.* 2010, 280.

time were not inaccessible but do not show signs of very frequent use. Debla, at a moderate height on the northern slopes of the Lefka Ori, can be interpreted as a small sheepherder's settlement which may or may not have been seasonal.

At the time of EM II-MM pottery styles, the only settlement activity that has been found is situated in region 8 (the possible site at Askyphou is discussed above), but interestingly, only in two cases so far in the plain proper, close to the coast.

There is surprisingly little MM-LM material so far, although it is feasible that the bulk of sites classified as 'prehistoric' ends up belonging to the palatial period. At the moment, Frangokastello is the area with the most evidence, followed by region 5 and 6, and the Madares seem to have been visited or used more from Neopalatial times onwards.

However, it is in LM III-PG that the upland areas really come to the fore. The number of sites above 400 m is bigger than ever before. There is definite evidence for use of the Madares and region 3, but the main focus is on the Anopolis area. Even the securely documented sites in the Frangokastello area are situated above 400 m.

This changes rapidly around the beginning of the Archaic period and later, when the former popular upland basin of Anopolis and many other parts of Sphakia are almost abandoned and only the coastal plain of Frangokastello has a substantial number of sites.

There is then a sudden upsurge in H/ER at Anopolis, possibly at the expense of the Frangokastello plain. 20 out of 32 sites are in region 4, and there is hardly anything everywhere else. Only in Roman/Late Roman times does the whole area revive again, and there is plenty of evidence from region 1, 4 and 8, at all elevations.

"If there were ever an area where geographical determinism would dictate people's activities, it would be somewhere like Sphakia": the terrain is very rugged and naturally divided into many small sections, the amount of available agricultural plots is very limited; there is more in the Frangokastello plain than higher up the slopes. Nonetheless the choice of settlement location was not determined by these factors: the uplands were popular (or populated) in some periods but not in others. The changes in the settlement pattern reflect the ambiguous character of the landscape of Sphakia: it can be menacing with its towering summits, steep cliffs, difficult paths and sudden mists, but in times of threats from the outside, it would be these very traits that saved people's lives by offering hideaways and shelters where no outsider could follow[159]. It is possible that the answer to the question "what factors enabled people in some periods to tame the landscape, while in other periods life in Sphakia was so inimical that people abandoned it [?]" is simply that in some cases the external peril must have been much bigger and scarier than life in the mountains. But it is also possible that in some periods, climatic conditions were less opposed to habitation in the uplands, or that advances in transport or storage made it easier to survive in some distance from agricultural production zones. Despite the often poor soils, a 'manuring scatter' or 'halo' of pottery that would indicate that settlement waste was used to fertilize the fields has not been reported from anywhere in Sphakia.

Even if one considers the different climatic conditions in the Bronze Age, it seems unlikely that the Madares were permanently settled in prehistoric times. It is interesting to note that all prehistoric sites in the Madares, including such high and remote places as the Livada basin at 1880 m (sites 2.28, 2.30, 2.32) or Katsiveli mitato at 1960 m (site 2.19), have no evidence for use in the succeeding Greek and Roman periods, but come into use again in Turkish-modern times[160]. There may be a connection with the importance of Anopolis and its mountain plain. The Askyphou plain (ca. 2 $\times$ 3.5 km) would have provided a better basis for subsistence, offering soils for agriculture on the basin floor and pasture on the surrounding slopes. Moreover, it occupies a good strategical position at the entrance of the north-south connection through the Imbros gorge.

A similarly divergent pattern of settlement or exploitation applies to all of Sphakia: one important finding from the survey was that there is hardly any correlation between settlement locations in Archaic to Hellenistic and in Roman-Late Roman times[161]. This is normally put into the wider political context and the security that the Roman rule established after the fashion for piracy in Hellen-

[159] Nixon 2001, 79.

[160] It has been pointed out that the upland summer pastures were not only of economic, but also of social significance, since the men from two sides of a mountain meet in these remote pasture grounds and marriages were frequently arranged there and then (Rackham – Moody 1996, 161).

[161] Francis *et al.* 2000, 429. 455.

istic times. Since some of the abandoned inland cities seem to have been rather prosperous in their time, the incentive to move to the coast must have been extraordinarily strong. The phenomenon of avoiding the coastal area is not restricted to some parts of antiquity; exceptions are settlements protected by a castle manned by the respective authority[162].

Pastoralism still prevails in Sphakia today and follows a transhumant pattern which may or may not be ancient; but the focus of production has been suggested to have changed from wool in the Bronze Age and possibly the Iron Age to cheese from Venetian times onwards till today[163].

[162] Cf. above footnote Agia Roumeli/Weinberg; Nixon *et al.* 1989, 211 with footnote 20. Cf. Spratt 1865b, 2–3; Creutzburg 1933, 65; Ruschenbusch 1996. For examples of a move to the coast in other parts of Crete see Raab 2001, 31.

[163] Nixon – Price 2001, 422.

# Chapter 6

# Psiloritis

In some ways, the Psiloritis is the least well-researched of the five case study areas: although some prominent sites have been subjected to more or less thorough examination, these places are not only of a very different character, but also set in very different environments and landscapes. They are hardly comparable and not suitable for painting a big picture; instead, what emerges is a number of isolated spotlights on various aspects of life in haphazard locations within a certain geographical framework. The random generator is represented by the state of research: since no systematic survey has ever been conducted in this part of the island, very few sites are known. This distorts the picture and makes it look as if these were the only occupied locations—but in reality they are simply those locations where archaeologists have recorded sites. The account given here must therefore remain fragmentary and can only deal with selected points of the grand total that was once there. Moreover, the following sketch focusses mainly on the biggest block of the massif itself, leaving out the adjacent valleys of Amari and the Pediada which are often treated as belonging to Psiloritis.

The Psiloritis massif, ancient Ida, consists chiefly of limestones (Plattenkalk) and dolomites (see Fig. 3.1) and is full of karstic features in a zoned pattern, among them—the only large polje—the Nida plain (1370 m ASL, very irregular shape, ca. 1.5 x 3 km)[1]. The highest peak is the Timios Stavros at 2456 m, which is exceptional in being reasonably easily accessible and (hence) crowned by a chapel.

[1]For more detail see Siart *et al.* 2010, 76. 84–86; Siart 2010, 5–14. 58 Fig. 12. 59 Table 9 and Fig. 13.

The modern settlement limit in Crete is at 800 to 900 metres[2], making the village of Anogia at 740 m one of the highest permanently inhabited places. As in other mountainous areas of Crete, the soils in the Psiloritis are mainly *terrae rossae* and rendzinas (see Fig. 3.2) and, where present at all, rather thin. An exception are the colluvial accumulations in depressions and valleys, especially of karstic origin, where they can reach several metres thickness[3]. These have been attributed to a combination of "climatic changes, tectonic activity, heterogenic petrographical units, aeolian input, anthropogenic land use and deforestation"[4]: not even the team of geographers concerned with reconstruction of the archaeological landscape in central Psiloritis felt they could make reliable statements about vegetation and human impact and based their model on the only stable feature they found: topography[5]. Theirs is a much more careful attitude than the one displayed by G. Lyrintzis and V. Papanastasis in their assessment of landscape development in the Psiloritis, who from the artefacts of the 8th and 7th century BC in the Idaian Cave conclude without further reasoning: "There is therefore evidence that humans have lived on Psilorites since ancient times and are responsible for the widespread land degradation"[6]. Another research group, although starting from the premise of human-induced degradation, acknowledges the adaptation of the flora in question to both fire and grazing and concludes that in Psiloritis as elsewhere, patterns of (negative) human impact should not be generalized[7].

Like in other karstic areas of Crete, there are a number of good springs in Psiloritis, the biggest are Gergeri, Zaros and Almyros (the first two are also bottled and sold in the supermarkets). The spring at Zominthos will be treated below; the spring just below the Idaian Cave called 'κρήνην Σαύρου' (Lizard's Spring) by Theophrastus has been identified as the one nowadays known as the Spring of

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[2]Sakellarakis – Panagiotopoulos 2006, 66.
[3]For more detail see Siart 2010, 18–19.
[4]Siart *et al.* 2010, 89. Cf. the local findings for the Zominthos plateau though, see below p. 209.
[5]Siart *et al.* 2008, 2924.
[6]Lyrintzis – Papanastasis 1995, 79. Cf. their contradictory statements a few pages further on (Lyrintzis – Papanastasis 1995, 91). They are definitely wrong about the dates of the Cretan Neolithic (which they give as 6000–2800 BC), and, shockingly, about referring the description as *πολυπῖδαξ* ('many-fountained') in Il. 8,47 and *h. Ven.* 68 to the Cretan Ida, when in both cases it is made clear in the previous or following lines respectively that the scene is set in the Troad.
[7]Hostert *et al.* 2003 *passim.* Cf. however Siart 2010, 150 with his statement that the landscape was degraded already in the Dark Ages and therefore not settled since.

Christ (Πήγη του Χρίστου)[8], and there are said to be numerous other springs in the Nida plain[9].

## 6.1 Neolithic

Neolithic activities are attested from very few sites in the Psiloritis so far. This is more likely to be due to a lack of research than to a lack of activities. As regards the area above 400 m ASL, Neolithic remains have been found only at Eleftherna (FNL), Axos and Gonies (NL)[10], all on the north flank of Psiloritis, and in two caves: Kamares on the south flank, and the Idaian Cave in the heart of the mountain.

The cave above the modern village of Kamares is situated on a steep slope, 1524 m above sea level and (in good weather) commands a marvellous view over the Mesara plain (for the landscape around Kamares see Fig. 3.8). Its arch-shaped opening (an estimated 20 × 33 m, see Fig. 6.1) leads into a cavity that is highly precipitous and entirely covered in what I suppose is bat guano. At the bottom of this hollow is an opening which leads into the inner chamber. A pool of water in this inner cave is often thought to have served the needs of the occupiers, but it may not always have been present[11]. The cave was explored late in the 19th and early in the 20th century, but never fully and the earliest traces can hence not be assigned a more precise date than 'Neolithic'. Since nowadays snow and rain block parts of the cave into summer, it is usually believed to have been a temporary or seasonal shelter only[12]. The climate in the Neolithic was even wetter and cooler than today, so this remains a likely scenario. The same point has been made concerning the Idaian Cave. On the opposite side of the mountain, it is situated at virtually the same absolute height (1538 m ASL), but in a quite different natural setting. Rather than a small terrace on a precipitous cliff, it has

[8] Thphr. *HP* 3,3,4; Sakellarakis 1983, 419 with footnote 3; Lyrintzis – Papanastasis 1995, 87.
[9] Manteli 2006, 11.
[10] For a short account of Gonies Malevizou see Zois 1973, 180–181. Neolithic stone axes at Axos are mentioned by Andreadaki Vlazaki 2004, 34; see also Andreadaki Vlazaki 2006, 17. The axes from Eleftherna are depicted in Stampolidis 2004a, 188 no. ,89; Stampolidis 2004b, 83 Fig. 2.
[11] Dawkins – Laistner 1913, 10. The same applies to a pool in the outer cave, see Dawkins – Laistner 1913, 2.
[12] Faure 1964, 179; Watrous 1996, 60.

**Figure 6.1:** The entrance to the Kamares cave (April 2009)

a broad flat area in front of it and overlooks the mountain plain of Nida from the West (see Fig. 6.2). The earliest pottery found here dates to the Late Neolithic and was quite abundant[13]. The entrance to the cave faces east and measures 25 m in width and 16 m in height; inside are three chambers, the biggest of which is 36 m long, 26–34 m wide and 9.5–17 m high[14].

[13] Sakellarakis 1983, 456. 469. 480. 485; Sakellarakis 1984, 518. Pl. 239e; Sakellarakis 1989, 87; Watrous 1996, 58; Prent 2005, 159; Manteli 2006. Now also depicted in Sakellarakis – Sapouna-Sakellaraki 2011, 138.

[14] Sakellarakis 1983, 421. The following plants were recognized in the cave in 1985 (*sic!* Although the issue is of 1983, it was published (and apparently written) in 1986): *Asplenium scolopendrium*, *Asplenium trichomonas*, *Anograna leptophylla*, *Silene fruticosa*, *Aubrietia deltoidea*, *Crepis raulini*, *Crepis cretica*, *Crepis flassii*, *Umbilicus erectus*, *Scrophularia lucida*, *Astragalus depressus* (Sakellarakis 1983, 422 footnote 1). For a detailed description of the history of modern exploration of the cave see Sakellarakis 1983, 423–429.

**Figure 6.2:** View of the mountain plain of Nida and its surroundings. The entrance to the Idaian cave is visible as a black spot to the right of the bottom of the leftmost vertical snow streak (April 2009; photo courtesy of Torben Keßler)

## 6.2 Early Bronze Age

Although the Early Bronze Age is very poorly documented in the Psiloritis, one of the most enlightening deposits of the whole region dates to this period. On the north flank of Psiloritis, much further down than the two aforementioned caverns at 630 m ASL, lies the Sentoni Cave near modern Zoniana. The bulk of the pottery dates to EM I/IIA and is associated with a faunal assemblage that includes remains of both domestic and wild species: sheep, goats, pigs and cattle as well as some roe and red deer[15]. There is nothing to indicate cultic activities, so that Sentoni seems to have been some sort of habitation, too. Pigs and deer imply areas of

[15]Hamilakis 1998, 87. According to a *pers. comm.* mentioned by Moody 2012, 243 footnote 104, the deer bones may be Pleistocene deposits.

forest; whether open spaces were created for sheep and cattle or whether they were grazed in bosky areas too is impossible to say.

Besides a small number of Early Minoan potsherds from the Kamares Cave and evidence for settlement at modern Eleftherna[16] nothing is known about human activities in the Psiloritis at this time.

## 6.3 Middle Bronze Age (Pre- & Protopalatial Period)

For the Middle Bronze Age and the time of the First Palaces, it is still mainly cave sites from which evidence for human activities is documented. The Kamares Cave may have been used for cultic purposes from MM IA onwards and the fine ware pottery which is named after this site was found in great quantities. However, the bulk of pots are undecorated and quite rustic ware and were deposited into MM III, although it has been suggested that this took place in phases rather than on a regular, perennial basis[17]. One of the vessels was filled with grain, and animal remains belong to cattle, sheep and goat[18]. Since it is usually believed that worshippers climbed up here from the settlement or even the visually linked palace at Phaistos, these findings cannot be taken as evidence for the upland economy. Moreover, the absence of animal figurines so frequently encountered at other contemporary cult places seem to imply that the concern of the worshippers in this place was not the wellbeing of their flocks, although it has been suggested that field crops may have been an issue[19]. Too little is known to state with certainty that "Dieu ou déesse, c'était essentiellement la divinité de la montagne"[20].

Computer modelling has shown that the Kamares Cave is located exactly on the least-cost path from Phaistos to the Idaian Cave[21], even though from my own experience I can say that it is still quite a bit further up than the route, and there was no way one could have gone round the mountain at the height of the cave. But this small (and rather scary) detour is certainly worth the effort and just goes to

[16]Kamares: Dawkins – Laistner 1913, 13. Eleftherna: Themelis 2009, 52.
[17]Dawkins – Laistner 1913, 27; Faure 1964, 180.
[18]Dawkins – Laistner 1913, 11; Watrous 1996, 60.
[19]As proposed by Faure 1964, 181.
[20]Faure 1964, 182.
[21]Siart *et al.* 2008, 2923 with Fig. 4; Soetens 2009, 267. See Siart 2010, 52 for the method.

show again that convenience is not the only factor determining which path people choose[22]. Pottery in styles otherwise known from the Mesara found in the Idaian Cave prove that people did indeed traverse the mountain, and potentially on this least-cost path. Whether these visits were already aimed at religious activities is not quite clear: L. V. Watrous is confident of an onset of cult in MM IA, whereas G. Sakellarakis has taken a mortar as proof of Middle Minoan habitation[23]. Of course the two need not necessarily exclude each other, though I am unsure how a quern can be securely dated in the muddled stratification of the cave[24].

At least two peak sanctuaries were established in the vicinity of Tylissos in MM I: Gonies Philioremos at 797 m and Pyrgos at 685 m ASL. They are unusual in that both of them are situated on the very summit of the respective mountain and both of them seem to have been marked by built structures. Another possible cult place is known at Keria, not far from Gonies, at 1160 m ASL and below the peak, but has so far not been dated more precisely than to Middle Minoan[25].

## 6.4 Late Bronze Age (Neopalatial Period and later)

Whereas the Kamares Cave seems to have been visited sporadically at best in the Late Bronze Age—the amount of MM III-LM I fine painted pottery and LM IIIA1 and LM IIIB offerings found is so small that P. Faure has spoken of abandonment after MM II[26]—the Idaian Cave must have been an important cult place in MM III-LM I, as great numbers of bronze animal and human figurines show. Pithoi have been interpreted as a sign of permanent human presence, necessitating storage of foodstuffs, although other, less mundane explanations are possible[27]. The scenario with storage vessels in the cave resembles the one at the Psychro cave in Lasithi in the same period (see p. 246). What kind of deity was worshipped here

[22] See the paragraph on the concept of hodological space above (p. 49) and cf. Siart *et al.* 2008, 2923–2924.

[23] Sakellarakis 1989, 87–88.

[24] Cf. Matthäus 2000, 519–520. For the pottery from this period see also Sakellarakis – Sapouna-Sakellaraki 2011, 140. 145.

[25] See Faure 1969, 182; Rutkowski 1988, 79–81. 87–88. 93. For Gonies Philioremos see also Faure 1969, 184; Cromarty 2008, 33. For Pyrgos see also Kyriakidis 2007.

[26] Faure 1964, 182. Cf. Dawkins – Laistner 1913, 26–27; Watrous 1996, 61.

[27] Habitation: Sakellarakis 1989, 88. Fertility cult: Tomkins 2009, 145.

is of course as unknown as at every other Minoan cult place[28]. The Neopalatial lentoid rock crystal seal depicting a female figure holding or potentially blowing a triton shell in front of an altar with Horns of Consecration[29] is intriguing but does not, unfortunately, provide any clues either.

**Zominthos** The most fascinating and promising site of the Late Bronze Age in Psiloritis so far is without a doubt the 'rural villa'[30] at Zominthos, situated on a little hummock in a small upland plain at 1187 m ASL (see Fig. 6.3).

**Figure 6.3:** View of the Zominthos plateau from north-west, with ruins of Central Building just visible in the centre (April 2009; photo courtesy of Torben Keßler)

[28] G. Sakellarakis once suggested a Minoan god of vegetation who was reborn every year (Sakellarakis 1989, 89). Cf. Matthäus 2008, 237.
[29] CMS II 3 no. 7. For the pottery see now also Sakellarakis – Sapouna-Sakellaraki 2011, 141.
[30] On terminology see Sakellarakis – Panagiotopoulos 2006a, 62–65.

Contrary to what is normally stated, the Minoan remains were known already in 1969 and discovered long before the excavation of the Idaian Cave began in 1982[31]. This is not surprising: some of the walls must always have been visible above the ground to some degree, the road from Anogia to the Nida plain leads past just 50 m away, there is a threshing floor basically right next to the building, and two *tyrokomeia* (cheeseries) are situated ca. 400 m to the north-east, close to the spring from which the site takes its name[32]. The huge structure termed the 'Central Building' (see Fig. 6.4) is known to have been surrounded by a settlement and a burial ground, and although the latter two are as yet unexplored, the results from geophysical investigations suggest that the settlement was much bigger than surface finds would seem to indicate[33]. Excavations in the Central Building took place in the 1980s and from 2005 onwards but, apart from some of the pottery and some field notes on the website[34], are largely unpublished. Therefore, even though the more recent project was accompanied by geoarchaeological investigations in the region, man-environment interactions have not (yet) been analyzed in as much detail as one would wish and rely mainly on topographical considerations. From what is known so far, it can be gathered that the location was occupied, though probably not continuously, from LM IA to Hellenistic times; remains of unknown date underneath the Central Building testify to an even earlier popularity of the location[35], and the hill on which the building is set may actually have been artificially enlarged by burying an older structure[36], which gives the whole thing a sort of tell-like character. Within LM I, the Central Building was erected, at

[31] Faure 1969, 182 ("ruines [...] du village minoen de Stalona, à Anogia, sont déjà connues"). Cf. Sakellarakis 1983, 444. 488 ("Ἁλωνες στή Ζώμινθο"); Sakellarakis – Panagiotopoulos 2006a, 49; Panagiotopoulos 2007, 17; <http://www.archaeology.org/interactive/zominthos/> (26/9/2011). For the first excavation see Sakellarakis 1983, 488–500.

[32] Depicted in Sakellarakis – Sapouna-Sakellaraki 2011, 28–29. 240–241.

[33] Sakellarakis – Panagiotopoulos 2006, 51. Human remains as well as fragments of pithoi and larnakes have been found in a rock shelter 500 m to the south of the Central Building (Sakellarakis 1983, 445).

[34] <http://www.archaeology.org/interactive/zominthos/> (26/9/2011); Sakellarakis – Panagiotopoulos 2004; Sakellarakis – Panagiotopoulos 2005; Sakellarakis – Panagiotopoulos 2006b; Sakellarakis 2007; Sakellarakis 2008. Pottery: Traunmüller 2009. Photos and a brief description have now also been included in Sakellarakis – Sapouna-Sakellaraki 2011, 238–251.

[35] Sakellarakis – Panagiotopoulos 2006a, 55.

[36] Siart 2010, 144.


**Figure 6.4:** Plan of the Central Building at Zominthos (from Sakellarakis – Panagiotopoulos 2006b, 123 Fig. 1)

least once extended and a potter's workshop added[37]. The extraordinary thing about Zominthos is not only that a Minoan 'rural villa' was located at such an elevation at all, but also its size: being ca. 37 × 54 m and more than 40 rooms on the ground floor alone, it is the biggest example of this type of structure known so far anywhere in Crete. Local *sideropetra* blocks and mud mortar were used to construct walls of up to 1 m thickness. The floor of the upper storey may have

[37]Sakellarakis – Panagiotopoulos 2006, 55–57.

been paved with schist slabs, as at least some rooms on the ground floor were. The huge lime plaster surface found in one of the rooms and fragments from other parts of the building[38] imply the use of tons of firewood to produce this material. Small quantities of orange and red pigments for dyeing or painting were retrieved[39]. Rock crystal crops up frequently[40].

Although agriculture would have been possible to some extent in the dolines in the vicinity[41] and was practised until fairly recently, as the *aloni* at Zominthos proves (the grain might have come from Nida), it has been suggested that the mainstay of the economy at Zominthos and, given the probable political system that led to its foundation, the main object of control and administration at the rural villa was (ovicaprine) livestock and its products[42]. As today, the area must have provided ample opportunities for grazing[43]. The decision to exploit upland areas on such a large scale has been suggested to have been prompted by a rapid population growth in Late Minoan times, coupled with land use conflicts and degradation of the lowlands[44].

This theory is so far neither dismissed nor supported by the archaeozoological analysis of a small number of identified bones: remains of sheep, goats, pigs, dogs, hares and, rather vaguely, birds have been published. More interesting is the occurrence of (fallow) deer, cattle, two probably equid teeth and two "horns" from

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[38] Sakellarakis – Panagiotopoulos 2006, 54; <http://www.archaeology.org/interactive/zominthos/2012/07/field-notes-2012-week-1/> (5/12/2012); Sakellarakis 2007, 58–60 (with photo).

[39] Sakellarakis 2007, 74; Sakellerakis 2008, 109–110.

[40] Sakellarakis 2008, 109; <http://www.archaeology.org/interactive/zominthos/> (26/9/2011).

[41] In fact, "potential areas for agricultural use are exclusively limited to loose sediment infills in karst depressions" (Siart *et al.* 2010, 89). See also Siart 2010, 64. 121.

[42] Sakellarakis – Panagiotopoulos 2006, 66–67. Cf. Platon 2008, 62 (with slightly weird phrasing). For possible cultivation of Nida see also Rackham *et al.* 2010, 277.

[43] "[L]arge herds of cattle" as suggested by Traunmüller 2008, 9 would run contrary to evidence from most other sites though.

[44] "Unter Berücksichtigung des rapiden Wachstums der spätminoischen Bevölkerung, als auch der damit verbundenen Landnutzungskonflikte und Degradationserscheinungen im Tiefland, erschließt sich somit die entscheidende sozioökonomische Bedeutung des Standorts: Da Viehzucht und Ackerbau die minoischen Haupterwerbszweige darstellten [. . . ] vermochte nur eine Verlagerung der landwirtschaftlichen Produktion in die peripheren Bergregionen Kretas den wachsenden Bedürfnissen der palatialen Zentren und ihrer Umgebung gerecht zu werden" (Siart 2010, 139).

an unspecified animal[45]. Other horns were identified as belonging to deer and *agrimi*Ê(“ibex”)respectively[46]. The recent work at the site has yielded large numbers of unspecified bones; however, there seems to be evidence for a predominance of sheep over goat and also for substantial quantities of (fallow) deer remains[47]. As for plant remains, so far only one olive stone, one cereal grain and seeds of *Lathyrus sativus* (grass pea) and *Vicia ervilia* (bitter vetch) have been published; carbonized wood abounds but has unfortunately not been attributed to a species although this could give interesting clues as to the surrounding vegetation at the time[48].

The presence of two *tyrokomeia*, one locally known as ‘Venetian’ but of uncertain date, the other one from the 18$^{\text{th}}$ century, indicate the scale on which dairying was and still is possible in this area[49]. As argued above, wool would have been a potentially more rewarding product in antiquity, and if the Central Building was indeed a palatial institution, it may have been directed at generating this commodity. However, it is too early to state with any certainty whether or which parts of the possible range of products were manufactured in this centre[50].

In the present climatic conditions, this part of Psiloritis can be snow-covered and haunted by blizzards into April, year-round occupation at this elevation is not feasible and a transhumant livestock regime has been adopted. In the Late Bronze Age however, winters were warmer than today, which may have allowed year-

[45] Sakellarakis – Panagiotopoulos 2005, 97. 104–105; Sakellarakis 2007, 95. It was noted that in comparison to the other rooms of the Central Building, the assemblage from the potter’s workshop was less well preserved but more diversified in terms of species.

[46] <`http://interactive.archaeology.org/zominthos/2013/07/field-notes-2013-week-2/`>; <`http://interactive.archaeology.org/zominthos/2013/07/field-notes-2013-week-3/`>; <`http://interactive.archaeology.org/zominthos/2013/08/field-notes-2013-week-4/`> (2/8/2013).

[47] Moody 2012, 244; <`http://www.archaeology.org/interactive/zominthos/2011/08/field-notes-2011-week-4/`> (26/9/2011).

[48] Sakellarakis – Panagiotopoulos 2005, 97. 105. Carbonized wood is reported in many of the field notes published on <`http://www.archaeology.org/interactive/zominthos/`> (26/9/2011) as well as for example in Sakellarakis – Panagiotopoulos 2006 *passim*.

[49] The present-day milk processing plant, which markets its products under the name of Zominthos and in return supplied the excavating team with free sheep’s milk yoghurt and rice pudding in 2006, is located just outside Anogia.

[50] I consider P. Militello’s conclusion that the lack of loom weights indicates a strong cultural and ceremonial, rather than economic, character (Militello 2007, 42) to be overhasty, even more so since the raw wool could have been transported elsewhere for spinning and weaving, cf. p. 384 footnote 41.

round upland grazing[51]. Even if transhumance was practised anyway (although it is not clear what advantage the system would then have), administration and potentially processing of hides and wool could still have been carried out here. The sturdiness of construction and the effort put into decoration of the building[52] and the surrounding settlement further strengthen the argument for permanent occupation.

Peter Warren has suggested that besides ovicaprid products, timber, cereals and herbs from around Zominthos were wanted in Knossos[53]. Others have pointed out the plentiful supply of building stone (Plattenkalk, schist) as well as clay for potting[54]. Paul Faure reported iron slags from near the Zominthos spring and the Nida plain[55]. The latter is reported to have been used for beekeeping in the 19$^{th}$ century AD[56], and the value of honey and beeswax has been sufficiently described above to make this a feasible hypothesis. (It is tempting to cite here—again—the myth about the infant Zeus' nourishment with milk and honey on Mount Ida.)

The strategic position of the site has often been stressed: one of two natural routes from Knossos to the Idaian Cave leads past the Minoan villas at Sklavokambos and Tylissos[57], the peak sanctuary near Gonies and Zominthos. It has even been suggested that Zominthos functioned as some kind of pilgrims' hostel or 'caravanserai'[58], since despite Platon's careless remarks, it is impossible to make the journey, even less the return, from the coastal plain to the cave in one day[59]. With respect to other potential locations for an upland way station on the itinerary to the Idaian Cave, the Nida plain would be too close and the plateau of Anogia too

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[51] Year-round grazing has been suggested by Siart 2010, 140. 149. It should be noted here that Siart's dating is lax and hence his application of the results of Rossignol-Strick 1999, 528 incorrect. Cf. chapter on climate, p. 64. Sakellarakis – Panagiotopoulos 2006a, 68 speak of year-round habitation but assume transhumance nonetheless. J. Moody (*pers. comm.* 2011) doubts that pasture would have been available all year, though probably for a longer period than at present.

[52] Sakellarakis – Panagiotopoulos 2006, 68. See also Siart 2010, 144.

[53] Warren 1994, 209; Sakellarakis – Panagiotopoulos 2006a, 68.

[54] Siart 2010, 143.

[55] Faure 1989, 284.

[56] Verbruggen 1981, 97.

[57] For animal remains from Tylissos see Vickery 1936, 19–20.

[58] Rehak – Younger 2001, 397. Cf. Sakellarakis – Panagiotopoulos 2006, 68.

[59] Whether the "three old men" (Bury 1967, vii) ever actually arrive at the cave does not matter here: they *set out* to do the walk in one day (Pl. *Lg.* 1,625B).

far away[60]. Even so, in relation to the millennia during which cult was practised at the Idaian Cave, the one hundred years or so during which Zominthos could have functioned this way would not have eased the problem very effectively. However, if it is true that ritual activities experienced some kind of hiatus between LM I-III[61], these ideas may have to be discarded altogether. If there was indeed a connection between Zominthos and the sanctuary, it is worth considering whether the potter's studio at Zominthos specialized in supplying vessels for the cult at the cave. Unfortunately, S. Traunmüller only very briefly mentions this possibility[62] but was not able to compare the two assemblages since the pottery from the Idaian Cave remains largely unpublished. Minoan relics along the other route from Knossos to the Idaian Cave, via Krousonas, are less conspicuous but definitely present[63]. The likeliness of the existence of such itineraries was reinforced by GIS modelling of least-cost analysis[64]. Visibility, which seems to have played a role in many Minoan choices of location, has also been found to be satisfying[65]. Since other locations in the area offer similar conditions, it seems that it was the combination of water supply, agricultural as well as arable land and visibility that tipped the scale in favour of this particular site[66].

Water, essential for humans, animals and economic activities such as potting, is indeed plentiful at Zominthos. The spring is still popular with shepherds today and also contributes essentially to the water supply of the village of Anogia[67]. In Minoan times, there may have been some kind of channel system for directing water from the nearby springs towards the settlement at Zominthos, which may also have served for drainage of agricultural land in times of surplus precipitation[68]. This supports the notion that the climate at the time was less arid than today, which in turn means, in accordance to what has been said about factors

[60] Siart 2006, 104.
[61] Driessen – Macdonald 1997, 27.
[62] Traunmüller 2008, 66.
[63] For all this, see Sakellarakis – Panagiotopoulos 2006a, 50 (with further references). This route was also mentioned by Warren 1994, 208–209.
[64] Siart *et al.* 2008, 2924; Siart 2010, 114.
[65] Siart *et al.* 2010, 89.
[66] Siart *et al.* 2008, 2925.
[67] See Sakellarakis – Panagiotopoulos 2006, 51 footnote 17 for more information.
[68] Siart *et al.* 2010, 89; Siart 2010, 140–141.

governing vegetation patterns, that the area may have had a denser tree cover[69]. It has been shown that the surface of the Zominthos plateau was 10 m below modern levels and had a very different appearance from today[70]. Drill-cores in the water channels showed a colluvium of up to 5 m thickness, which is believed to have been created in one go, though its origin is not known. Apart from such colluvial action, pedogenesis is very limited. Alluviation can, with reservations, be stated to have been minimal between 4991–4770 and 3360–2882 cal BC, indicating periods of stability[71]. The stratigraphy of the cores proves that erosion started at the earliest after the eruption of Thera. According to Christoph Siart, this would have been contemporary with settlement activities at Zominthos, and the pottery assemblage seems to suit this picture well enough; the end of occupation came at a time when, at least in Zominthos, LM IA pottery was used[72]. The onset of the alluvial phase has been attributed with some confidence to human impact: "Die mindestens 10 m mächtigen Kolluvien von Zominthos und deren Genese während bzw. nach der Besiedlung des Hochplateaus müssen somit als eindeutiger Hinweis auf einen Zusammenhang zwischen menschlicher Aktivität und Landschaftsdegradation gesehen werden. Sicher beeinflussten auch klimatische Ursachen diese rapide und grundlegende Transformation des Ökosystems, doch wäre ohne anthropogene Einflussnahme eine deutlich geringere Intensität der Abtragungsprozesse zu erwarten"[73]. Hitherto seismic destruction was believed to have been the main reason for abandonment[74]. However, both electromagnetic prospection and excavation have revealed taphonomic processes that are incompatible with this notion: building blocks in the uppermost layers may indicate that the walls only collapsed when the voids had already been filled in with sediment[75]. Geophysical analysis has also detected the presence of volcanic material of an event which took place circa 3600 BP. The material has an identical chemical composition to that from

[69] Siart 2010, 140. This would have affected visibility. Mean annual precipitation today is estimated to be around 1400 mm (Siart 2010, 17).
[70] Siart 2010, 142 Fig. 43.
[71] Siart 2010, 130.
[72] Siart 2010, 144; Traunmüller 2009, 268.
[73] Siart 2010, 148–149.
[74] Sakellarakis 2008, 113 states that the walls show clear evidence for this. For how to distinguish damage caused by earthquakes see Furger 2011, especially 77–118. 295 and Helly 1998.
[75] Siart 2010, 76. 145–146; Prof. Dr Diamantis Panagiotopoulos (*pers. comm.* 2011).

Santorini/Thera and is hence believed to originate from this eruption. It seems that the tephra fallout in the Cretan mountains was much larger than previously thought, and the impact of the eruption on these areas may have to be reassessed[76]. The effects of the volcanic eruption and climatic instability at the time in combination with degrading soil properties may have made continuation of the enterprise unfeasible. Socio-political change probably also played a role, however, since the abandonment of (rural) villas in Crete is a widespread phenomenon[77]. In addition, Christoph Siart has suggested that climatic change was a key factor through its impact on local hydrological conditions: if the springs dried up, the location lost much of its economical value. This could also have been caused by seismological activities, which, especially in the geological conditions of Crete, can result in a sinking groundwater table[78]. The availability of water would then have been the one factor whose disappearance made a previously marginal landscape an economically unusable one.

However, the most likely scenario is that a number of more or less related causes accumulated to prompt the abandonment. "Demnach muss ein Zusammenwirken von Klimawandel, hydrologischer Ungunst, Bodenverlust an den Hängen, Vegetationsdegradation, Erdbeben und dem Santorin-Ausbruch (mit Tsunami und Aschefall) zu einem stetigen Bedeutungsverlust der Gebirgslagen geführt haben. Nicht die Veränderung eines Faktors, sondern die vollständige sowie grundlegende Umstellung des Geoökosystems mit hoher Geschwindigkeit und Vehemenz machte die Kultur anfällig für die folgenden oder zusätzlich eintretenden politischen und ökonomischen Umbrüche, die zum endgültigen Niedergang der lokalen Besiedlung führten"[79]. The region of Zominthos would then be a prime example of environmental factors inducing human settlement, human impact changing this environment, and human response by abandoning the area. More recently, the local

[76]Siart *et al.* 2010, 88; Siart 2010, 92. 134–136. Cf. the map indicating ash fallout in Driessen – Macdonald 2000, 84 Fig. 3, which assumes that no tephra fell further west than the eastern limit of the Lasithi mountains. Cf. however also the much earlier map in Boekschoten 1971, 44 Fig. 3 and the one in Watkins *et al.* 1978, 123 Fig. 1.
[77]Driessen – Macdonald 1997, 36 Fig. 4.1. 40–43. 70–74.
[78]Gorokhovich 2005; Siart 2010, 144–145.
[79]Siart 2010, 149–150.

ecosystem has been stable; there is no evidence for continuous land degradation from the late Holocene onwards[80].

In view of the distribution pattern of 'rural villas' in Crete, it has been suggested that the Central Building at Zominthos functioned—the 'caravanserai' idea notwithstanding—as the central controlling unit of a more or less densely settled region, with other as yet undiscovered centres fulfilling the same role for adjacent areas[81]. Predictive modelling has identified potential locations for such subordinated settlements in the karst depressions[82]. However, it has to be borne in mind that while the criteria of human choice of an area for exploitation and/or settlement have hardly changed over the millennia, the climatic conditions probably have, and with them the areas which meet these specifications[83]. In addition to these predicted locations, there are a number of sites that have been identified through material evidence, in most cases solely from surface finds. There are traces of Neopalatial and later habitation (at and near Rizoplagies south-west of Krousonas), whereas four certain and one possible peak sanctuary show that the ritual aspect of this landscape was not limited to the Idaian Cave and the associated route[84]. Sklavokampos, at ca. 600 m ASL on the way from Knossos to Zominthos, is believed to have been a thriving settlement, although only one mansion has been excavated so far; this building, from which almost 40 clay sealings were retrieved, was not reoccupied after a fire destroyed it in LM IB[85]. The animal bones found here were not specified any further, and apart from twelve olive pits, no plant remains were reported either[86]. Evidence for LM presence has also been seen in

[80] Siart 2010, 147.

[81] Siart 2006, 55.

[82] Siart *et al.* 2008; Siart 2010, 115–116. Cf. Traunmüller 2008, 12.

[83] Siart 2006, 104.

[84] For references to all these sites see Sakellarakis – Panagiotopoulos 2006a, 50 with footnotes 9–16. The peak sanctuaries are Gonies, Pyrgos, Gournos Krousonas, a possible second one near Gournes at *tou Petrogianni to Mouri* and the uncertain Keria; in the case of the first two it is not clear whether they were actually still in use at the time (see Rutkowski 1988, 79–81. 87–88. 93), whereas the MM IIIA peak sanctuary on the summit of Gournos (ca. 1300 m ASL) would already have been abandoned at that time, see Rethemiotakis 2009, 192 (this in contrast to MM III-LM I given by Rutkowski 1988, 93). For Pyrgos see also Kyriakidis 2007. A small number of Minoan sherds has also been found in a cave at Kylistria, about 1.5 km east of Zominthos. For other finds from the area, for example from Sisarcha, see also Sakellarakis 1984, 599; Sakellarakis – Panagiotopoulos 2005, 105; Andreadaki-Vlazaki 2006, 18. For peak sanctuaries see chapter 11.

[85] For a short introduction see Driessen – Macdonald 1997, 127–128; Fotou 1997, 46–48.

[86] Marinatos 1941, 93.

several locations outside modern Gonies, and 'Minoan' sherds in a small doline 2.5km south-east of the modern village[87].

Not much is known about the Psiloritis in the later parts of the Bronze Age. There was some kind of reoccupation in LM III of a small part of the settlement at Zominthos, though not of the Central Building. Landscape degradation, at least in some areas, is believed to have been quite advanced[88]. Tylissos was a decent-sized settlement in LM IIIA-B[89]. The toponym *'e-ko-so'* in the LM III tablets from Knossos has been identified as later Axos, although surface finds from this period are so far largely lacking. Nonetheless, the fact that it is mentioned together with *'su-ki-ri-ta'* (thought to be Sybrita) has been taken to mean that there existed a connecting roadway between the two sites[90]. The area of later Eleutherna, possibly 'Satra' in Minoan documents[91], was probably settled throughout the Bronze Age. A faunal assemblage tentatively dated to LM contained unquantified numbers of bones of cattle, sheep/goat, pig and donkey as well as those of wild boar, badger and hare. Chicken has also been identified[92], which would be an interestingly early occurrence (see below, p. 221). Both wild and domestic pigs imply the existence of forests, preferably oak; ovicaprids and cattle may have grazed those or open pastures of different kinds.

## 6.5 LM IIIC and Early Iron Age

As in the previous period, cult activities seem to have been much less frequent at Kamares than at the Idaian Cave. Whereas from the former a few Subminoan and Protogeometric weapons testify to very occasional dedicatory visits[93], testimony from the latter is much richer. Metal votives include weapons and animal figurines[94]. The bronze figurines of horses and bulls have been interpreted by M. Prent

[87] Faure 1969, 182. 185.
[88] Siart 2010, 150.
[89] Wallace 2010, 66.
[90] Scafa 1994, 175.
[91] Andreadaki-Vlazaki 2004, 31; Stampolidis 2004b, 82–83; Andreadaki-Vlazaki 2006, 15.
[92] Nobis 2003, 92 Table 9.1. For the potential settlement see Stampolidis 2004b, 83.
[93] Faure 1964, 182.
[94] For some of the other votives of the 10$^{th}$–8$^{th}$ century BC see Matthäus 2000; Sakellarakis – Sapouna-Sakellaraki 2011, 151.

as substitutes for the ideal but costly sacrifices of live animals rather than as a reflection of the concerns of livestock owners since in her opinion cattle were never prevalent in Cretan economy[95]. This pattern seems to have been the same in the whole island[96]. The comparatively pricey material of the statuettes—terracotta figurines are rare—could indicate the aristocratic status of the dedicators, who may or may not have been concerned with the wellbeing of herds[97]. Animal and bird bones inside and around the altar have also been reported[98].

One of the few settlements which persisted, possibly into Protogeometric times, is Tylissos[99]. Its topography defies the general trend of this period, although the number of 'defensible sites' is surprisingly small in this part of Crete. A settlement was probably located at Axos, 550 m above sea level on a naturally protected ridge. A small number of LM IIIC-PG potsherds has been found[100]. The low hill called Koupos south-east of modern Krousonas was occupied in the times of LM IIIC and Late Geometric pottery[101].

Pyrgi (340 m ASL, see Fig. 6.5) and other locations around later Eleutherna were also settled, maybe as discrete neighbourhoods or quarters[102]. Excavation produced animal remains from LM to Geometric layers, though they are not numerous (129 identifiable pieces) and no context is given. When considering the following percentages, the small number of bones should be kept in mind. A surprisingly large portion, namely 20%, originates from wild animals: agrimi, wild boar, hare and salt-water fish[103]; hunting and fishing apparently made valuable contributions to diet[104]. The inventory of domestic species is notable for including not only the usual sheep/goat, pig, cattle and dog, but also horse, donkey and

[95]Prent 2005, 394. I very much like the argument of Audring 1989, 79, which can easily be transferred from mentions in literary sources to number of votives.

[96]According to Prent 2005, 394, the majority of Cretan bronze figurines from the Early Iron Age are bulls and bovids, followed by rams, goats and *agrimia*.

[97]Prent 2005, 569. 571.

[98]Prent 2005, 315.

[99]Kanta 1980, 13; Wallace 2010, 66.

[100]Nowicki 2000, 192–193. Kanta 1980, 201 reports LM IIIB, too.

[101]Sjögren 2003, 118.

[102]Nowicki 2000, 193–194; Andreadaki-Vlazaki 2004, 32; Stampolidis 2004b, 83. Cf. Erickson 2010, 43 with footnote 6. Erickson 2010, 44 with footnote 8 also mentions unpublished Geometric material from the second ridge at Eleutherna called Nisi.

[103]Rat bones have also been found but I am reluctant to class these as food remains.

[104]But cf. below footnote 191.

chicken. The last-named are usually assumed to have been introduced to Greece only in the 8th century BC[105], and given the date assigned to the assemblage and the number of chicken bones at Eleftherna, it is interesting to note that they seem to have been popular from early on. Horses were kept since the Late Bronze Age, whereas the first evidence for donkeys in Crete dates to the Final Neolithic[106]. Another surprising result is the clear dominance of pig bones: 44 specimens (42%) as opposed to 29 (28%) from ovicaprids[107]. The social implications of pig-keeping can be large[108], but given the small size of the sample and without further information on the find context of the bones, it is impossible to draw any conclusions on daily life: for example, they could come from a cult place[109], and the alleged predominance of pigs in the city's economy may really just be the reflection of a religious tradition[110].

Late Geometric-Archaic pottery found recently in the area of the Central Building at Zominthos indicate that the site was much more long-lived than previously thought, although the extent of reoccupation, if such it was, is not clear yet[111].

## 6.6 Archaic, Classical and Hellenistic

Evidence from historical times is not plentiful. A couple of late 7th/early 6th century potsherds found on Timios Stavros (2456 m) have been taken as proof of a cult of Zeus on the highest peak of Psiloritis: firstly, because cult places on mountain tops are 'always' for Zeus, and secondly because of Diodorus Siculus' statement that the high meadows around the Idaian Cave were also sacred to Zeus

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[105] But the excavators at Kommos have assigned some specimens to MM II, see Reese *et al.* 1995, 200–201.

[106] Rackham – Moody 1996, 75.

[107] All information on Early Iron Age faunal remains from Eleftherna is taken from Nobis 1998, 413–419. It may be coincidence that the only place in Crete where I have ever seen pigs was the village of Kynigiana near Eleftherna (April 2011).

[108] See Filios 2007.

[109] Cf. Nobis 1999, 50. 53. 56. 60–61.

[110] A preference for pigs as sacrificial animals is attested from sanctuaries of Demeter, see Hermary *et al.* 2004, 80. Cf. Wallace 2003, 608; Wallace 2010, 264; Moody 2012, 239.

[111] <http://www.archaeology.org/interactive/zominthos/2011/08/field-notes-2011-week-3/> (26/9/2011).

(D. S. 5,70,4)[112]. This is, in my opinion, a very weak case, since sherds do not equal cult, and the ancient source does not even mention a peak.

Theophrastus (*Vent.* 13) reports that the mountain plains in Mount Ida, among them presumably Nida, were cultivated before the climate became too cold in his time, *i. e.* around circa 300 BC. However, even afterwards the plain would still have been desirable as grazing land for sheep—its value is reflected in the fight over exploitation rights between Anogia and Vorizia (on the south slope of Psiloritis) which was settled only in 1870[113]. Whether the same people who exploited the plain in ancient times also worshipped at the Idaian Cave is not clear. At any rate, a wealth of votive offerings dedicated here dates to the 8$^{th}$ to 6$^{th}$ century, indicating that the cult must have been especially popular at this time[114]. There may have been a rather sudden decline directly afterwards, but otherwise, there is evidence for continuing ritual activities in the following centuries, although the cult practice as such is not well known[115]. The first written mention of the Idaian Cave comes from the Classical Period, from one of the Olympic winner's songs by Pindar (Pi. *O.* 5), and in Platon's times it was apparently a place whose mention did not require further explanation. The identification of the cavern above the Nida Plain as the Idaian Cave of antiquity, backed by a terracotta plaque of Roman date with an inscription to Idaian Zeus which was found in the early excavation, is not normally doubted[116]. In contrast, the suggestion of tracing the cult of Zeus back to the Bronze Age and an association of a Minoan god with the mountains[117] must remain speculative.

Although the deposition date of the burnt bones of cattle, sheep/goat and hare cannot be discerned for certain, a number of Classical vessels found with them and mixed with ash may indicate that at this time, both domestic and

[112] Kritsas 2006, 196.
[113] Marinatos 1956, 243–244; Sakellarakis 1983, 418.
[114] Watrous 1996, 59. See Sakellarakis – Sapouna-Sakellaraki 2011, 155–157. 165–171. 176–180. 182–187 for some pictures.
[115] Interpretations vary somewhat, cf. Sporn 2002, 221 with Melfi 2006, 217 and Erickson 2010, 257. 260 with footnote 114. 266–267.
[116] Cf. O. Rackham's statements about Platon's poor geographical knowledge, *e. g.* Rackham 1996, 22. For the inscribed pinax see Fabricius 1885 and Prent 2005, 158 footnote 265 (with further references).
[117] Prent 2005, 592–593 attributes this idea to Cook 1925, 932 where however no such statement is to be found. Cf. Ventris – Chadwick 1973, 306–307.

wild animals were sacrificed here. Whether this happened on the enormous rock-cut altar in front of the cave's mouth is unknown since the platform has not been dated yet, although a Roman origin has sometimes been suggested[118]. Some remarks in ancient written sources could imply that there was a temple too[119]. At any rate the four bases of colossal statues on a small hill opposite the cave entrance do indicate that this was not just a remote and pristine location of a nature sanctuary[120]; it is up to everyone's imagination to envisage how the statues were conveyed to Nida. Theophrastus related that votives were hanging in a black poplar by the entrance (Thphr. *HP* 3,3,4)[121]; if he was describing his own experience, this practice would have been in fashion in the 4th and the beginning of the 3rd century BC. Nonetheless, no details of the ritual activities or their organization are known for this time either[122], although it is usually assumed that in Archaic times, Axos was responsible for managing the cult and that Gortyn took over in the Classical period[123]. The cult must have been of supra-regional significance, since Zeus Idaios is the *θεός ὅρκιος* not only of Gortyn, but also of poleis such as Hierapydna or Priansos, located at a fair distance[124]. Accordingly, in both Hellenistic and Roman times, pilgrims came from all over Crete and left their gifts to the gods[125]. The polis of Gortyn arranged processions to the cave

[118] See Watrous 1996, 59; Sporn 2002, 219. See also Verbruggen 1981, 72 footnote 8. For a photo see Sakellarakis – Sapouna-Sakellaraki 2011, 76.

[119] E. *Cret.* Frg. 472; Pl. *Lg.* 625B. See Sporn 2002, 219 with footnote 1601.

[120] Xanthoudides 1918, 23. All later writers such as Sakellarakis 1983, 421; Sakellarakis 1989, 86 refer to Xanthoudides; before the publication of a photo in Sakellarakis – Sapouna-Sakellaraki 2011, 76 I was not sure anyone else had ever actually seen these bases.

[121] Rackham – Moody 1996, 129 point out that this is unlikely to have been the true species of the tree.

[122] Sporn 2002, 221.

[123] Sporn 2002, 223. See Chaniotis 1988a, 34–35 for a more detailed analysis and cf. Chaniotis 2009, 62. Even if this assumption is correct, a statement like "Es ist jedoch sicher, daß in der Idäischen Grotte eine mächtige Priesterschaft amtierte, zu deren Unterhalt nach antiken Quellen verschiedene kretische Städte verpflichtet waren" (Sakellarakis 1989, 93) remains unjustified. The oracle function suggested by Sakellarakis 1988, 188–189 on the basis of a silver-plated knuckle bone has been dismissed by Sporn 2002, 221; see also Capdeville 1990; Chaniotis 2006a, 211–213. The knuckle bone has also been suggested to have been dedicated when a boy reached puberty (Chaniotis 2009, 63).

[124] Sporn 2002, 223.

[125] Sporn 2002, 222 with footnote 1633. Chaniotis 2008, 95 suggested: "If the cult of Zeus in the Idaean Cave revived in Roman times, this is probably due to its connection with a mystery cult and to its association with the Cretan Koinon, and possibly with the emperor cult as well."

on a regular basis[126]—in view of the distance, these must have occupied more than one day. The recent discovery of Archaic, Classical and Hellenistic material at Zominthos[127] is also of interest in this context—it is not on the route from Gortyn, but may have been a stop in the journey to the sanctuary from the north.

The remarkable thing is the continuity of the cult in this place: it is believed to have been performed uninterruptedly from MM III/LM I to the 5th century AD[128]. M. Prent thinks that at least part of the attraction of this location was its setting in what she calls "no-man's land"[129]. Although in political terms this is probably not a suitable description, given that it is generally assumed that this part of Psiloritis with the valuable Nida plain was always controlled by either Axos or Gortyn, it is nonetheless plausible to think of a visit to the Idaian Cave as "a true pilgrimage, leading through 'wild countryside' not normally crossed"[130], at least not by aristocracy. More important may have been a function as a meeting place for people from either side of the mountain (see above, p. 154 and p. 200 footnote 160).

The explicit naming of the *Idaian* Cave as the location of King Minos' meeting with Zeus to receive new laws only appears in a lecture by Maximos Tyrios in the 2nd century AD, although it can be argued that earlier authors meant the same site when they spoke of *τοῦ Διὸς ἄντρον*[131]. The parallel with Moses on Mount Sinai has sometimes been drawn[132], even though the two myths are really very different. Having said that, the notion of ascending a mountain to converse with divinity is deeply rooted in Christian, Minoan and Greek religious traditions (see chapter

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126 Matthäus 2000, 542 with footnote 113.

127 <`http://www.archaeology.org/interactive/zominthos/2012/07/field-notes-2012-week-1/`> (5/12/2012); Bennet 2011, 67.

128 Prent 2005, 158. See however p. 215. G. Sakellarakis encountered people from Anogia at the cave on Ascension Day 1988 and connected their visit to the ritual activities performed on that day (Sakellarakis 1989, 92).

129 Prent 2005, 566. Cf. Sjögren 2006, 152; Small 2010, 207.

130 Prent 2005, 566. I do not agree with Prent's comments on the weakness of political control of this area. Prent also has to be contradicted when she states that the Idaian Cave was not located on the natural itinerary through the mountains; she refers to potential transits from central to west Crete and also to the north-south route (p. 568) which has been shown to have been vital. See also Chaniotis 2006b, 200. 202–203. 206.

131 Max. Tyr. 38,2; Str. 10,4,8. For a detailed account see Poland 1932, 1903–1904; Verbruggen 84–85 with footnote 64.

132 Poland 1932, 1904; Panagiotopoulos 2008, 126.

4.4) , and I think it is more the idea of a mountain as a liminal area and meeting the divine there to receive godly instructions that they share than anything else.

Other cult places are known in upland locations from Hellenistic times too. A concentration of bovine figurines in a conspicuous location, namely "all placed around a rock on the edge of a deep chasm" may mark a Hellenistic cult place at Kinigotaphkos, north of the mountain called Voskero, north-north-west of Krousonas, from where a settlement is reported[133]. In the same area, the location of the Minoan peak sanctuary on Mount Gournos seems to have been frequented again, although to what purpose is not clear[134]. The same applies to the Minoan cult place on the two connected peaks of Pyrgos near Tylissos, at 685 m ASL, where both Archaic and Hellenistic pottery has been found[135].

Habitation at Krousonas Koupas, which had been settled in LM IIIC and is counted as one of the poleis of Crete, may have ceased in the 6th century BC[136].

L. Sjögren makes out a certain parallelism in the development of Axos and Eleutherna: they were both, she claims, small villages in the 8th century. "However, their mountainous locations, overlooking vast valleys or plains in the direction of the north coast, constituted good incentives for urban development, which must have taken place in the course of the 7th century"[137]. Others have argued for an emergence through the fusion of formerly separate communities on the two ridges dominating the area[138].

The *asty* of the ancient city of Axos is so insufficiently explored that not even a plan is available, but it is generally thought that the polis enjoyed its greatest prowess in Archaic times. A number of cisterns were constructed at this time[139], reflecting either a lack of springs or a high population density and intensive agriculture. The majority of surface pottery dates to the Archaic to Hellenistic or Roman

[133] Chaniotis 1991, 96.
[134] Rethemiotakis 2009, 189–190.
[135] Rutkowski 1988, 87–88; Kyriakidis 2007, 218. For this phenomenon see p. 149.
[136] Sanders 1982, 9/13; Chaniotis 1991, 96; French 1994, 78.
[137] Sjögren 2003, 85.
[138] See Themelis 2009, 50; Erickson 2010, 43.
[139] Sjögren 2008, 143.

period, although the Hellenistic history of Axos is better known from epigraphy than from finds and topography[140].

Eleutherna on the other hand has been subject to modern excavation and is hence much better documented than most other sites in the Psiloritis. It is often cited as being representative of the *mountain* economy in this area. For example, A. Chaniotis found that "in some parts of Crete, particularly in the uplands, in certain periods and under certain conditions, shepherding and related activities took the form of a specialized trade which compensated for the lack of other resources (*e. g.*, arable land)"[141]. In the case of Eleutherna (but also Lyttos, Biannos and Prinias), he argues, this compensation took the form of leather working and textile production. His statement is based on 345 loom weights published from the site—all in one building (House A) which dates to the Hellenistic period and seems to have been a private house, not a factory[142]. Eleutherna, however, is not situated in the mountains proper but on and, *nota bene*, *around* a foothill with a modest elevation of ca. 320–390 m on the northern periphery of the mountain range (see Fig. 6.5), amidst lush valleys in which olives abound today but which would doubtless have supported cereals and other crops until a hundred years ago[143]. Since the early Modern Era, a village to the south of this location has been known as Prines, which is believed to derive from large numbers of *Quercus ilex* (holm oak, Greek *πρίνος*) growing in the area[144]. The city had its own quarries from which the limestone for its buildings was extracted. The narrow bedrock connection between the Prines acropolis with its ruined medieval (?) tower and the village of Archea Eleftherna shows rectilinear grooves from quarrying, too[145]. No houses from the Archaic and Classical period are known so far[146], but the funerary record contin-

[140]Nowicki 2000, 192–193; Sporn 2002, 224. Paul Faure mentions Geometric and Roman sherds in a cave near Axos called Lamias (Faure 1964, 188).

[141]Chaniotis 1999b, 207.

[142]Tsigonaki 1994. See also Moody 2012, 240.

[143]Cf. Spratt 1865b, 97; Nobis 1999, 54–55.

[144]Spratt 1865b, 87; Themelis 2004, 47. It is an interesting detail that apparently the acorns of this species are especially useful as pig fodder (Alibertis 2007, 112) which goes well with the evidence for pig breeding in ancient Eleutherna (see above footnote 107). Cf. however the warning expressed by Rackham – Moody 1996, 65 and the distribution map on their p. 66 Fig. 6.10b.

[145]See Stampolidis 2004b, 88 with Fig. 7. Note that there are still quarries in operation in this area today (April 2011). Sanders 1982, 162 gives 'late Roman or early Medieval' as the date for the tower.

[146]Stampolidis 2004b, 93. See Themelis 2009, 50–53 for a Geometric-Archaic *megaron*.

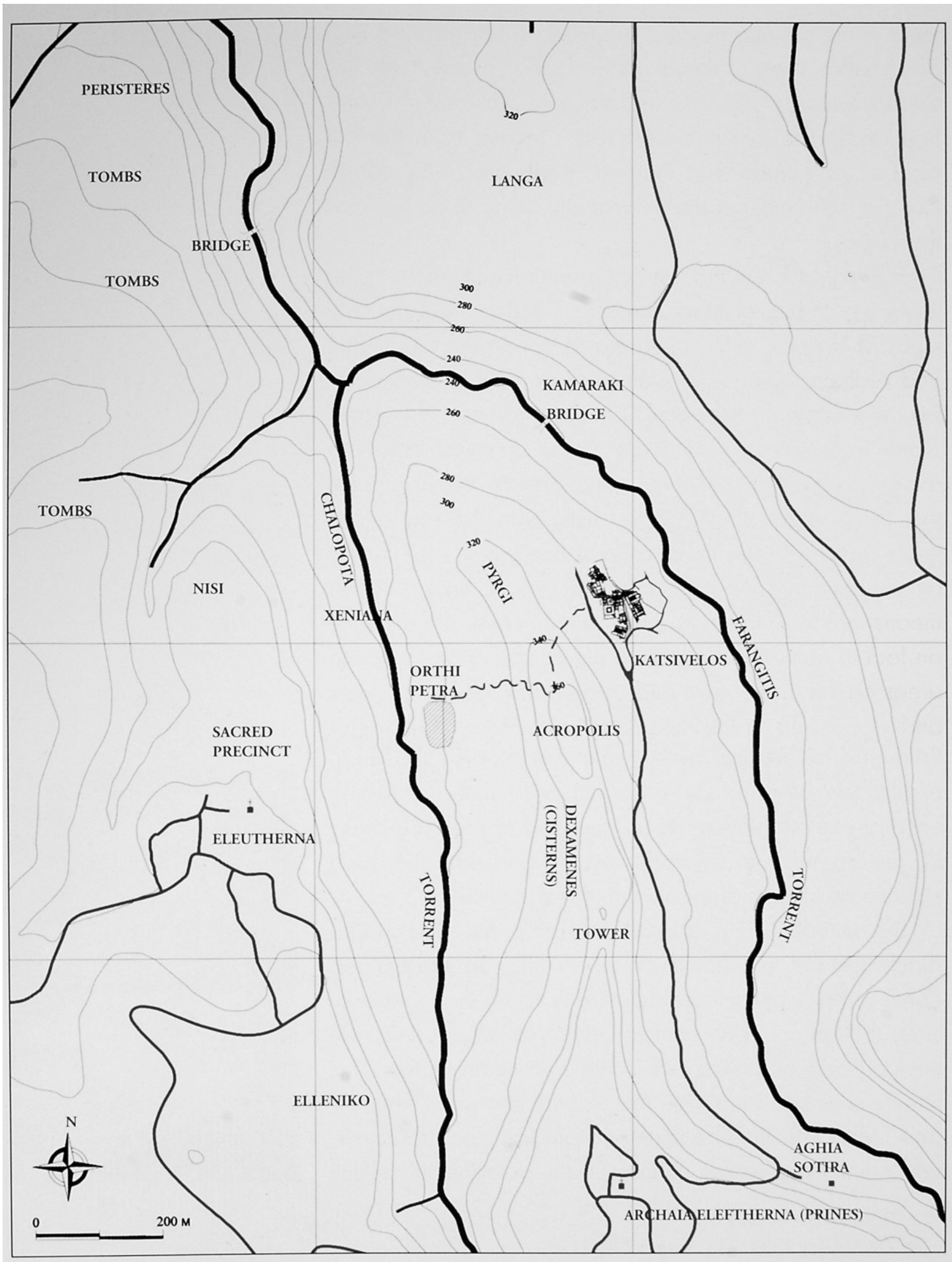


**Figure 6.5:** Map of the Eleftherna area (from Stampolidis 2004c, 19 Fig. 3)

ues throughout and imported pottery styles (which seem to have come in separate waves of fashion) show that the city was not cut off from the outside world at all. Local wares point to Eleutherna as a centre of ceramic production from its own distinct clay[147].

Unfortunately, although more Archaic inscriptions are known from Eleutherna than from anywhere else in Crete except Gortyn, and lots of them are concerned with economy[148], none of them mentions these aspects. Moreover, as Paula Perlman rightly points out, even leather-working could rely on hides imported from elsewhere, and references to wine drinking cannot be taken as proof of local wine production, not even in conjunction with a series of coins probably minted in the 3rd century BC depicting a bunch of grapes on the reverse[149]. A specialization in perfume has also been suggested, which would imply access to fine oil[150]. An Archaic (?) farmstead has been found in the vicinity of the site[151].

There are several archaeozoological studies of bones from Eleutherna, but publication is hardly adequate and in fact contradictory. Because of these difficulties, it is not useful to separate the Greek from the Roman period here, as will become apparent. One of the contradictions is that the number of identifiable bones from Late Archaic levels is given as three, the number of identified species is six, and the number of cattle, pig and ovicaprid bones with an identifiable slaughter age is ten[152]. Another and more unfortunate inconsistency is the pigs-to-ovicaprids ratio given: in 1998, it was stated clearly that pigs dominated in period I to III, *i. e.* Late Minoan-Geometric, Hellenistic-Early Roman and Imperial Roman times; the percentages given are 45% pigs, 30% sheep/goat, 11.5% cattle[153]. The number of pigs was said to have dwindled only in the Early Byzantine period to half the former value, with sheep and goat now constituting 50% of the material. This distinct change was put down to a change in climate leading to a reduction of oak forests and hence of 'grazing' grounds for pigs in the area. In contrast to this,

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147 Erickson 2010, 51. 77. 86–114. 245.
148 Perlman 2004, 97.
149 Marangou-Lerat 1995, 34; Perlman 2004, 103 with footnote 39.
150 Erickson 2010, 288 with references and discussion.
151 Erickson 2010, 254 with reference.
152 See Nobis 1999, 54 Table 2. 55 Table 5. 56 Tables 6. 7. It is also worthy of note in this context that in the same article, chickens are classed as mammals.
153 Nobis 1998, 414.

in an article published just one year later, the same author states as an overall result: "Mit fast 60% aller in Eleutherna gehaltenen Haustiere dominierten in der damaligen Tierhaltung die kleinen Wiederkäuer [*i. e.*, sheep and goats]"[154]. It can therefore unfortunately not be said with certainty when the change in economy from pig to ovicaprid husbandry came about.

That pigs were kept for meat is not a particularly surprising conclusion. Of greater interest seems to me that the slaughter age of pigs is said to be connected to sacrificial rituals[155]. In other parts of the Roman empire, extensive pig-keeping (with pigs roaming the oak forests for food) was with time replaced by an intensive form where pigs were raised in sties and fed with leftovers, clover and agricultural surplus. This would have required a different breed from the lean and leggy long-snouted variety that was used to walk longer distances: it would have been a short-legged type with more fat[156]. The bones from Eleutherna however indicate that the individual animals were much smaller than the 70 cm height they attained in earlier periods and have been classified as "relativ feingliedrige, hochbeinige Hausschweine, die man typenmäßig einem primitiven Weideschwein zuordnet"[157].

Through all ages, pigs feature much more prominently than cattle (this is backed by evidence from House A). Unfortunately, information on domesticated cattle are again contradicting: the 1993 article (referring to bones from the 1980–1992 excavations) states that in Hellenistic to Early Roman times, cattle at Eleutherna were of decent size and had big horns whereas the bones from Imperial Roman layers indicate small animals. In 1999 however, Classical to Hellenistic cattle (from the 1994–1997 seasons) were said to be small (1.0–1.2 m shoulder height) with short horns, to be replaced only in Roman times by a bigger breed termed 'Roman cattle' ("Römerrind")[158]. Of course it is always well possible that later excavations modify earlier results, and I would not blame anyone if that were the case. What I would expect in such circumstances however is a note or comment

[154] Nobis 1999, 57. This was repeated in Nobis 2003, 94.

[155] Nobis 1999, 56; Nobis 2003, 94–95. In Nobis 1998, 414 it is stated that pigs were slaughtered at a very young age of one to two years, whereas in Nobis 1999, 56 one reads of a "größere Anzahl älterer Tiere".

[156] Meyer *et al.* 2004, 87–98. 109–110.

[157] Nobis 1999, 57; Nobis 1998, 414. Cf. Meyer *et al.* 2004, 68–70. 87–98. 109–110.

[158] Nobis 1993, 113; Nobis 1999, 56; Nobis 2003, 95–96. Cf. however the heights given by MacKinnon 2004, 84.

stating that the new analyses differ to a large degree from earlier findings. As it is, all further interpretation is made impossible.

The slaughter age for cattle (without chronological differentiation) was determined as between the fourth and ninth year. However, a great number was left to live to ten years or more, which may indicate their use in traction: Hesiod recommended male cattle of nine years or older for ploughing[159].

In a context in room 67 for which no date is given, numerous rib bones from three individuals of cattle without traces of butchering were found. This has been suggested to represent either a ritual deposit or the victims of some epidemic[160]. In the case of the latter scenario, it is odd why only a certain portion of the animals should have been found however.

The majority of sheep and goats were killed in their fourth year—probably, so it has been suggested, to maximize wool production[161], although the production of *wool* can obviously only relate to sheep, not goats. The age profile is at least partly confirmed by a second faunal study from the second phase of occupation of House A (end of 2$^{nd}$ to beginning of 3$^{rd}$ century BC), although the assemblage is small and "pas très important". Ovicaprids by far dominate; unfortunately, no sex distribution has been published to supplement the hypothesis of an interest in meat and wool more than in milk[162]. The other trenches (excluding House A) apparently also yielded a great number of lambs of three to nine months as well as sheep of less than three years[163], which is precisely what would be expected if meat is the prime interest[164].

In contrast to donkeys, horses also seem to have been eaten. The bones of equids were made into tools and hinges[165]. Compared to modern breeds, both species would appear tiny: they were not higher than 1 m[166]. Chickens continue to be present[167].

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[159] Hes. *Op.* 436–440; Nobis 1999, 55; Nobis 2003, 95. Cf. Johannsen 2011; Halstead 2011b, 65–66.
[160] Nobis 1999, 56; Nobis 2003, 96.
[161] Nobis 1999, 55; Nobis 2003, 95.
[162] Villa 1994, 193–195.
[163] Nobis 1998, 414.
[164] Cf. Klippel – Snyder 1991, 184–185 with reference to S. Payne's 'meat model' (Payne 1973).
[165] Nobis 1999, 57. For Roman bone hinges and how they work see Mols 1999, 107–108 and Fig. 29.
[166] Nobis 2003, 96. Cf. Clutton-Brock 1987, 86.
[167] Nobis 1998, 417.

The percentages of domestic and wild animals given also vary; for the earlier phases (LM-Geometric), a relation of 80 and 20% respectively is given, followed by 85 and 15% for H-ER and 82 and 18% for Roman; nonetheless, the overall balance is stated as 95% domestic and 5% wild[168]. From Archaic through to Roman Eleutherna, there have been found what has been claimed to be remains of aurochs, *i. e.* wild cattle; whether the question about this species (see p. 114) can be solved by the evidence from Eleutherna I dare not say[169]. Besides the aurochs, the taxa of wild animals found include fallow deer, roe deer, red deer, hare (which would have been very small) and wild boar. The most popular quarry however, at least according to the number of bones found, was the *agrimi*[170]. The natural habitat of red deer is forest; G. Nobis concludes: "[d]ie Umgebung von Eleutherna war somit für den Rothirsch kein geeigneter Biotop"[171]. Obviously a hunter may well have gone further away and brought this rare prey home with him. Another possibility is a change in landscape and vegetation, but there are no additional data available which could lend more weight to this hypothesis. In Late Archaic and Hellenistic times, both domestic and wild animals were sacrificed at the temple in sector B-I/3[172].

The inscriptions from Eleutherna mention fig trees, barley and a *'κᾶπον'*, which has been interpreted as an orchard, possibly an olive grove, and Paula Perlman deems it safe to confirm, from the written sources, the cultivation of the Mediterranean triad[173]. The archaeobotanical sample from House A is ridiculously small but does not contradict this notion: two-row barley (*Hordeum distichum*), vine and olive have been identified, supplemented by dwarf chickling (*Lathyrus cicera*), fig and, interestingly, *Rumex* sp., which could be a type of sorrel, but at any rate an edible wild plant, into which category we can probably also put the *Labiatae* found[174]. *Celtis* sp. (hackberry) is also present; the only species native to Crete

[168]Nobis 1998, 414; Nobis 1999, 53.

[169]The remains from Eleutherna are presented in Nobis 1993; Nobis 1999, 58; Nobis 2003, 97.

[170]Nobis 1993, 113; Nobis 1999, 58–59.

[171]Nobis 1999, 58. Cf. Waelkens *et al.* 1999, 705. 707–708; De Cupere 2001, 174; Vanhaverbeke – Waelkens 2003, 44; Wallace 2010, 38.

[172]Nobis 2003, 98.

[173]Perlman 2004, 102. 129.

[174]For the plant remains from House A see Sarpaki 1994. The Labiatae family includes members such as mint, rosemary, oregano, sage and rosemary. For *Rumex* species growing in Crete today see Turland *et al.* 1993, 128.

today is *C. tournefortii*, which grows on calcareous cliffs in gorges at 400–750 m[175]. Paula Perlman also detects "two traditional strategies of land use—fallowing and cultivation by serfs"[176], though to my mind the latter is less a strategy of land use than a question of social hierarchy: to nature it makes no difference whether it is cultivated by a serf or a free citizen (although the resulting landscapes are certainly different). It is possible that these agricultural activities made it necessary to supplement the city's water supply from two streams with a great number of cisterns (two of them unbelievably huge, see Fig. 6.6) and an aqueduct from the mountains, even more so if, as today, the rivers dry up in the summer. Given the position of the cisterns, it seems more likely however that they served the public bathing facilities in the city[177].

## 6.7 Roman

Testimonies to human activities in the Psiloritis after the Roman conquest in 67 BC are largely restricted to the Idaian Cave, where cult continued seemingly uninterrupted into Late Roman times (5th century AD)[178]. It has been suggested that the mountainous setting with its harsh climate was especially fitting for the cult of a god believed to die in winter (when the cave was inaccessible) and reborn in spring (when the Psiloritis is at the height of its beauty)[179]; however, the notion of a *repeated* birth and death of Zeus is not put forward in any ancient source and cannot be sustained[180].

[175] Turland *et al.* 1993, 147. For slightly different information and on hackberry and its uses see Moody 2012, 250–251.

[176] Perlman 2004, 129.

[177] Themelis 1992, 91–92; Nakassis 2000, 353; Perlman 2004, 98. For the cisterns see Sanders 1982, 162; Guy – Matheron 1994; Stampolidis 2004b, 100–101. For the Roman baths, which may have necessitated such measures, see Themelis 2009, 72–79.

[178] Sakellarakis 1988, 173–174; Prent 2005, 158–159. See also Melfi 2006.

[179] Sapouna 1998, 16. Cf. Matthäus 2000, 518: "Die topographische Lage brachte erhebliche Probleme für die Heiligtumsorganisation, für Konservierung, Schutz und Bewachung der kostbaren Weihgaben, da die Höhle nur wenige Monate im Jahr offen war und im Frühjahr das Innere regelmäßig von den Schneemassen befreit werden mußte." See also Verbruggen 1981, 91–93; Matthäus 2000, 542.

[180] Verbruggen 1981, 68–70. The same applies to the notion of a Bronze Age worship of *Zeus* in this location (Verbruggen 1981, 75).

**Figure 6.6:** Giant cistern at Eleutherna (Esther Widmann scale)

As mentioned above, the altar in front of the cave may have been cut out of the rock in Roman times (see p. 223 footnote 118). A popular votive object in those times were terracotta lamps, often with figurative decoration, which however in most cases does not seem to bear any relation to the personal concerns of the dedicator or the nature of the cult[181]. Their origins however do support the rank of the site as the most important cult place in Crete and one of the most important ones in the ancient world, which must have attracted a comparatively large number of pilgrims[182]—despite its remote location. Further evidence for the high status of the sanctuary comes from Diodorus Siculus (D. S. 5,70,4; 1st century BC), who

[181] Cf. Sapouna 1998, 171. In theory, the lamps could have been objects of use rather than gifts to the god, even more so since the largest number was retrieved from the deepest and darkest part of the cave. However, most lamps do not show any traces of burning, making this hypothesis unlikely (Sapouna 1998, 18. 171). Cf. Melfi 2006, 222.

[182] Sapouna 1998, 172.

states that the meadows around the Idaian Cave were sacred to Zeus, which has been interpreted as land owned by the sanctuary[183]. The same author tried to combine the differing traditions about the birth and rearing of Zeus and related (5,70) that the god was born on Mount Dikte and then brought to the Kouretes on Mount Ida[184]. Hellenistic to Roman pottery has also been found in two smaller caves on the south side, the northern slope and several other locations in the plain[185].

There is now evidence for Roman (and later) reuse and modification of parts of the Central Building at Zominthos[186]. Outside the Zominthos-Nida area, Paul Faure described Roman ruins near Astyraki at Kanassos, north of Minoan Sklavokambos[187]. Sisarcha, nowadays a small village halfway between Gonies and Anogia, was the site of a small Roman fort[188]. The only noteworthy remains in the study area come from the Sentoni Cave at Zoniana, where a Late Roman deposit contained bones of sheep/goat, pig, cattle (*Bos taurus*) and roe deer (*Capreolus capreolus*)[189]. The faunal material from Roman and Byzantine Eleutherna has been discussed above. Although Eleutherna was destroyed by an earthquake in 365 AD, it was not given up afterwards[190]. An assemblage of fish remains from Eleutherna dated to the Late Roman/Early Christian period contained bones of shark, sting-ray, grey mullet and grouper. The distance to the sea, about 10 km, is suggested to be "sufficient to assume that the fish remains found there did not come from the catch of a local fisherman. [...] [They] could have reached Eleu-

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[183] Chaniotis 1988a, 35 with footnote 72; Prent 2005, 569; Chaniotis 2009, 63. cf. above, p. 221.
[184] See Prent 2005, 593–594. For the myth of Zeus' birth and upbringing see Verbruggen 1981, 27–49.
[185] Sakellarakis 1983, 445–446.
[186] <`http://www.archaeology.org/interactive/zominthos/2010/08/field-notes-2010-week-1/`>; <`http://www.archaeology.org/interactive/zominthos/2010/09/field-notes-2010-week-2/`>; <`http://www.archaeology.org/interactive/zominthos/2010/10/field-notes-2010-week-3/`> (26/9/2011); Bennet 2011, 67; Petrakou 2011 (with photos).
[187] Faure 1969, 182.
[188] Pendlebury 1939, 371.
[189] Hamilakis 1998, 87. 92. See however also above, footnote 15. A Roman coin reported from Anogia (Sanders 1982, 163) does not seem to me to constitute sufficient evidence for activity there.
[190] Themelis 2009, 69.

therna either through a travelling fish monger, or by an Eleuthernian who had been to the coast, or even as preserved fish"[191].

## 6.8 Summary

With no part of Psiloritis ever subjected to systematic survey, the current state of research does not allow the derivation of a settlement pattern through the ages. A couple of sites were either explored very early or remain largely unpublished and can hence also shed only a very dim light on man-environment interactions and their development through time. From the faunal assemblages known, it can probably be assumed that roe and red deer lived in the wooded parts of this mountain range in antiquity, but apart from this, there are no indications as to the state of vegetation at that time. The earliest traces of human activity come from three open air sites, all of them situated on the north flank of the mountains, and two cave sites (Kamares and the Idaian Cave). At this early time, the caves were used for habitation, though maybe only temporally. Cattle featured much more prominently in the economy of the region than one would conjecture from the present state; the earliest bones so far come from an EM I/IIA deposit in the Sentoni Cave near Zoniana. In Middle Minoan times, the Kamares and Idaian Cave were sooner or later given over to cult, and a number of peak sanctuaries were founded in the area too. Most of them are only very superficially explored, and their connection to contemporary settlements and their territory is completely unknown. Both peak sanctuaries and caves were endowed with votives in the shape of animal figurines. Kamares ceased to receive attention, but cult at the Idaian Cave continued through the centuries, and the huge Minoan 'villa' and surrounding settlement 300 m below at Zominthos may have benefited from the traffic of pilgrims. Although not the only Palatial site in Psiloritis, it is by far the best explored. Predictive modelling may help to locate many more sites whose existence can as yet only be hypothesized: Zominthos is unlikely to have been the only place in the mountain range where favourable environmental conditions were taken advantage of. At Zominthos, both agriculture and stock-breeding

[191] Mylona 2003, 108. Cf. Moody 2012, 258: "A runner could easily deliver fresh fish several kilometers inland, if there was a demand."

were possible, and the excellent water supply would have further contributed to its attraction. It seems probable that some sort of degradation of these environmental assets, most likely due to a combination of natural (earthquakes, climate change) and anthropogenic (impact on vegetation) factors, led to the site being given up within a couple of generations. Nonetheless, it was apparently occupied again several times between LM III and the end of the Roman period. Axos and Eleutherna are two of the very few examples of LM IIIC 'defensible' settlements in Crete that developed into a polis. The former may have overseen the cult at the Idaian Cave in the Archaic Period, when it was especially popular. With the earliest traces going back to the Neolithic, Eleftherna proved a particularly favourable position over the millennia. Its setting on and around a foothill of the Psiloritis, surrounded by two rivers and set back from the sea without being cut off from international trade, seems to have been a winning combination, and the community retained its city status into Roman times. The faunal remains from Eleutherna are unsatisfyingly published but definitely show that for a long time, pigs held a prominent position in the economy of the settlement. The Idaian Cave continued to be visited as a cult place into the $5^{th}$ century AD, but even in the centuries before that, it is, with Eleutherna, virtually the only site known.

# Chapter 7

# Lasithi Plain

The area known as the Lasithi[1] mountain plain is really an enormous *polje*, or karstic basin, in the limestone massif of north-western Dikti, at a height of approximately 840 m above sea level (see Fig. 7.1). The biggest of its kind in the island, its surface roughly measures 6 km (north-south) × 11 km (east-west). A karstic hum called Kephala divides the plain into two parts of unequal size. The western, bigger portion makes up about two-thirds of the total plain. Since the whole basin slopes from east to west, the smaller, rockier eastern part known as Xerokampos lies at a slightly higher elevation. The highest point of the plain—870 m ASL—is the south-western corner of the basin, at the entrance to the Chavgas gorge. Rain and melt water from the highest ranges of Dikti gather in the Katharo plain, 350 m above Lasithi, flow through the gorge, cross the plain as a river and disappear at its lowest point (814 m ASL) at the western end into a funnel-shaped *χώνος* (*chonos*, natural sinkhole).

A number of springs are situated along the edges of the plain, predominantly in the south and in the east between the villages of Tzermiado and Mesa Lasithi. Since water seeping through the limestone mountains is stopped short by the impermeable schist layer which underlies the limestone, springs occur where the schist is exposed. The Kampos can be dug for wells; on the Xerokampos ('dry plain') deep wells are needed, and cisterns were constructed here in the Venetian period. However, the face of Lasithi has changed substantially through the con-

[1]For the origin of the name see McArthur 1993, 143–144.

**Figure 7.1:** View of the Lasithi plain from east (May 2009; photo courtesy of Torben Keßler)

struction of drainage canals in the 17th century AD. Until then, water must have submerged the plain at times for more than six weeks and drowned the crops. There seem to have been early attempts at drainage, but it was the Venetians who succeeded in dividing an area in the western portion of the plain into fields by a (roughly) orthogonal grid of ditches sometime between 1463 and 1630[2]. The central and western portion of the plain effectively consisted of marshland until windmills were first employed to pump water at the end of the 19th century AD; more recently it got so dry that they were used for irrigation[3].

Habitation and agriculture were therefore possible solely on the foothills and also in the valleys all around the plain[4].Within this framework, recent (and therefore some ancient) settlement locations were probably chosen because of their vicinity to springs and the starting points of routes to the outside world in the side valleys of the plain. The slopes of these valleys are convenient for vine cultivation[5]. The plain itself is planted with potatoes and vines; cereal cultivation

[2]Rackham – Moody 1996, 150. I wonder whether tree-covered slopes as described by visitors to the area after 1463 (Watrous 1974, 3–4) would have retained some of the melt-water.

[3]Rackham *et al.* 2010, 275. See Rackham *et al.* 2010, 271–275 for field systems in Lasithi.

[4]Watrous 1974, 3–4.

[5]Dawkins 1914, 3–4. The routes to the outside world are believed to be very old. The road to Lyttos starts near the *χώνος*, and there are paths to Kritsa in the east, Avdou in the south-west,

has now almost completely ceased[6]. Because of its elevation and setting, Lasithi receives morning dew all through the year, which means that the ground is never as dry as it is at lower altitudes in the height of summer[7]. Water pumping is still necessary, and some of the characteristic windmills are still there, although a large number has been replaced by electric pumps. The soils within the plain make all these efforts worthwhile: made up of a lower stratum of *terra rossa* mixed with rubble and an upper but older layer of yellowish Pleistocene alluviations, they are an unusually even stretch of good arable land in this rugged island. The only essential crop that will not prosper at this altitude is the olive: in winter, the local climate is cold compared to Mediterranean standards and snow often settles for weeks[8]. Many Lasithiotes today therefore own olive orchards in lower elevations outside Lasithi: because olives are harvested in winter, in the slack period of other agricultural activities, it is possible for them to leave the mountains for a while and come back with fresh oil supplies in early spring[9].

The state of archaeological research in Lasithi is mediocre: thankfully, surveys of the plain itself as well as the surrounding mountains have enabled us to state with some certainty where people broke their pots. But although some sites have been more closely examined, the information gained from these enterprises is very limited overall and even smaller as far as man-environment interaction is concerned.

## 7.1 Neolithic

The earliest traces of human presence in Lasithi date to the Late Neolithic. Before the survey conducted by Livingston Vance Watrous in the early 1970s, it was mainly cave sites that were documented for this period, namely Psychro, Trapeza, Skaphidia, Argoulia, Meskine and Agios Charalambos. The last-named as well

to Potamies/Neapolis to the north-east, to Viannos in the south and to Malles, Kalamafka and Ierapetra in the south-east.

[6] *Pers. comm.* from the landlady of a *kafenio* in Agios Georgios, April 2011.

[7] Greger 1988, 23.

[8] Watrous 1974, 5; Watrous 1982, 7.

[9] Watrous 1974, 321–322; Forbes 1995, 327–328. Cf. however the different pattern described by Rackham – Moody 1996, 160 for Lasithi and Koster 1977, 175–176 for the Argolid.

as Psychro and the Trapeza cave were used for habitation (see Figs. 7.2, 7.4 and 7.5)[10].

**Figure 7.2:** Inside the Trapeza cave (April 2011)

Use of the Agios Charalambos Cave, on the western edge of the plain, is dated to the Final Neolithic, though maybe not all of it: "Rooms 1–3 may have been more hospitable than the lower, cooler, and muddier Rooms 4–7"[11]. In the Psychro Cave the pool in the lower chamber of the cave may have been a convenient source of water and one reason for choosing this place as a residence[12]. Although the cave has been explored, the mode in which this happened can hardly be considered scientifically valuable: D. G. Hogarth relates how he used dynamite to remove inconvenient boulders. He described the Neolithic pottery which he found inside the Psychro Cave as "primitive *bucchero*" and reports it to have been mixed with

[10]See however Tomkins 2009 for a different approach to Neolithic cave usage.

[11]Ferrence 2008, 87. I am not sure that in view of finding utterly disarticulated skeletons and that the "contents of the cave were thoroughly mixed, and no stratigraphy was discernable [*sic!*] during the recent excavations", I would arrive at the conclusion that "[d]ue to these conditions and the parallel types of artifacts, this assemblage of burial goods has elucidated the nature of the Bronze Age use of the Trapeza Cave and will provide immeasurable information on Minoan burial customs and their communal life in Lasithi" (Ferrence 2008, 3). The bones were redeposited in the cave in MM IIB, see also Betancourt *et al.* 2008a.

[12]Watrous 1996, 47.

great quantities of bones[13]. It is not clear whether these are the bones described by W. Boyd-Dawkins since they have not been assigned any date at all and are therefore of very limited use[14].

Watrous' survey has made it clear that people also lived in open air sites, normally only represented by a few sherds; no architectural remains can be assigned to this period. The sherd clusters are located all around the plain on the lowest slopes of the surrounding hills and mountain ranges. One of them is Tzermiado Kastello, a rather steep hill on the north side of the plain (see Fig. 7.3); the closest water source today is situated behind the Trapeza hill. There is evidence for a settlement and associated burials[15].

Drawing on evidence from Knossos and Debla, L. Watrous hypothesizes that the Neolithic settlers came to the Lasithi area in search of pastures for their livestock (sheep, goats, cattle, pigs), forced by population pressure in the plains to move to the mountains. According to him, fragments of large open vessels frequently occur in the ceramic assemblage from Lasithi, and many of them are blackened by fire. Watrous conjectures that they may have been used for boiling the milk to make cheese analogously to modern practises[16].

The plain of Katharo had also already been settled by the Neolithic. Stone tools were made from red flint which was probably collected in the area of Pethianos one kilometre to the south, but some obsidian indicates trade connections. One tanged and barbed flint arrowhead and a biconical terracotta spindle whorl were found[17]. Because of the great elevation of Katharo, Nowicki hypothesizes that hunting and seasonal pasturage may have been the decisive rationales behind the choice of place, even more so since the mountains would have sheltered animals

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[13]Hogarth 1900, 96. Pendlebury and his colleagues later stated that at Psychro, "the earliest objects date from the very end of MM I (*i. e.*), just before the beginning of MM III)"; 'objects' in this case do not seem to include pottery (Pendlebury *et al.* 1939, 23). Watrous 1996, 47 dates the beginning of cult activities at Psychro to MM IA.

[14]Boyd-Dawkins 1902. Watrous 1996, 47 seems to have reason to believe that they can safely be attributed to the Neolithic occupation and therefore states the presence of oxen, sheep, goats, pigs and dogs.

[15]Pendlebury *et al.* 1940a, 9–10.

[16]Watrous 1974, 290; Watrous 1982, 10.

[17]Watrous 1974, 122–125. Watrous 1982, 48–49 describes all finds as Late or Subneolithic but nevertheless states an occupation of "LN-EM I". This also applies to Agios Georgios Alexenia (Watrous 1974, 143–147; Watrous 1982, 51).

which had populated the lowlands before humans settled there. Whether Katharo was used by people from Lasithi or from elsewhere is impossible to say[18].

## 7.2 Early Minoan

### 7.2.1 EM I

The very beginning of the Bronze Age is not well documented in Lasithi. As elsewhere, it seems that the pottery of Early Minoan I was often hard to distinguish from that of the preceding Late and Final Neolithic[19]. Indeed there are a number of sites in Lasithi from which so far no unambiguous Neolithic material has been recorded. According to the chronology which Watrous himself cites, the five characters of "LN-EM I" equal a time span of 900 years (3500–2600 BC). This means that the material from such sites is of hardly any value at all, since it cannot tell us anything about the people who lived there at any one point in time. The same is true about the marine shells from the Trapeza Cave, which, in contrast to Watrous' statements[20], cannot be assigned to this (or indeed any other specified) period; sheep and cattle remains may or may not date to EM I-III[21].

### 7.2.2 EM II-III

Evidence for settlement in the Early Bronze Age proper comes "usually [. . . ] [from] the tops of steep hills near the edge of the plain". Considering the state of research, it seems premature to suggest they were really chosen with a view to defensibility, although according to K. Nowicki, the same phenomenon is notable in other regions of Crete, too[22]. However, at least in the case of Lasithi these slightly elevated and hardly imposing locations could also have been chosen because they were out of

[18] Nowicki 1996, 31. 33.

[19] Only in some regions and styles is there a clear distinction between FNL and EM (Betancourt 1985, 23). See also Watrous 1984, 9 and Haggis 2005, 47.

[20] Watrous 1974, 292. He does bemoan a "lack of context" in most EM sites however.

[21] Pendlebury *et al.* 1939, 21. 23. 126.

[22] Watrous 1982, 11; Nowicki 1996, 33–34; Nowicki 1999b. Nowicki even proposes that this phenomenon may have been caused by an influx of people fleeing from the lowlands.

the flood zone of the plain, or, as elsewhere, to avoid building over valuable arable land.

## 7.3 Middle Minoan

### 7.3.1 MM I-II

At the beginning of the Middle Bronze Age, this pattern is retained. Tzermiado Kastello and Plati (Pano Kefala) were arguably among the most extensive and populous settlements in Lasithi. On the Kastello (see Fig. 7.3), a number of stone

**Figure 7.3:** View of Tzermiado Kastello (foremost hill to the right) from roughly south (April 2011)

pounders, animal bones, a boar's tusk, a conch shell, carbonized wood and plaster, an unbaked mud-brick, spindle whorls, a few loom weights and parts of a house with pithoi were dug up in the 1930s; the majority of associated pottery was dated to MM I and MM III[23]. These locations may have been advantageous in the prevailing dry climate at the time which would have gone hand in hand with severe floods.

Nowicki has located a substantial number of settlements with MM II material in the mountains around Lasithi and reported mud-brick and wood as building materials[24]. Other sites have MM I-II mud brick structures as well as MM II-III architecture built from big blocks of stone. It is these latter structures which Arthur Evans in 1895 interpreted as "forts" and "guard stations" along a Bronze Age military road[25]. However, Evans' impression that these sites were situated linearly along a route is not correct: they are dispersed all over the region. Nowicki conjectures that these sites were the result of a more or less systematic colonization of the area by people from outside the Lasithi plain. In his opinion, these locations were chosen because of their suitability for economic purposes such as herding, farming and the exploitation of the forests in the area; especially the latter would, he says, have been in constant demand by the palace at Malia[26]. There is no supporting evidence for any of these claims.

Habitation in caves had ceased completely by this time. Instead, these places were given over to ritual use: the Agios Charalambos Cave was used as an ossuary in MM IIB and not disturbed after that. Cutmarks on bones of sheep/goat and pig found in front of the cave's entrance make it likely that they are the remains of a meal, possibly ritual, in this location, whereas bones of sheep or goats, pigs and cattle inside the cave are interpreted as offerings to the dead. Bones of cats and dogs were also present, and the large numbers of remains of hare have led to the suggestion that they may have been kept in enclosures rather than hunted in the wild[27]. A gold ring with a representation of cockle shells is noteworthy because of

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[23] Pendlebury *et al.* 1940a, 6–14.

[24] Nowicki 1996, 39.

[25] Evans – Myres 1895 (*non vidi*; cited after Nowicki 1996, 36). On this type of site see also Beckmann 2012, 85–91.

[26] Nowicki 1996, 36. Cf. Ferrence 2008, 6–7.

[27] Betancourt *et al.* 2008a, 541–542. 546; Betancourt *et al.* 2008b, 163–164. The DNA of the human remains was recently analyzed in an attempt to trace the origin of the Minoan popuation (Hughey *et al.* 2013).

the distance to the sea[28]. Luxury objects, which presumably were produced in the palatial centres, were deposited in the caves of Trapeza (now used for burials)[29] and Psychro. In Psychro there were several layers of sherds and animal bones, with strata of ash and carbonized matter between them. The lowermost layer contained Kamares pottery, and a number of bronze objects such as double axes, daggers and tweezers, clay figurines as well as ceramics have been attributed to MM IB-II, which is hence taken as the date of the earliest cult activity in the cave[30].

Cult was not restricted to caves: an open air sanctuary seems to have existed in MM I-II at Karphi, to the north of the mountain plain. Finds include animal and human figurines, both male and female, terracotta limbs and miniature vessels, and it has been suggested that because of visibility connections this peak sanctuary was linked to settlements outside Lasithi rather than in the mountain plain[31].

### 7.3.2 MM III

The most definite evidence comes from the oval hilltop of Mesa Lasithi Vigla in the eastern part of the plain. Architectural remains and the pottery scatter cover an area of ca. 50 × 50 m. The dating has recently been revised to MM II and perhaps MM III[32]. Pendlebury described this as a "fort with good heavy walling and sherds". In contrast, Watrous saw in these remains, just like in other clusters of sherds, something like a farm or a *metochi*, reflecting the agricultural system at the time. There seems to be a cluster of ceramics and terracotta figurines of bulls on the western edge of the site. Situated 160 m above the basin bottom, this spot commands an unrivalled view over the mountain plain, but also down the adjacent valley which is one of the natural routes from Lasithi to the east. This could indicate a lookout post, while the presence and amount of the bull terracottas

[28] Betancourt 2011.
[29] See Betancourt *et al.* 2008a, 552–552 for similarities to Agios Charalambos.
[30] Hogarth 1900, 97–98; Nowicki 1996, 36; Watrous 1996, 47–48. Cf. Watrous 1974, 296.
[31] Pendlebury *et al.* 1940b, 98; Watrous 1974, 297; Nowicki 1996, 40–42; Nowicki 2000, 164. More MM material, including grape pips and bones of sheep, pig and one possible equid, was unearthed recently, see Wallace 2012, 25. 30–34. 68. 71. 74–75.
[32] Nowicki 1996, 39.

may point to some kind of cult place. Nowicki therefore argues in favour of "a small multifunctional settlement or hamlet, with a domestic shrine"[33].

## 7.4 Late Minoan

### 7.4.1 LM I

The scarcity of LM I pottery in Lasithi makes it difficult to define this period, but it seems that the settlements around the edges of the plain moved further down the slope[34]. Again a palatial connection has been suggested, this time the idea is that Lasithi supplied the coastal settlement at Malia with grain on a regular basis and would have traded with this and possibly other palatial centres in mountain produce such as cheese, meat and wool for metals and other commodities[35]. Cult in the Psychro Cave on the other hand is well documented for MM III-LM I (see Fig. 7.4 and Fig. 7.5): in addition to the deposition of braziers and lamps or incense burners, conical cups, possibly filled with food, and a large number of bronze objects (weapons, tools, pins and other ornaments), an altar was built in the upper chamber and an area separated with a wall and paved with stone; the pithoi found there led to its appellation as a 'storeroom' (a recent new interpretation of caves associates storage facilities with fertility cults[36]). Clay and bronze figurines depict bulls, wild goats and birds, and remains of oxen, pigs, deer, goats and *agrimia* may testify to offerings of another kind[37].

No LM II pottery has been recorded in Lasithi; however, it would be too rash to suppose that the area was abandoned. The chronology of Late Minoan Pottery was

[33] Pendlebury *et al.* 1940a, 2; Watrous 1982, 14; Nowicki 1996, 39–40.
[34] Watrous 1982, 15. This is not the only pottery style which is difficult to trace in Lasithi, see Nowicki 1996, 30.
[35] L. V. Watrous supports this idea (although there are several difficulties with it, see Watrous 1974, 307–309) but cautions that such a connection to Malia would not have the same character as the way in which "a classical Greek mountain city would have been linked to its own harbor town (*e. g.* Lyttos and Chersonesos)" (Watrous 1982, 16). He does not really explain why, but I would point to the fact that with Lyttos and Chersonesos, it was the upland(ish) Lyttos who was superior, whereas with Lasithi and a coastal settlement, archaeological evidence makes it clear that the mountain plain would always have been the weaker party.
[36] Tomkins 2009, 145.
[37] Watrous 1996, 48–50. On the conical cups see Evans 1928a, 135 with footnote 1.

**Figure 7.4:** Inside the Psychro Cave (May 2009; photo courtesy of Torben Keßler)

devised largely on the assemblage from Knossos and does not necessarily allow for the pace of development elsewhere. It has been shown that in remote areas, LM I may have continued and then merged seamlessly into LM III—after all, we are talking about fashions in pottery decoration, not fixed dates of cultural change[38].

### 7.4.2 LM IIIA-B

Evidence for LM IIIA-B settlements in Lasithi is present, but only on a very small scale. Merely the settlement at Plati seems to have thrived and an imposing new building complex was erected there, leading Watrous to "the conclusion that Mycenaeans lived at Plati among the remnants of the Minoan population in Lasithi"[39]. A tholos tomb tentatively dated to LM IIIA1/2 was recently discovered close to the road between modern Magoulas and Kaminaki[40].

Bronze weapons, human and animal figurines (bulls, a ram), jewellery and other objects were dedicated in this period in the Psychro Cave, and tantalizingly,

[38] See Betancourt 1985, 149; Nowicki 1996, 43.
[39] Watrous 1982, 18.
[40] Whitley *et al.* 2007, 103.

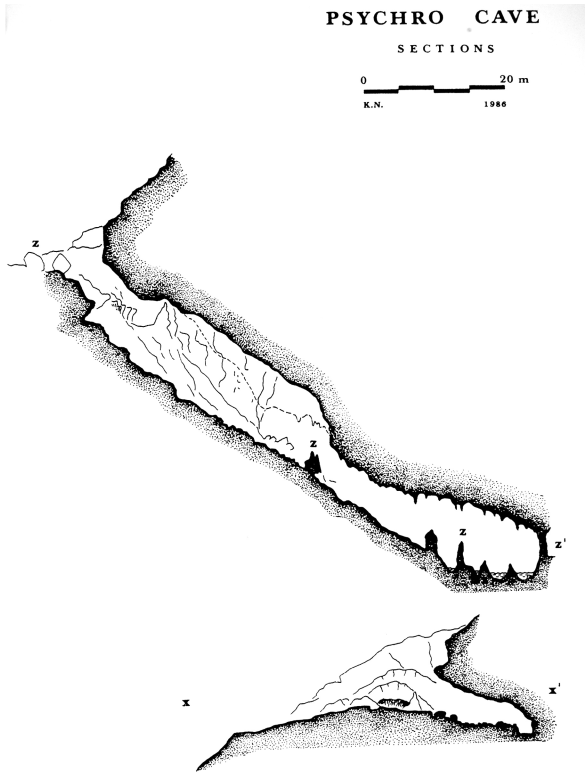


**Figure 7.5:** Section through the Psychro Cave (from Watrous 1996 Pl. 3)

the Linear B tablets from Knossos record food offerings (*viz.*, figs and oil) to Diktaian Zeus and Dikte, although there are doubts about the actual location of these sanctuaries[41].

### 7.4.3 LM IIIC

The dedicatory practice at Psychro did not change[42], but the plain seems to have been largely abandoned in this phase. Evidence for LM IIIC settlement comes from a number of new settlements which were founded in the mountains around Lasithi. The most famous and largest one is situated on the northern ridge of Dikti: taking a path up the slope to the north of the modern village of Tzermiado, crossing the small mountain plain of Nisimo and continuing upwards through rather barren

[41] Ventris – Chadwick 1973, 305–306; Watrous 1982, 18; Watrous 1996, 18–19. 52–53.
[42] Watrous 1974, 245; Watrous 1996, 53.

land, one finally reaches a rocky summit known as (Kera) Karphi. It is mostly light grey from the rubble and dotted with blobs of green shrubbery; the walls of buildings which were unearthed in the 1930s are barely distinguishable from this background. The present state of the ruins at Karphi is appalling—just compare the photographs after excavation and today (Fig. 7.6 and Fig. 7.7)—and so is the treatment of this site in scholarship, although the two are diametrically opposed to each other: physically, the remains appear utterly neglected; in writing, they (or rather an idealized notion of what they might have been) have received more attention than any other contemporary site. To call Karphi "the largest and best investigated LM IIIC settlement in Crete"[43] makes me shudder to think what scholars are happy to put up with. In 1996, when detailed reports of the Kavousi Kastro and Vronda reinvestigation had already been published, K. Nowicki still praised Pendlebury's work in Lasithi and his fast publication of the "only properly excavated" three "standard reference sites", namely the Trapeza Cave, Tzermiado Kastello and Karphi[44]. I would like to argue that just as in the case of Gournia, which is commonly referred to as *the* Neopalatial settlement from which oh so much can be learned about the life of Minoan people, the data base left to us by the explorers of Gournia and Karphi respectively is hardly adequate for any modern scientific research. Moreover, at Karphi there was "no stratification in the chronological sense"[45], so that whatever is said may or may not apply to any point of time within the 200 years of occupation[46]. And although I honour what John Pendlebury did for Crete and its people, I am somewhat reluctant to praise his (and his colleagues'[47]) attitude towards ancient ruins. As amusing as their report about the construction of a small shelter to store the workmen's tools on the site is, it is quite shocking to read that "[t]he materials and methods employed in the building were precisely the same as those used on the ancient site, from

[43] Nowicki 1996, 45. Cf. Nowicki 2000, 157; Day 2011a, 1.

[44] Nowicki 1996, 30. Note that LM IIIC occupation of Tzermiado Kastello is mainly conjectural (see Nowicki 2000, 220; cf. Nowicki 1996, 45) and that Pendlebury *et al.* 1940a, 15 speak of abandonment of Tzermiado Kastello in LM IIIC.

[45] Pendlebury *et al.* 1940b, 59. See also Wallace 2012, 65.

[46] Cf. Nowicki 2000, 163.

[47] The names of the members of the British School at Athens who took part in the excavation are listed in Pendlebury *et al.* 1940b, a report which, strictly speaking, must be attributed to all of them but is here, for reasons of convenience, abbreviated with John Pendlebury's name.

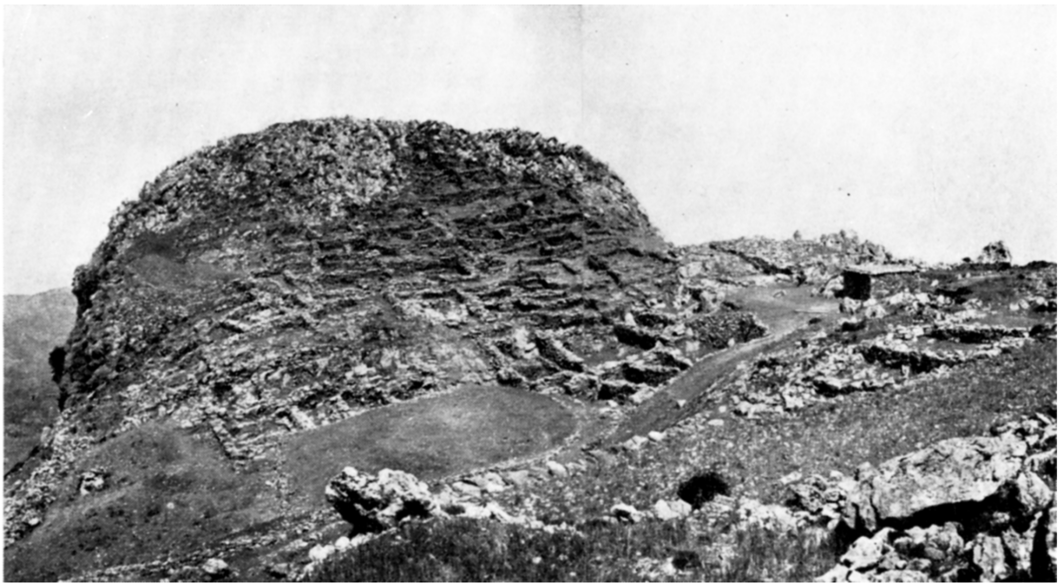

**Figure 7.6:** View of Karphi in 1939 (Pendlebury *et al.* 1940b, Pl. 15,3)

**Figure 7.7:** View of Karphi in May 2009 (photo courtesy of Torben Keßler)

which, indeed, all the materials but the wood came. This is not surprising, for, to judge by their ages, our two masons had probably built part of the ancient city"[48]. I am therefore much more in accordance with Saro Wallace, who states that the incomplete recording and publication of the Lasithi excavations, combined with the selective preservation of finds "have always limited exploitation of Karfi's research value"[49], even though one is tempted to say there is more limit on value than on exploitation. However, a recent excavation project has produced much valuable evidence, which not only supplements, but in some cases corrects the earlier results[50]. Despite the limitations of the material, I unfortunately have no choice but to do what everyone else does and elaborate on Karphi, since the other sites in the area, known at best through survey, are even less yielding in terms of man-environment analysis.

The name 'Karphi', the nail, is derived from the large white limestone knoll which, when seen from the north, looks like a cone-shaped pin. Situated on the northern ridge of Dikti, at an elevation of about 1150 m, the site commands a tremendous view to the coast, the slopes around and parts of the Lasithi plain. It has become clear that the settlement was not restricted to the slope on the south side of the eponymous outcrop, but stretched out between this summit and Megali and Mikri Koprana on an area of about 250 × 450 m[51] (see Fig. 7.8). Founded in LM IIIC, the settlement seems to have been largely abandoned before the early Subminoan pottery style fully developed; recent excavation has found evidence for destruction by fire[52].

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[48] Pendlebury *et al.* 1940b, 58.

[49] Wallace 2005a, 216. She is of course also right in stating that "this data must either be used in its present form, or not at all" (Wallace 2005a, 218). Cf. Wallace 2010, 104.

[50] Wallace 2012.

[51] Nowicki 2000, 159. He divides the area into three quarters: the Western Quarter on the proper knoll of Karphi, its eastern slope and the saddle between Karphi and Mikri Koprana; the North-Eastern Quarter on the summit of Mikri Koprana and its eastern and southern slopes; the Central Quarter on a narrow stretch between Mikri and Megali Koprana; the Southern Quarter on the summit of Megali Koprana and the slopes around it. Whether a patch with pottery but no architectural remains really betrays the site of a 'suburb', ca. 300 m east of Mikri Koprana, must remain open. Only a fraction of the original settlement has been excavated.

[52] Nowicki 1987a, 237; Nowicki 2000, 164; Nowicki 2008a, 83; Day 2011b, 1. 327. Cf. Wallace 2012, 4. 65–66. Fire: Wallace 2012, 34.

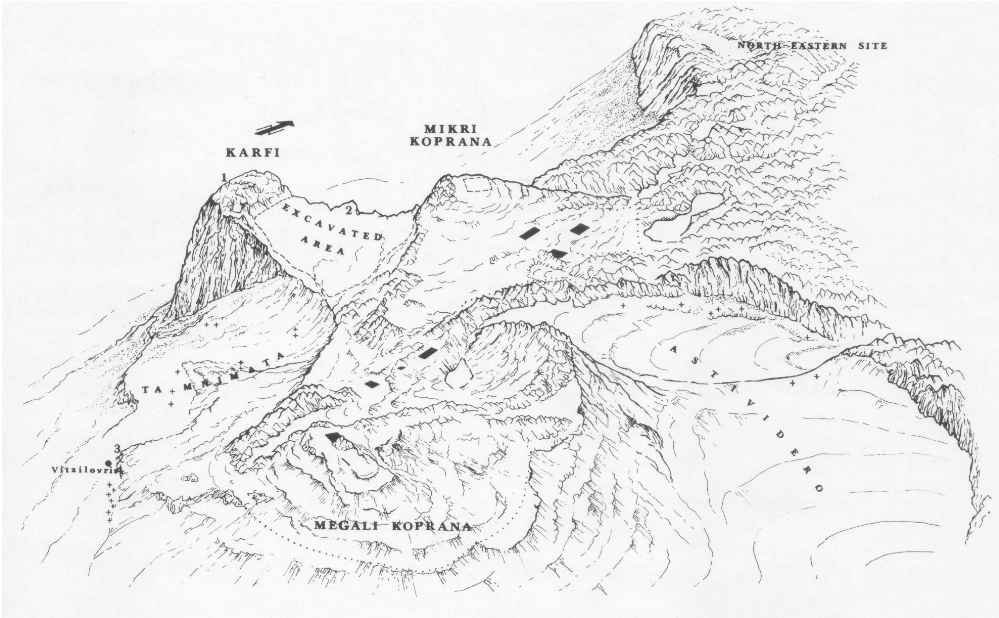


**Figure 7.8:** Map of Karphi and its immediate surroundings (from Nowicki 2000, 161 Fig. 91)

The local soils are mostly *terrae rossae*; two of the four sampled pedons around the site have a high agricultural potential[53]. To the east of the site some agricultural terraces can be made out which may be from the Bronze Age. From a pedological viewpoint the value of setting up these structures on the soils in question seems doubtful[54]. At any rate, analysis of a sediment profile has shown that the soil in this area was stable at the time of inhabitation[55]. The settlement was given up about 100 years before erosion began, so that the loss of soil cannot have been the reason for the abandonment. John Pendlebury and his colleagues reported a possible charcoal layer just below the surface of the Nisimo plain, leading them to believe that it was once densely wooded and then burnt down[56]. Deciduous oak, Cretan pine and arboreal maquis species ("mock privet/buckthorn

[53] Morris 2002, 41.
[54] Morris 2002, 23.
[55] Morris 2002, 43. 75.
[56] Pendlebury *et al.* 1940b, 61–62. This suggestion is taken on or at least not criticized by Morris in his soil analysis (Morris 2002, 31). N.B. Pendlebury's wording, *viz.*, his definition of 'well wooded': "The hills which fringe the plain to the north are to-day drier and more inhospitable than those to the south. In ancient times, however, there is reason to believe that they were at least as well wooded."

(*Phillyrea/Rhamnus*)") are all attested and indicate the presence of both trees and shrubs in the vicinity of the settlement[57]. The closest spring is Vitzilovrysis, below Karphi to the south at the lower end of the Ta Mnimata slope (see Fig. 7.8); another one is located in the Nisimo plain, in the part known as Astividero. The British team described the water supply as "woefully inadequate" and considered it possible that some springs could have dried up through earthquakes[58].

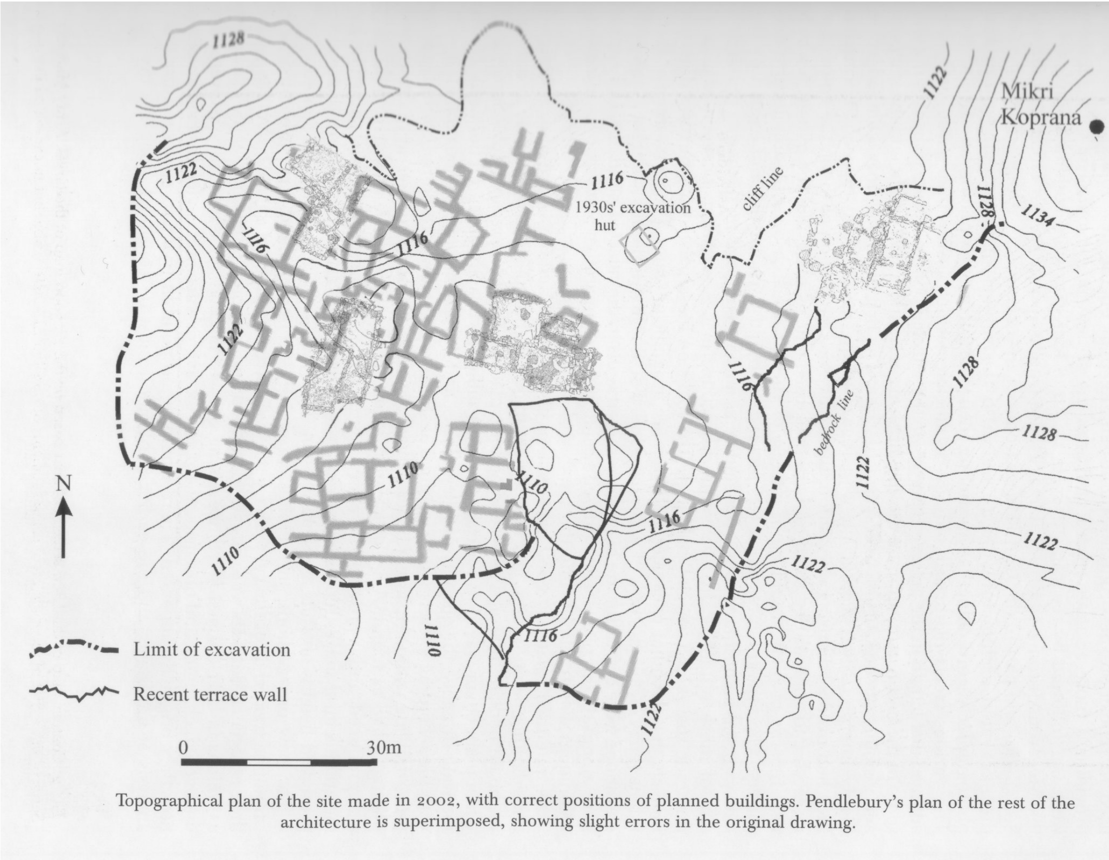


**Figure 7.9:** Plan of the excavated part of Karphi (from Wallace 2005a, 227 Fig. 3)

According to the explorers, the pathways between the houses were paved in the manner of *kalderimia* (see Fig. 7.9). Houses are believed to have been one-storied, with flat roofs. The dry-stone walls of the houses were built from local rubble, 60 to 80 cm thick and sometimes incorporate the bedrock. Mud was also

[57] Wallace 2012, 70.
[58] Pendlebury *et al.* 1940b, 63.

used, although it is not clear whether it was actually made into proper bricks[59]. The rooms have right angles but building outlines must have been irregular, even though the division into house units as suggested by Pendlebury seems doubtful: the lack of connecting doorways between rooms makes it impossible to judge how large the habitations really were, and there is no indication whatsoever as to the number of inhabitants[60].

The clay of which the pottery from Karphi was made was probably taken from a local source. In the 1930s, clay for potting was still extracted at two sites on the Lasithi plateau. Some rooms at Karphi yielded fragments of eight or even more pithoi. Apparently they were used not only for storage but also as chimney pots[61].

The 2008 excavation unearthed several querns (previously absent from the assemblage) and pumice implements[62]. The archaeobotanical remains included olive pips, cereal grains (wheat or barley with husks), pulses (among which lentil and broad bean) and numerous grape pips. The early excavators reported horns of red deer from six loci, and a number of boar tusks were also found. One horn each of wild goat and fallow deer retrieved in 2008 reinforces the exploitation of wild animals, although the absence of (deer) meat bones may imply collecting of shed antlers rather than hunting[63]. Nonetheless, if the identification of deer at Karphi and the Psychro Cave is correct[64], the presence of these animals could suggest the existence of forests in the area[65]. Deciduous oak wood has been found in the new excavation—today, evergreen oak dominates[66]. Unfortunately, documentation is not exact enough (and in addition the actual specimens are lost) to allow a comparison of the deposit of horns of ox, deer and goat from room 61 with the

[59] Pendlebury *et al.* 1940b, 66–67; Wallace 2005, 249; Wallace 2012, 72–73.

[60] Pendlebury *et al.* 1940b, 65 suggested, in analogy with modern villages, a number of 3500 people, Nowicki 2000, 162 thinks of 625–1200. For the difficulty of establishing house units and population numbers see Widmann 2007, 9–10. 21–24.

[61] Seiradaki 1960, 2–3. Local clay sources are currently being researched (Wallace 2012, 66). For the pithoi and storage see also Day 2011b, 329.

[62] Wallace 2012, 63–64.

[63] Wallace 2012, 70.

[64] Evans 1897, 355; Vickery 1936, 17; Pendlebury *et al.* 1940b, 134; Jarman 1996, 216. Watrous 1996, 48 attributes the deer bones from Psychro to MM III-LM I.

[65] Nobis 1999, 58; Waelkens *et al.* 1999, 705. 707–708; De Cupere 2001, 174; Vanhaverbeke – Waelkens 2003, 44; Wallace 2010, 38.

[66] Wallace 2012, 70.

in-all-likelihood ritual deposition at Kavousi Vronda and the Kastro (and later in the Northeast Building at Azoria). Species identified in the new exploration include sheep/goat, pig, equid and also cattle. Two sheep/goat horns were found on or next to a low platform[67]. It can presently not be ruled out that some dog bones are the remains of animals that were eaten (see also p. 309. 327). Noteworthy too is the presence of a small number of marine shells[68].

From the 1930s exploration stem 146 spindle whorls of clay or stone and a grand total of two loom weights. However, the recent re-examination has found weaving and spinning implements in all but one building. This new assessment rests on the hypothetical identification of "spools" as loom weights for a new weaving technique[69]. At any rate, the presence of spindle whorls can count as a strong indication of shepherding even if the archaeozoological material retrieved so far is minimal, for it seems unlikely that bulky fleeces would have been transported over long distances. The rugged terrain to the north-east of the site would have been well suitable for sheep and goats. Although the presence of deciduous oaks (radiocarbon-dated to 1130 cal BC) indicates "a slightly wetter climatic regime as well as much less grazing"[70], it is commonly agreed that sheep played an important role in the economy of the settlers at Karphi[71]. More varied are the opinions on whether these sheep were tended in a transhumant scheme, an idea nourished not only by the general transhumance debate (see below, chapter 10) but also by the locate climate: John and Hilda Pendlebury and Mercy Money-Coutts described the conditions as potentially hostile even in summer and conjectured that people would have moved to the more moderate environment of the Lasithi plain for the snowy

[67] Wallace 2012, 22. See also p. 310. 337. Sheep bones had also been reported from the tombs at Ta Mnimata (Pendlebury *et al.* 1940b, 106–107).
[68] Wallace 2012, 71–72.
[69] Wallace 2012, 60. Cf. Wallace 2005, 259; Wallace 2010, 125. L. P. Day names weaving as one of the few attested activities at the site; she postulates the presence of looms in six rooms because of great numbers of "spools" found in them (Day 2011b, 329. 332). According to J. Pendlebury and his colleagues, kylix stems were often re-used as spindle whorls; however, they were not entirely sure of the real purpose of all of these objects (Pendlebury *et al.* 1940b, 129–131; Seiradaki 1960, 25). See also Wallace 2012, 62.
[70] Wallace 2012, 70.
[71] Pendlebury *et al.* 1940b, 140; Watrous 1982, 20; Nowicki 1987a, 249. Day 2011b, 330 footnote 27 notes the absence of specialized cheesemaking equipment.

months[72]. L. V. Watrous once suggested that Karphi developed from a shepherding site of seasonal occupation into a permanent settlement; later he backed the notion of seasonality with present day examples[73]. K. Nowicki on the other hand, although taking transhumance for granted, points out that movement of herds does not necessarily mean movement of large numbers of people. He considers the climate harsh but not worse than elsewhere and the houses at Karphi to offer enough protection even for winter[74]. The economic base certainly allowed for year-round subsistence, since the land around Karphi offers opportunities for agriculture as well as for herding. The slopes below Karphi to the north-west are today terraced, planted with fruit and vegetables and irrigated from the Vitzilovrysis spring. The Nisimo plain (ca. 1.75 km$^2$) at 920 m ASL just below Karphi to the south may have been cultivable, too, depending on the amount of water available from the Astivídero spring. Even Lasithi itself does not seem excessively distant, considering travel times to fields known from ethnographic research[75]. Two sickles were found at Karphi and may testify to cereal cultivation. Vines are suggested to have been grown nearby[76]. The fact that olives cannot be grown in these heights is not a wholly valid objection to the notion that the agricultural resources around the settlement were sufficient to sustain the population, nor do olive pits found in a number of deposit[77] prove that the people from Karphi tended olive orchards at lower elevations: the olives could have been obtained from lower-lying communities

[72]Pendlebury *et al.* 1940b, 139. However, the absence of a site of suitable size has been noted by Watrous 1974, 323. I myself was caught in a nasty spell of extremely cold and wet weather in Lasithi in April 2011, when temperatures ranged at 2–5 °C during the day and around Karphi mist was so dense that sight was limited to less than 10 metres.

[73]Watrous 1974, 38.

[74]Nowicki 1987a, 249; Nowicki 1995, 702. Katia Perna has stressed the absence of hearths, which she deems necessary for winter habitation in this environment (Perna 2005, 157–158 with footnote 16)—this has now been shown to have been an incorrect assumption on the part of the early excavators, see Day 2011b, 330; Wallace 2012, 36–37. 73.

[75]Wagstaff – Augustson 1982, 108. 110 with Table 10.5; van Wersch 1972, 178; Allbaugh 1953, 245. Day 2011b, 330 footnote 27 claims that ordinary agriculture was impossible at Karphi.

[76]Wallace 2012, 69. "The absence of skin remains could suggest there was no regular processing of grapes into wine within the site; as with oil and grain, processing may have been organised closer to the main cultivation locations, which were perhaps lower and more sheltered than the immediate vicinity of Karphi."

[77]Pendlebury *et al.* 1940b, 95; Wallace 2012, 68. See however Waelkens *et al.* 1999, 705; Vanhaverbeke – Waelkens 2003, 53–55 for other explanations.

in exchange for mountain products[78]. Olive wood, found recently, may be of more significance in this debate. In the present climatic conditions, the Lasithiotes have their olive plantations at lower elevations; since the olive harvest takes place in winter, it is possible to adopt a migratory scheme of agricultural activity[79]. But at the end of the Bronze Age, climate could actually have allowed olive growing, if not at Karphi itself, then in Lasithi[80]. The existence of a sanctuary and necropoleis, to some extent also the amount of space apparently given over to storage are arguments in favour of permanent occupation[81]. According to L. P. Day, there must have been a potter's workshop, even though no kiln has been found[82]. The preliminary archaeozoological and botanical results of the new excavation at Karphi investigations have now settled this question: "Any lingering conception of Karphi as a specialised/seasonal site, reflecting a subsistence revolution in Crete at this time, is swept away by the broad suite of animals and crops shown to have been consumed"[83].

A number of hypotheses have been advanced with regard to additional sources of food and wealth. They are inspired by the peculiar location of Karphi, which seems to suggest a certain desire for a remote and somewhat protected place. J. Pendlebury and his team suggested that the rocky knoll was some sort of a "brigand city" to which the marauders returned with their booty after successful raids[84]. L. V. Watrous still thought it possible that some inhabitants of Karphi "may have tried [. . . ] piracy"[85]. K. Nowicki modelled his picture of life in ancient Karphi on present-day mountain villages and lists places from which the inhabitants could have stolen sheep in the night—as a challenge, but also to increase meat supply

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[78] As tentatively suggested by Wallace 2003, 615; Wallace 2012, 68.

[79] See Watrous 1974, 321–323; Watrous 1982, 20. According to calculations by K. Nowicki, each "family" (this term can be questioned of course) in Karphi would have needed 51–82 trees to produce enough olive oil for one year (Nowicki 1999a, 155).

[80] See however Wallace 2012, 68.

[81] Wallace 2003, 617; Traunmüller 2005, 91–92. See however Pendlebury *et al.* 1940b, 138 and Watrous 1974, 324 for thoughts on the cemetery. See also Matthäus 2008, 236.

[82] Day 2011b, 332. 335.

[83] Wallace 2012, 76.

[84] Pendlebury *et al.* 1940b, 140.

[85] Watrous 1982, 19. The argument was supported by a reference to the Odyssey 14,199–234, some foreign objects and a number of seashells. Contra, see Nowicki 1987a, 249; Day 2011b, 335 with footnote 49.

without decimating their own flock[86]. Other reasons for this choice of location seem more likely however (see also below, chapter 12).

Karphi was long seen as an isolated settlement, orientated at best towards the Lasithi plain, which however was but sparsely inhabited at the time. However, K. Nowicki's survey of the hills and ridges to the north, east and west of Karphi have fundamentally changed the image of the landscape: Karphi was just one—albeit an exceptionally large one—among a whole bunch of settlements (see Fig. 7.10)[87]. Quite a number of them were most probably chosen for their topographic setting

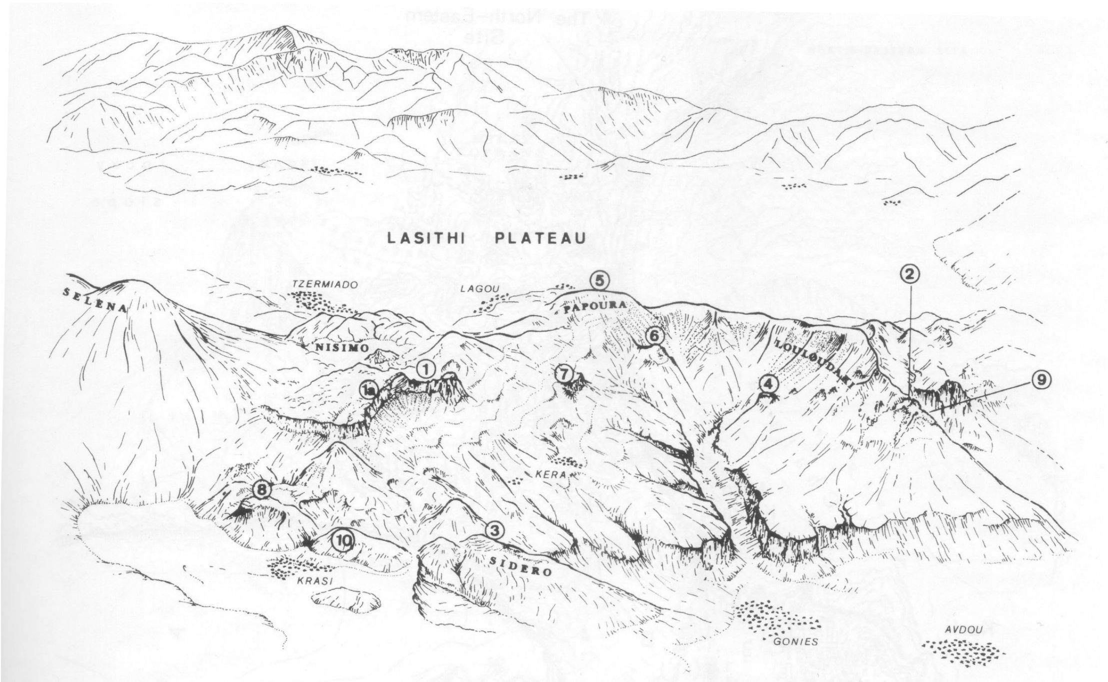


**Figure 7.10:** LM IIIC-PG sites north of Lasithi: 1: Karphi. 1a: Northeastern Site. 2 & 9: Gonies To Flechtron. 3: Krasi Siderokefala. 4: Gonies Porolios. 5: Kera Papoura. 6: Kera Kastello. 7: Kera Vigla. 8: Krasi Kastello. 10: Krasi Armi (from Nowicki 2000, 159 Fig. 89)

which predestined them as natural lookouts. Nowicki, although emphasizing this quality, nonetheless also contends that these sites actually were refuge settlements, populated by people who formerly lived in the plains but fled from some unknown

[86]Nowicki 1999, 162. Cf. the explanation for sheep-stealing given by modern Cretans (Ivanovas 2000, 168) and see also Forbes 1995, 331.

[87]Unless stated otherwise, all information about the settlements around Karphi is taken from Nowicki 1995, 696–699 and Nowicki 2000, 147–170.

attack to more elevated places[88]. It is important to stress that the settlement at Karphi could not have provided full protection from an attack. Karphi is easily accessible from a number of directions, did not have any fortifications and its main water source, the Vitzilovrysis spring, is situated in an even less protected spot down the slope towards the sea. Most of the other settlements in the area, such as Gonies Porolios, Krasi Sidero/Siderokephala or Kera Vigla, are situated on or around rock outcrops which Nowicki interprets as 'citadels' or strongholds, and some of them are less easily accessible than Karphi. Nonetheless, I think it unlikely that small settlements like this would have aimed to be prepared for a siege[89].

I would therefore suggest that the strategic advantage which this new settlement location offered was not directed at withstanding direct confrontation, but rather at escaping from it: set back from the coast, it prevented surprise attacks from the sea, and the tremendous view meant that approaching enemies would have been spotted early enough to retreat into the safety of the mountain wilderness, where only the locals know their way around[90]. Through the centuries, the Cretan mountains have provided protection from all kinds of invaders, and to the present day they continue to evade efficient control. The lack of signs of destruction at Karphi seems to imply that this strategy worked and/or no attackers ever reached the site—thanks to its position in the landscape and its topographical features.

Proximity to good agricultural land and pasture is not an indicator of primarily economic concerns: the houses at Karphi were designed for long-term occupation, and there seems little point in moving to an elevated, more or less protected habitation site if you are going to spend most of your time wandering back and forth to your old fields in the valley to plough and sow and harvest.

Despite the worries and insecurity which seem to have troubled people at the time, S. Wallace believes that the imposing phenomenology of Karphi may have been exploited by the inhabitants to state and support their own social position[91].

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[88] Nowicki 1996, 47.
[89] As also pointed out by Nowicki 1987a, 230. Cf. Wallace 2012, 41–42.
[90] Cf. Nowicki 1987b, 30; Nowicki 1995, 696.
[91] Wallace 2007, 250. 259–260. 269; Wallace 2010, 141. Cf. the 'local elites' suggested by Traunmüller 2005, 130–134. 137–138. L. V. Watrous hypothesized: "So perhaps Karphi was colonized

One might wonder whether the shrine in its very unusual position, on the very top of the knoll, may have played a role in this, too[92].

## 7.5 Geometric, Archaic, Classical and Hellenistic

The settlement at Agios Georgios, situated on the Papoura ridge north of the mountain plain at 1026 m ASL, has evidence for occupation at least from the times of Protogeometric to those of Archaic pottery and has been suggested to represent the place to which the population from Karphi and other settlements relocated[93]. The cemetery nearby may point to permanent occupation[94]. The Psychro Cave was still frequented in the Geometric and early Archaic period: weapons, jewellery and figurines of humans, bulls, rams, a goat, two ducks and a chariot drawn by a bull and a ram were deposited, as well as an Egyptian statuette[95]. A bronze cut-out plaque depicts a man carrying a sheep on his shoulders (see Fig. 7.11).

The contemporary pottery has not received great praise: "Neither the decorative motives nor the forms represented present any feature of special interest. There is no Geometric fabric so frigid and lifeless as the Cretan"[96]. Elsewhere, new cults were established: although Karphi was abandoned, the Vitzilovrysis spring below began to serve as ritual location. Animal and human figurines, a bronze dress pin and other objects were dedicated to an unknown deity here[97]. It has been suggested that the cult at the spring may have been connected with collective memory, marked by the rocky knoll of Karphi[98], but so far this remains speculation. As mentioned above, a phase of soil destabilization took place around Karphi after

by mainlanders who may have forced the remaining Lasithiotes at Agia Paraskevi and Plati to join them, with less than full citizenship, on the analogy with Lyttos" (Watrous 1974, 319–320). I think there is too much guesswork involved in Watrous' idea, and I could come up with an almost infinite number of equally likely or unlikely suggestions of individual fate. Moreover, the incident he refers to took place much later, at a time of different political circumstances after the emergence of the polis system.

[92] K. Perna suggested that the shrine may indicate Karphi's role as a sort of regional centre (Perna 2004, 174).

[93] Watrous 1980, 270–275; Watrous 1982, 20–21; Wallace 2010, 238.

[94] Lieberman 1998, 77; Renfrew – Bahn 2008, 202. Cf. Hayden 1995, 125; Wallace 2010, 74.

[95] Watrous 1996, 54–55. All zoomorphic terracotta figurines depict bulls (Pilz 2011, 139.)

[96] Hogarth 1900, 105.

[97] Pendlebury *et al.* 1940b, 99–100; Nowicki 2000, 164.

[98] Sjögren 2008, 179. Cf. Wallace 2007.

**Figure 7.11:** Archaic bronze cut-out plaque from the Psychro Cave in the Archaeological Museum at Agios Nikolaos

914–828 BC; climatic or human impact have been suggested as possible causes[99]. Human impact would imply that the slopes were still used in some way after the abandonment of Karphi.

Dating is too imprecise to draw a coherent picture of Lasithi in the Archaic and Classical period. The new nucleated settlement at Papoura does not seem to have retained its attractions or advantages for very long: in the early Archaic period, it was given up and a pattern of scattered small farmsteads or hamlets around the edges of the Lasithi plain emerged, for example at Pinakiano Donades, where a number of spindle whorls testify to a probable economic mainstay. The huge building of unknown function at Kolonna[100] does not really fit this pattern. Soon afterwards, it is argued, Lasithi became part of the territories of Lyttos and Lato, although it is not quite clear how this influenced the settlement pattern[101].

[99] Morris 2002, 75.

[100] Watrous 1980, 277–278.

[101] Wallace 2010, 333 suggests: "By mutual agreement, a relatively large proportion of the Lasithi population may have maintained a scattered rural residence pattern, rather than move to the dominant large settlements a considerable distance away; the area is an especially large and useful fertile pocket and yet could not be easily managed from Lyttos or Lato, given its altitude and isolation". Cf. Erickson 2010, 239.

Deposition of votives at Psychro only ceased in the 7th or 6th century; L. V. Watrous has connected the end of the cult to the almost total abandonment of the plain in Classical times[102]. This would seem to support the frequently brought up hypothesis that the cave at Psychro is *not* the Diktaian Cave of which some ancient authors speak as the birthplace of Zeus; it has been pointed out that there is no historical source mentioning any part of the mountain massif as being called 'Dikte'[103]. Only Augousti seems to have been a proper village at this time[104]. Watrous puts this near-desertion down to security concerns drawing people into bigger centres. He also thinks it possible however that the Lyttians killed or enslaved the inhabitants of the mountain plain, or that at least they were forced to leave their homes and move elsewhere[105]. If this is what happened, it did not affect Augousti and Kolonna, both of which continued into the Hellenistic period; at Kolonna there even seems to have existed in the 3rd century BC what looks like a wool-processing plant, with installations and equipment for dyeing and weaving. An inscription on a clay bottle indicates that *lykeion*, a yellow dye made from buckthorn (*Rhamnus infectorius*) was used here[106]. Interestingly, this is not a local plant, but a western European species that does not occur in Crete today[107]. Since by Hellenistic times, climatic conditions were similar to today's and there is no reason to believe that the plant may have become extinct, the dye had to be imported, and not only for this reason the whole project was certainly only worthwhile if the number of sheep kept in the area was sufficiently large to merit such an industrial establishment.

## 7.6 Roman

Evidence for the following centuries is scarce. Lamps dating to the 1st to 2nd century AD have been found in the Psychro Cave and may indicate that people worshipped there again. It is impossible to say whether this went hand in hand

[102] Watrous 1974, 329–330; Watrous 1996, 55.
[103] Verbruggen 1981, 134–138.
[104] Watrous 1974, 331–332. For the Classical pottery from the wool processing plant at Kolonna see Watrous 1980, 277 footnote 8.
[105] Watrous 1974, 332–337.
[106] Watrous 1980, 278–281.
[107] Strid 1986, 587; Turland *et al.* 1993, 134. Cf. Chaniotis 1999b, 206.

with settlement and exploitation of Lasithi since there is no definite evidence so far before the 4$^{th}$ century AD. The only substantial settlement seems to have existed in the 4$^{th}$ century at Kardasmoutsa, on the northern foothills. For the first time, three (small) sites, maybe farmsteads, are situated on the plain proper[108]; a connection with possible drainage by Roman engineers seems unlikely when one compares the pattern with the one from Venetian times.

An interesting side note on the significance of the mountains for the water supply of cities is the fact that the Lyttos aqueduct drew its water ultimately from the sinkhole in the Lasithi plain[109].

## 7.7 Summary

Data for Lasithi come mainly from a one-man survey and a couple of early 'excavations', rendering attempts at a detailed reconstruction of man-environment interaction rather difficult. Nonetheless, some conclusions can be drawn about the settlement pattern through the millennia.

Despite the probably difficult conditions in terms of floods in the mountain plain before Venetian drainage, Lasithi was exploited from the Late Neolithic onwards. In the earliest phases, people lived both in caves and in open sites on the slopes around the basin. This pattern continued through the Early Bronze Age. Concerns for safety have been derived from the topographical choices, but the argument for Lasithi is not strong, even less so since settlement locations in the Middle Bronze Age were basically the same. In the time of Middle Minoan pottery styles, caves, most prominently Psychro with its fantastic speleothems, began to be used for burials and/or cult, a phenomenon observable in other parts of Crete, too. Another cult place was the peak sanctuary established at Karphi. Bones of sheep/goat and pig are attested. *Agrimia* feature both in depictions and faunal assemblages. The first documented traces of buildings in Lasithi also date to this time, which seem to have employed stone as well as wood and mud-brick, such as at Tzermiado Kastello, where a boar's tusk and a conch shell also throw

[108] Watrous 1974, 337–339; Sanders 1982, 142–143; Watrous 1982, 24 and Map 14; Watrous 1996, 55; Nowicki 1996, 47.

[109] Watrous 1982, 24. Cf. Sanders 1982, 147.

an interesting light on the resources used, although obviously the shell could have been traded and need not imply direct contact with the sea. Apart from the continuing cult activities, little can be said about LM I to LM IIIA-B, and it is possible that the plain was much more scarcely populated in these periods. Almost complete abandonment followed in LM IIIC, when the oft-cited 'defensible settlement' at Karphi, to the north of the plain, was founded, along with a number of other smaller sites on that flank of Dikti. Karphi, occupying the back slope of a steep limestone outcrop and the adjoining hillsides, may have held a special status among them. The settlement incorporated stone-built houses with storage facilities, cobbled pathways between them and a temple on the summit of the landmark rock. Tombs are located on the slopes below. The people from Karphi may have exploited the small mountain plain below to the south (Nisimo) and sourced water from two nearby springs. Both at Karphi and at Psychro, bones of red deer have been identified, possibly indicating the existence of forests, where wild boars also roamed. There must have been suitable ground for cattle too, as bones indicate. A remarkably large number of spindle whorls can be taken as evidence of sheep-breeding, whereas the soils around the settlement could have been planted with grain. It is not clear where the olives, whose pits were found, were grown.

At any rate conditions cannot have been favourable enough—or not any more—to tempt people into prolonged settlement; rather it seems that they relocated to Agios Giorgios Papoura for the Geometric to Archaic period. It was only in the latter period that the Lasithi plain proper was resettled, albeit only for a short spell, since by Classical times, cult at Psychro had ceased and the basin was widely abandoned again. However, nucleated villages were established at Augousti and Kolonna and persisted through the Hellenistic period; the latter settlement was even equipped with a kind of wool-processing plant. Cult at Psychro revived in the Roman period, when first (recognizable) attempts at draining the plain were also made. Their (at least partial) success is indicated by the location of some small sites on the bottom of the basin.

# Chapter 8

# Kavousi Region

The Mirabello Bay in eastern Crete was a popular settlement area through the millennia. More than one Minoan town prospered here: Mochlos, Gournia, Pseira on its island; later there was the city of Istron. There may be countless other places that have not been recorded yet. The landscape around modern Kavousi, one of the larger villages on the coastal road, is the setting of none fewer than three famous sites and a number of less-known smaller ones (see Fig. 8.1). According to John Pendlebury, the toponym *'Καβούσι'* translates as "hollow in the rock kept filled with water by a spring"[1]—which of the springs in the area this refers to must remain an open question; there is one in the centre of the village. In 1896 and 1899, Arthur Evans was the first scholar to record archaeological remains in the Kavousi area, namely the settlement at Kastro and finds from tombs near Plagi Tou Kastrou (to the south of Kastro). Harriet Boyd of the American School of Classical Studies at Athens was granted a permit to excavate in this district and in 1900 and 1901 (then for the American Exploration Society of Philadelphia), she dug trial trenches near Agios Antonios on the coast, at Azoria, Kastro and Vronda[2] (see below). Edith Hall shortly investigated "several rectangular chamber tombs"[3] with bones and small stirrup jars at Kamara tou Tholou and at Agios Antonios in 1912. No systematic research was then undertaken for more than 65 years, until

[1] Pendlebury 1939, 33.

[2] She decided to apply for the permit on a visit to the Isthmus earlier that year: "At more than one of these places I might have been tempted to put in the spade had it not been for the salutary laws which forbid unauthorized digging" (Boyd 1901, 127).

[3] Hall 1914, 183.

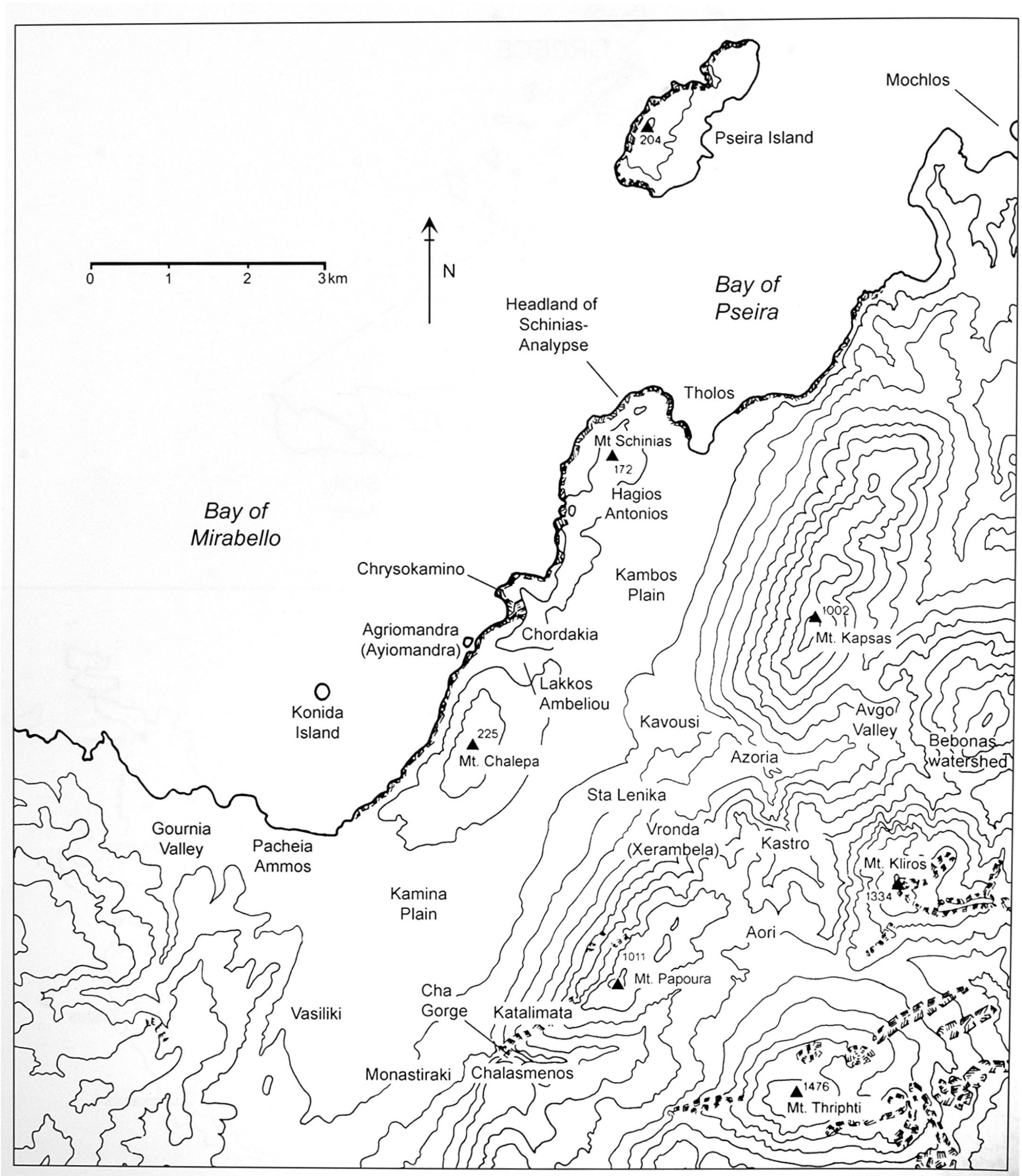


**Figure 8.1:** Map of the Kavousi area, with some place names (from Haggis 2005 Fig. 2)

the American School began a large-scale project in 1978, comprising both excavation and regional survey. Vronda and the Kastro were excavated simultaneously between 1987 and 1992 under the direction of Geraldine C. Gesell, Leslie Preston Day and William D. E. Coulson. Donald Haggis conducted a one-man survey of the Kavousi-Thriphti area from 1988 to 1990, the results of which he published in his dissertation, numerous articles and the first volume of the INSTAP Kavousi Excavation Series. D. Haggis also directed the excavation at Azoria (2002–2006).

Early on, Coulson and his colleagues criticized that Kastro, Plagi Tou Kastrou, Skouriasmenos, Aloni (modern Skala) and Vronda are often referred to as characteristic examples of a certain type of site and period, even though none of them had until then been satisfyingly published[4]. Moreover, the (still) common perceptions of the Kavousi area are clearly influenced by the history of research: "The vagaries inherent in early excavations—often responses to impressions of the landscape—have helped to create a new systemic context of the 'published site' and its associated region. How different would our perception be of Mirabello if Azoria had been excavated instead of Vronda; if Protogeometric levels were exposed on the Kastro, if Tholos had been excavated instead of Pseira [...]? The traditional focus on specific sites has greatly affected, if not fundamentally shaped, both the administrative decisions on cultural resource management by the Greek Ministry of Culture as well as the research orientation of current research projects"[5].

## 8.1 Topography

The term 'Kavousi region' is used here to designate the area from Vronda in the south to the bay of Tholos in the north, from the sea in the west to the mountain range in the east. Even though the southern limit may seem rather arbitrarily chosen at first sight, the local topography does promote this division: Vronda is the southernmost site in a kind of pocket surrounded by high mountains on all but

[4] Coulson *et al.* 1983, 393.
[5] Haggis 2004, 228–229.

the west side[6]. The area surveyed by D. C. Haggis incorporates terrain from sea level up to 800 m.

The modern village of Kavousi is located on the western flank of Thriphti which forms the eastern boundary of the Ierapetra Isthmus, where Crete is only 12 km from north to south coast. This is a strategically advantageous position, since at the northern end of the isthmus the natural routes from and to Iraklio, Ierapetra and the coast and mountains of eastern Crete meet[7]. The mountains reach up to around 1000 m in this area above the flat coastal plain which is simply called 'Kampos'[8]. A river runs through this area, from modern Kavousi to Tholos, where it flows into the sea. The local mountains are composed of dolomite and phyllite rocks and soils (see Fig. 8.3)[9]. These soils are very productive when terraced[10] and irrigated, and potsherds and wall remains recorded on terraces between Vronda and Kastro indicate that their construction may date to the Early Bronze Age[11]. The upland plain at Papoura has silty phyllite soil that was planted with barley for a long time. The agricultural potential of the region would have been even greater in the past: analysis of a pedon near the Avgo gorge has revealed a massive alluvial layer, formed after the Bronze Age, which may or may not be anthropogenic. The rendzina soil buried by this alluvium probably formed in the Late Pleistocene or Early Holocene when the climate in Crete was wetter and the region may have had a forest cover. It has high water retention qualities, but because it would mostly have been present on uneven terrain, even then it would have required terracing

[6] It cannot be denied, however, that this choice is also influenced by the fact that Vronda is the southern limit of D. C. Haggis' survey, his study area being largely congruent with the catchment area of the river Platys. Although he admitted that this area is not a "discrete or insular geographical unit, such as the Lasithi plateau or the island of Pseira, nor the agriculturally rich hinterland of a Minoan palace or urban center" (Haggis 1996a, 376), from my personal experience the selection does make sense in terms of natural boundaries such as visual relations.

[7] As noted by Boyd 1901, 130.

[8] H. Boyd called the mountain range bordering the east side of the isthmus "a huge wall from sea to sea" (Boyd 1901, 128).

[9] Haggis 1996a, 377.

[10] "Land, suitable for dry agriculture, is plentiful in the upper elevations, but the steep slopes require considerable maintenance, in the form of terracing, and the actual cultivable area is less than in the lowlands unless terraces are continuously maintained" (Haggis 1995, 370).

[11] Haggis 1996a, 377 with footnote 10.

**Figure 8.2:** View across the area of Kavousi as seen from the Kastro, with Azoria on the hill in the foreground and the island of Pseira in the background (April 2011)

to be usable for agriculture. Nonetheless this soil would have been more profitable than the *terra rossa* prevalent in other parts of the region (cf. soil map Fig. 8.3)[12].

Agriculture also benefits from the good water supply. There are plenty of springs in the area which flow year-round and are today used for irrigation. The terraced hillsides near the springs, namely at Xerambela/Vronda, Avgo and Aori/ Thriphti, were of great economic value before the Kampos plain was supplied with water on a large scale after the Second World War (see below). People planted nut and fruit trees as well as barley and tended little plots in these upland areas. "The perennial water and the rich, silty phyllite and mixed terra-rossa soils were mountain resources fundamental to the subsistence base in the traditional

[12] Morris 2002, 73. 76. For an analysis of the geomorphology of the slopes around Kavousi see Hempel 1982, 44–47.

(pre-World War II) economy. Extensive terracing, while a sign of the scarcity of adequate agricultural land, is also a strong indication of the productivity of this mountain environment"[13].

The soils in the Kampos are alluvial *terrae rossae* interspersed with many rocks (cf. Fig. 8.3). Before large-scale irrigation, this used to be regarded as inferior to the highland fields, since grain and olive plantations in the Kampos produced only half or even only one fifth of those in the uplands. Indeed, without irrigation, the Kampos had been mostly uncultivable; it was "the poorest agricultural soil in the region and [...] of minimal value even during years of plentiful rainfall"[14]. Olives were grown on a small scale and not above 400 m ASL, and the undemanding barley was planted in the plain before the Second World War. Today, carob seems to cope well with the given conditions. Chordakia and Agios Antonios are the only two locations in the plain which could traditionally be farmed without artificial irrigation, and these are also the spots with the greatest number of Minoan and Roman remains recorded in Haggis' survey[15]. There used to be a spring at Agios Antonios, and both locations have alluvial phyllite soils. Like the rest of the northern part of the isthmus, they were planted with olives, wheat and barley in 1900[16]. The construction of deep wells in the years between 1947 and 1968 enabled large-scale olive cultivation in the Kampos. This meant a "shifting emphasis from mountain to plain during the past three decades [which] has led to the conversion of upland barley terraces to the cultivation of vines, and the abandonment of a larger number of mountain communities for all but seasonal or pastoral use"[17].

## 8.2 Neolithic

The earliest traces of human presence found so far date to the (Final) Neolithic, but they are very sparse. Prior to D. Haggis' survey, A. Zois is said to have repor-

[13]Haggis 1996a, 377–378. See also Haggis 1993a, 140.
[14]Haggis 1993a, 140–141. Cf. Morris 2002, 76.
[15]Cf. Morris 2002, 76 (Kavousi pedon 2).
[16]Boyd 1901, 129.
[17]Haggis 1996a, 378–379. See also Haggis 1993a, 138–139.

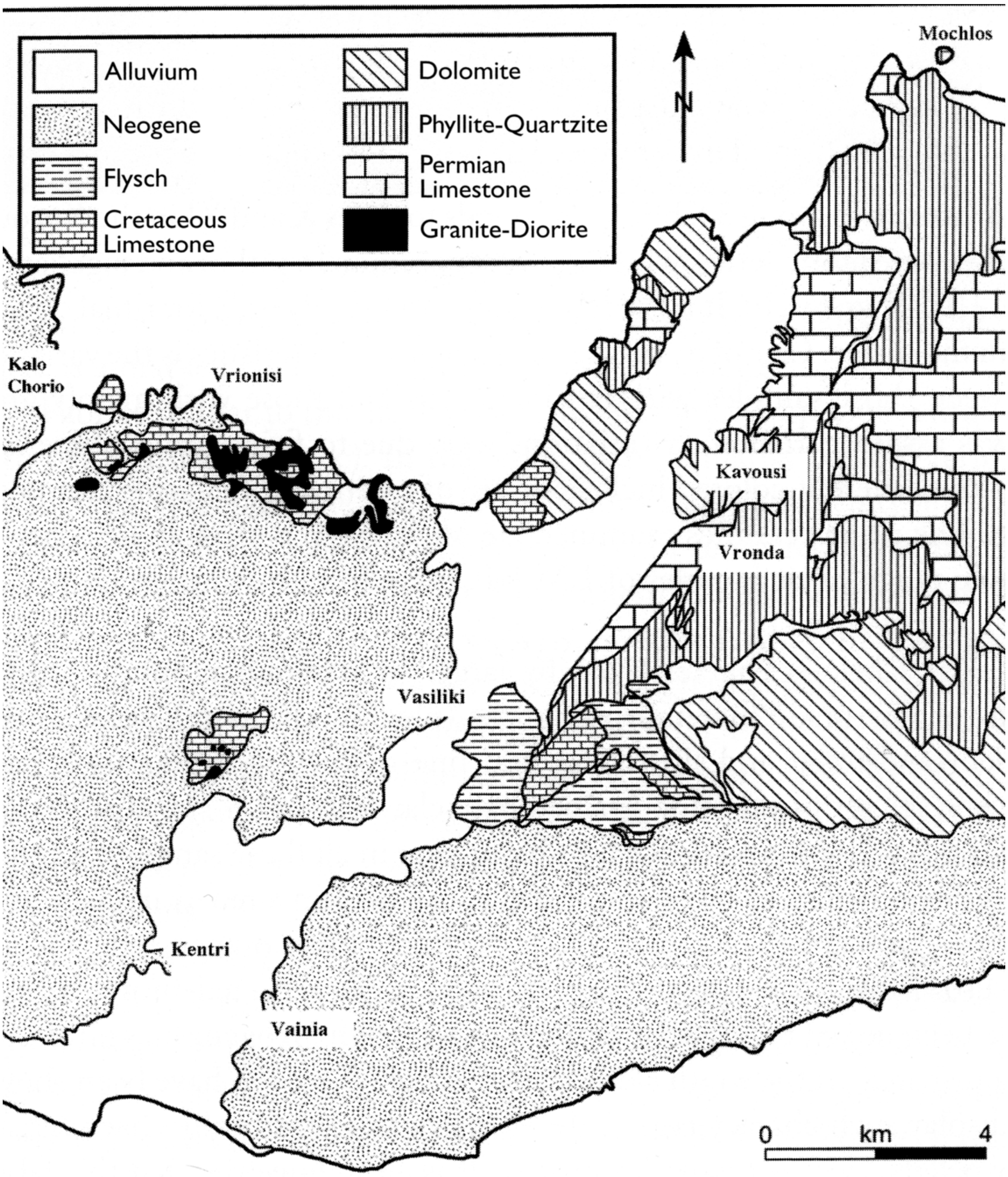


**Figure 8.3:** Geological map of the Kavousi area (from Day *et al.* 2006, 147 Fig. 4)

ted Neolithic sherds from the cave of Kolonospilio near Chrysokamino[18]. Haggis recorded only one further trace of Neolithic human activity. It comes from west of the plateia in modern Kavousi village and is restricted to two fragments of carinated bowls and a possible ladle handle[19]. However, in his more recent publication of archaeological survey in the region, Haggis states that he found Neolithic sherds at six locations, namely Alykomouri (habitation site and associated cave), the cave of Theriospilio[20], Chondrovolakes, Vronda and Azoria[21]. Among the pottery sample from the 'Metallurgical Site' at Chrysokamino are twelve pieces from the Final Neolithic[22]; they are discussed in the section on the site below. The only substantial evidence for the Neolithic comes from Azoria.

Azoria is the modern name of a hill to the south-east of Kavousi village, about 3 km from the sea as the crow flies. It is located at the point where two important rivers of the region and two key routes into the Thriphti mountains meet and overlooks the Kampos to the west. Rising to a moderate height of 300–370 m ASL, the dolomite, crystalline limestone and phyllite outcrop is steep on all except the south side. A perennial spring can be found nearby[23]. H. Boyd explored the site in 1900 and described the double-peaked hilltop, which measures ca. 50–70 m (E-W) × 200 m (N-S), as "shaped like an old-fashioned sugar-loaf"[24] (see Fig. 8.2). An American team under the direction of Donald Haggis began thorough excavation in 2002, continuing until 2006.

The Neolithic remains at Azoria are obscured by overlying later structures which could not be removed (see Fig. 8.4), but the size of the pre-Bronze Age settlement has been tentatively estimated to exceed 0.4 ha[25]. Four superimposed Neolithic floor surfaces have been found, associated with at least two architectural

[18] Haggis 1992, 269. This allegation, however, only appears in Haggis' summary, not in the description of the locus (Haggis 1992, 170–173).
[19] Haggis 1992, 58.
[20] In the sites catalogue, the 'N' for Neolithic evidence has a question mark and no further mention of Neolithic material is made in the text (Haggis 2005, 113–114 (site no. 31)). Wherever a site number in Haggis 2005 is given, all further references are to be found in that volume.
[21] Haggis 2005, 59.
[22] Betancourt *et al.* 1999c, 354 with footnote 39; Betancourt 2006, 73–76. 87.
[23] Its exact location is not specified (Haggis 2005, 60).
[24] Boyd 1901, 150.
[25] Unless stated otherwise, all information on the Neolithic material from Azoria is taken from Haggis *et al.* 2007b, 668–695.

phases. The Neolithic buildings were constructed of local dolomite fieldstones (cobbles and small boulders)[26].

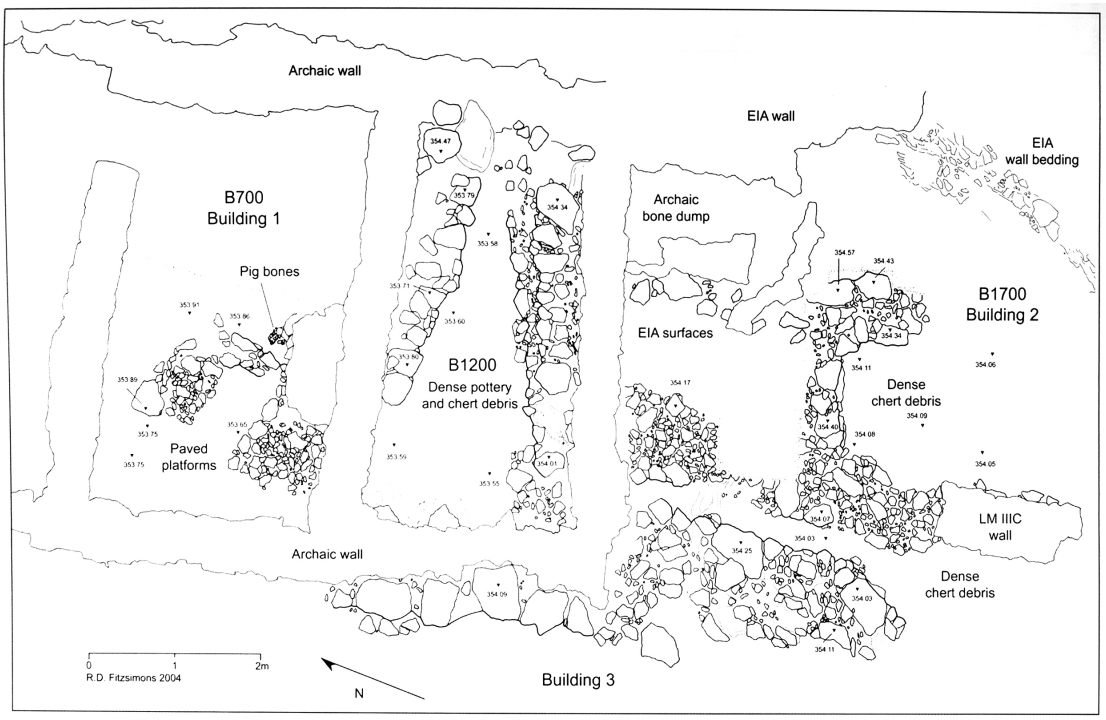


**Figure 8.4:** Plan of the excavated Neolithic remains at Azoria (from Haggis *et al.* 2007b, 669 Fig. 2)

In a spot thought to represent the interior of Building 1 (B700/B1200), a fragmented vessel was found in a shallow depression in the ground. Inside the vessel were pig bones probably stemming from one single animal. Dark soil and bits of charcoal around the vessel may point towards a pit hearth. Some stone tools were found, but no stone chipping waste. This room is interpreted as "a kitchen or internal food-processing area"[27].

Building 2 has rather strong double-faced walls (70–80 cm thick). Only one room was completely excavated; from its floor some stone tools were retrieved. Because of its small size, it is supposed to have served as a storeroom.

[26] *Sideropetra* seems to have been hardly used at all in the Neolithic at Azoria (Haggis *et al.* 2007b, 668).

[27] Haggis *et al.* 2007b, 677.

Part of a single wall is all that is left of a third building (Building 3) from the Late Neolithic. The open spaces between the houses seem to have consisted of "hard-packed red dolomite clay"[28]. Finds from the area between Buildings 1 and 2 include numerous potsherds, 106 chipped stone artefacts (blades, flakes and waste), an awl or borer made from bone and some tiny disk-shaped metabasite beads. Although the excavators do not comment on the origin of the raw material for the beads, it seems it might well be local[29]. Two roughly rectangular platforms (ca. 70 × 90 cm) made from small stones and clay were found in front of the west wall of Building 1. "Above" these platforms—whatever that is supposed to mean in terms of stratigraphy—a fragmentary clay female figurine (H 10.6 cm) was recovered. From the narrow pathway between Buildings 2 and 3 come stone tool production waste and a green schist slab with abrasion and possible drilling traces which is interpreted as a work table[30].

On the basis of this evidence, the following conclusions have been drawn: Building 1 probably served domestic purposes. The inhabitants apparently did not manufacture their stone tools *within* the house; I would not agree on the wording that they "were only gaining access to ready-made implements"[31]. In contrast to this, Building 2, where stone chipping waste was found, has tentatively been identified as a production area. The function of the two paved platforms to the west of Building 1 is uncertain, but they may have served as working surfaces in an exterior work area. Clay figurines like the one found here have elsewhere turned up in food-processing areas[32].

Even though the exact number and arrangement of houses is not known, the Final Neolithic remains are taken to reflect a long period of inhabitation within which the houses underwent reconstruction several times. Haggis and his colleagues conclude that the settlement structure was very different to what is known from the Bronze Age with its agglomerative complexes, in that "individual struc-

[28]Haggis *et al.* 2007b, 668.
[29]Rosenbaum *et al.* 2007, 437.
[30]Unfortunately, no measurements other than the thickness (6 cm) are given but from the photograph can be estimated to be ca. 20 × 30 cm.
[31]Haggis *et al.* 2007b, 689.
[32]"The location of the Azoria figurine, in a presumably exterior space that could have functioned as a domestic work area, is in keeping with other contexts for Neolithic figurines in the Aegean" (Haggis *et al.* 2007b, 673).

tures [were] separated by alleys and courtyards [...]. On the whole, the houses in the excavated area appear to be tightly clustered with rather narrow spaces between buildings rather than party walls, although the courtyard with the paved platforms indicates the possibility of open spaces shared by more than one household or the community"[33]. Azoria was given up before the onset of EM pottery.

### 8.2.1 Interactions

The evidence for the relationship between man and the environment in the Neolithic of the Kavousi region is not very substantial. The survey results show that people located themselves either close to the coast or close to the Papoura mountains, though not at any considerable altitude. Proximity to permanent water supply and promising agricultural land can be conjectured to have been a concern of people looking for a place to live in this region.

Judging by what is known from Azoria, people used local raw materials for building purposes and for the production of stone and terracotta artefacts: nodules, cortical debris and other waste were all found on site, indicating that stone tools were produced within the settlement. With the exception of red chert (represented by four artefacts only), most stone raw materials present at Azoria are supposed to be of local origin. Black chert was probably available from Thriphti or even closer at hand. The (so far) total absence of obsidian from the stone tool assemblage is notable, but not as unusual as it may at first appear: scarcity of this material at several other Cretan sites such as Kalo Chorio, Myrtos Phournou Koriphi and others support the notion that the 90%-prevalence of obsidian reported from Nerokourou or Phaistos and taken to be 'normal' may be more of an anomaly. The traditionally expected distinct fall-off pattern from the coast towards the inland is contradicted by the evidence from sites like Azoria or Debla which are near to the coast but devoid of obsidian artefacts[34]. The Vrokastro survey and other projects support this trend, suggesting that in the area of the northern isthmus,

[33]Haggis *et al.* 2007b, 676. Cf. Azoria 2004.

[34]The Kavousi region may have been "a trading 'desert' of sorts with regard to access to off-island products"; "the impression is that there were only a handful of well-connected communities in [Final Neolithic] Crete, including those around the later sites of Chania and Petras" (Haggis *et al.* 2007b, 691). With reference to the Ziros plateau, K. Branigan confirms the scarcity of obsidian at inland sites (Branigan 1998, 49).

obsidian was not used (or not available) on a greater scale before the EBA and chert was used instead. However, Haggis and his team warn that when discussing the significance of differences between the assemblages, the factor of chronology should also be borne in mind: the period labelled "Final Neolithic" corresponds to a timespan of about 1000 years[35], and sometimes cannot even be distinguished from the earliest Bronze Age and is therefore called 'FN-EM I'[36]. Nevertheless, the authors then go on to state that the raw materials at Azoria may point towards an early FNL date[37]. In terms of function, the stone tools found are not very specific: "one might associate these implements with a range of domestic activities, such as the removal of meat from the bone, the cutting of plant materials [. . . ], or craftwork such as the shaving or incising of bone, horn or wood"[38]. Lacking are scraping tools to work skins or woods, as are implements needed to separate or split bones during butchering. The single perforator or borer retrieved may have been used for leather working. Projectiles, which have also been found, should according to Haggis and his colleagues not primarily or exclusively be thought of as hunting tools, but must be seen in the context of the defensible character of the site. Interestingly, only few of these stone artefacts found show actual traces of use, and none of them exhibits sickle-sheen, so they apparently were not used for harvesting grain[39]. Nonetheless it is usually surmised that the people based at Azoria did grow grain, even though no botanical evidence has yet been published. Pig bones do, however, point towards the Neolithic economic strategy. The pig was 12 to 24 months old when it was killed, then apparently cooked and at least parts of it consumed[40].

Like the stone tools, the pottery was apparently produced locally, possibly even at the site itself. The shape known as 'cheese pots', perforated around the rim and with internal lugs, which is frequently encountered in the assemblages from

[35] Haggis *et al.* 2007b, 692; Haggis 2005, xxxi: 4000–3200 BC; Momigliano 2007, 7: 4500–3000 BC.
[36] For this problem see also Betancourt 1999, 34.
[37] For the pottery date see also Nowicki 2002, 20. 53–63.
[38] Haggis *et al.* 2007b, 689.
[39] Chipped sickles are said to be rare in Bronze Age Crete anyway (Haggis *et al.* 2007b, 689).
[40] "The presence of a number of articulating limb elements, in addition to vertebrae, strongly suggests that a whole animal was butchered, and then placed in the pot for cooking, with some of the meaty elements finally having been removed for eating" (Haggis *et al.* 2007b, 674; cf. Azoria 2004).

FNL-EM I sites such as Kavousi village, in the Agios Antonios valley, and at EM I Kalo Chorio, does not occur at Azoria[41].

Since evidence from Kavousi village and Alykomouri indicates that these two sites were occupied late in the FNL and continued at least into EM I-II, the authors sum up: "The FN settlement at Azoria appears to have been inhabited and abandoned early in the period, with the FN population relocating to lowland sites within or near the Kampos plain and the Mirabello coastal zone"[42]. Why these locations were deemed or proved more favourable is not known. K. Nowicki has suggested defensibility concerns for this period, though in that case it is not clear why Alykomouri should have been a better location (cf. also below with footnote no. 49) and why these concerns should not have persisted into the Early Bronze Age.

## 8.3 EM I-II

The region was not very densely settled at the beginning of the Early Bronze Age; Early Minoan I-II pottery was found in ten locations[43]. The two main settlements in the Kavousi region of the Early Bronze Age were Alykomouri[44] and Kavousi village. If one can go by the two sherds found, the latter seems to have been occupied continuously from the Final Neolithic to MM I[45], but of course the size of the settlement cannot be determined[46]. The location near the *plateia* of the

[41] Unfortunately for our purposes, the name does not correspond to their function. The lugs are supposed to have supported a lid (Vagnetti 1996, 32). However, the perforations would then be situated above this lid, which does not seem to make much sense to me neither for cheese-making nor any other purpose. In other instances the holes are not even pierced entirely through the wall, which means they cannot have been used for straining. Cf. however Broodbank 2008, 282. See also Nowicki 2002, 54. 62 Fig. 32; Tomkins 2009, 129.

[42] Haggis *et al.* 2007b, 707.

[43] The grouping of ceramical phases is adapted from Haggis 2005. Haggis states that "the total number of sites does not increase"; this, however, is not true, even if there really had been six NL sites; cf. footnote 20. For a justification of calling Early Bronze Age pottery in this area and the people who used it 'Minoan', a term not applied to the Neolithic groups, see Betancourt 1999.

[44] The settlement was first detected by H. Boyd who did not date the pottery (Boyd 1901, 130–131); the EM I date was later confirmed by Haggis (Haggis 1996a, 380) who also found evidence for earlier (Final Neolithic) activities (see above).

[45] Haggis 1992, 270.

[46] Haggis 2005, 62–63.

modern village was rendered attractive for settlement by the spring that still flows there today[47].

At Alykomouri, a settlement with an associated cave has been identified; both seem to have been in use from EM I to EM III[48]. The settlement is situated on top of a 'defensible' hill (120 m ASL), set back from the coast and with an eastward orientation. Although all but the western side are very steep, three routes are possible to reach this location, one of which is straight up the precipitous slope from the plain[49]. A perennial spring (something that Azoria does not offer) exists in a distance of ca. 300 m to the north-east, at the church of Agios Antonios[50]. Evidence for the Early Minoan settlement is as yet restricted to 1800 $m^2$, said to correspond to five to ten houses[51]. Besides pottery and some obsidian and stone tools (blades, flakes), a saddle quern, several rubbers, a number of marine shells and "door and window sockets"[52] were retrieved in survey; some of these were imported.

Further settlements may have existed south of the modern village of Kavousi, where remains of what may have been a single house have been found at 180 m ASL, and at Vronda (EM IIB pottery)[53].

The bay at Tholos, an important natural harbour, was apparently inhabited for the first time in EM I-II[54]. Bronze Age pottery is scattered more or less evenly across an area of 3 ha. Early Minoan sherds, however, seem to be restricted to the western side of the cove[55]. According to Haggis, Tholos was "an active port" by EM IIA, serving ships on intra- and inter-island routes[56].

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[47] Haggis 1996a, 391.
[48] Haggis 1993b, 28. Cf. Haggis 1992, 272; Haggis 2005, 99–201 (site no. 8).
[49] Haggis 1993b, 13. 20. "Typical of EM I-II sites, the settlement was located in a sheltered and defensible location, but within easy reach of the sea and the plain" (Haggis 2000, 60).
[50] Haggis 1992, 270–271.
[51] Haggis 2005, 62–63. In 1993, Haggis stated that the terrace on which the settlement sat is 1300 $m^2$ large (Haggis 1993b, 19).
[52] Haggis 1993b, 21–22. 25 Fig. 8 no. 155. Pl. V, 1. 2; Haggis 2005, 100 (no. 8.15).
[53] Kavousi: Haggis 2005, 127 (site no. 62). For Vronda see also Day *et al.* 2009, 7.
[54] Haggis 2005, 90–93 (site no. 1).
[55] "Locus 16".
[56] Haggis 2005, 62.

All bigger settlements of EM I-II (Tholos, Alykomouri, Kavousi village, Vronda)[57] are in close proximity to a spring as well as to fertile land farmable without artificial irrigation so that they would have been "self-sufficient communities with populations small enough to be supported from local resources"[58]. In the case of Tholos, however, the decisive factor for the choice of location probably were its natural port facilities. D. C. Haggis thinks that the inhabitants of these hamlets would have collaborated in economic matters such as control of trade routes, a hint at which is offered by the spectrum of imported ceramics. Moreover, "Kavousi village is situated at precisely the geophysical transition between the lowland plain and the Kavousi Mountains, a position that permitted it to control the crucial passes into the Kavousi Mountains and Thriphti Range, that is, the principal pastoral environment in the region"[59].

Pottery from FNL and EM I indicates some kind of activity at Chrysokamino Chomatas ('Chrysokamino Habitation Site'), but only for EM II-MM does the ceramic evidence suggest more substantial occupation (there are no architectural remains from this phase). The site is situated on the western slope of a coastal hill called Chomatas, at circa 120 m ASL. There seems to be no spring nearby, but a rock fissure to the south of the site is supposed to have acted as a natural cistern for the rain which would have been more plentiful at the time. Despite the scarce record, D. C. Haggis has considered the possibility that this site was "the location of the original nucleated EM I-II settlement from which the late Prepalatial pattern develops in the Chordakia-Chrysokamino area"[60].

Caves were seemingly used for ritual purposes in this period, as finds from the small cave associated with Alykomouri and Kolonospilio/Theriospilio suggest.

[57] The term "bigger" must of course be understood as relative since none of these sites is really known to any reliable extent.

[58] Haggis 2005, 64.

[59] Haggis 2005, 64. See also Haggis 1996a, 392–393. The nucleated settlement pattern is stressed in Haggis 2005, 64.

[60] Haggis 2006, 227. The actual local name for this spot is 'Katsoprinos', but this toponym occurs several times in the Kavousi region and has therefore been dropped by the excavators in favour of the unique 'Chrysokamino' (Betancourt 2006, 10). Other information from Betancourt 2006, 258; Floyd 2006, 205.

In both cases, burial function has been suggested although human remains are lacking[61].

### 8.3.1 Interactions

To sum up, people continued to live near the coast or near the mountains, often in the same spots as before. New foundations, however, seem to have been orientated just as much towards nearby springs and soils. On sites near the sea such as at Alykomouri, there is evidence for the exploitation of marine resources: "Fragments of marine shells demonstrate that the inhabitants [of the settlement] used the sea, and obsidian blade fragments point to links to the Aegean. Large querns and a variety of hand stones, derived from the nearby river bed of the Platys (in the Kambos), are evidence of household agricultural activities"[62]. The fertile deep silty phyllite soil—said to be the only dry-farmable patch in the plain—has traditionally been used for growing wheat, so possibly in the Bronze Age, too. The settlement is the only location in the area from which the associated rock-shelter can be seen[63]. This exclusive visual connection between the settlement and its potential ritual or burial place may represent a deliberate link between the realm of the living and the realm of the dead within the landscape.

The Avgo valley (see Fig. 8.5) may have been explored for the first time in EM IIB[64], as was Xerambela, testifying to the exploitation of more mountainous terrain—which would have necessitated terracing in order to be suitable for agriculture—and the search for steady water sources; Haggis suggested growing population numbers or climate change as possible reasons[65]. However, this is not in keeping with the reconstructible climatic sequence, which suggests that summers were becoming cooler from 2700–2200 BC (see section 3.2.2).

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[61] Both caves were first explored by Edith Hall, but her publication was not extensive. See Haggis 1993b; Haggis 2005, 98–99 (site no. 6); Haggis 2005, 113–114 site no. 31. A number of smaller caves at Agios Antonios have been suggested to have had the same function (Haggis 2005, 99 (site no. 7)).

[62] Haggis 2005, 62.

[63] Haggis 1993b, 11. 13.

[64] The identification of EM II material at Panagia seems to be rather uncertain (Haggis 2005, 138–139 (site no. 87)).

[65] Haggis 2005, 63.

**Figure 8.5:** View into the Avgo valley from the Kastro (April 2011)

## 8.4 EM III-MM IA

Sixteen sites of the late Prepalatial period have been recorded, some of which lie in previously unsettled terrain[66]. The settlements at both Tholos and Kavousi village may have been abandoned after EM II, though this impression could—at least in the latter case—be due to the difficulties in ceramic dating. D. C. Haggis orders the settlements into groups which he calls 'clusters'. The three clusters of late Prepalatial times are Agios Antonios, Xerambela and Chordakia; among them, no hierarchical pattern can be made out[67]. At Azoria, part of the Xerambela cluster, EM III-MM IA coarse pottery and three black serpentine vessels were

[66] Haggis 2005, 65.
[67] See Haggis 1992, 277: "The pattern at Kavousi in MM I is one of localized growth in precisely the areas inhabited in EM I, and there is no evidence for settlement nucleation or hierarchical differentiation."

found during the 2003–2004 excavation, but their unstratified contexts make it impossible to draw any conclusions about the qualities of the settlement. The material came to light in a limited area of 800 $m^2$ on the South Acropolis and has hence been suggested to stem from "a single hamlet" (it seems unlikely to me anyway that more than one hamlet could be expected on the hill). At any rate, the area occupied in the Late Prepalatial period appears to have been much smaller than in the Neolithic[68].

Traces of continued human activity in MM I-II, possibly even of a site of "special importance"[69], have been found at Vronda. Whether the singular mud-brick recorded during excavation and exceptional in size as well as in its lacking the usual straw temper dates to this period is not clear[70].

On a foothill of the Papoura range, 265 m above sea level at Chondrovolakes (700 m north-east of Vronda), a new single building was erected in MM I-II or possibly already in EM III-MM IA[71]. Built of huge blocks, it has been identified as a farmstead, a sealstone being enough to suggest some "complex or special economic" function[72]. This may be supported by the fact that it sits on a natural route from the Kampos to the pasturage in the mountain hinterland. The expansion into the uplands that had begun in EM II continued and now took in higher elevations than before: a farmhouse or hamlet was founded in pottery phase EM III at the Bebonas watershed at 800 m ASL. Haggis concludes: "These new sites were established by settlers seeking new agricultural land, pasturage, and stable water supplies. Their existence is evidence of a new impetus for settlement siting, controlling new pasturage, and bringing areas previously unoccupied or unexploited under cultivation. In the plain there are signs that the limited arable was used to its fullest potential; sites are located on essentially uncultivable terrain, leaving the arable free for agriculture. This apparent agricultural resource management accords well with the evidence for the first signs of activity in the mountain zones"[73].

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[68] Haggis *et al.* 2007b, 695–696. 707.
[69] Haggis 1996a, 399.
[70] Day *et al.* 2009, 22–23.
[71] Haggis 2005, 128–129 (site no. 68). The dates given in the catalogue entry heading and in the text vary.
[72] Haggis 1996, 399–400.
[73] Haggis 2005, 66. Bebonas: Haggis 2005, 141 (site no. 92).

Despite this tendency, the area where both newly founded and 'old' sites are more closely set than anywhere else is Chordakia, to the north-west of modern Kavousi, on the other side of the Kampos and closer to the coast. It has been suggested that there may have been perennial springs here which have now dried up[74]. The phyllite soils in this area (see Fig. 8.3) are very fertile at any rate and people apparently took care not to waste any of them by using them as building ground. Lakkos Ambeliou in Chordakia is described by Haggis to stand out as far as topographical position and evidence are concerned[75]. Situated on a coastal foothill at 82 m ASL, the newly-founded site commanded the route through the plain to Agriomandra (the natural roadstead). Foundations built of boulders—not known from other sites in the region—testify to the former existence of a substantial edifice. The first traces of use at Agios Antonios also date to within this period[76]. Situated about 20 metres up the south-east slope of Mount Schinias, this may have been a more promising location than Alykomouri higher up the slope, though the latter was not abandoned at the same time in favour of the former (which might have been the case at Tholos) and habitation continued there into EM III; the rock shelter at Agios Antonios was used even longer, namely into MM IA[77]. Since the topography at Alykomouri would not have allowed the settlement to expand, Haggis thinks it possible that some people may have relocated to Agios Antonios when the population grew too large. Residence on the rocky terrain at Agios Antonios meant that no fertile valley floor was built over with houses. The new site also offered the advantage of facilitating communication with the rest of the Kampos plain[78]. In Haggis' view, there may have been family connections between the settlements. He concludes: "Dispersed sites clustering in locales of concentrated arable land could be the result of a process that began in EM III-MM IA, and there is no particularly strong indication of a new or intrusive population element into the region, only a response to local environment in the context of a gradual

[74] Haggis 2005, 66. Since this is only a hypothesis, it is not clear to me why Haggis later states that Chordakia "controlled [its] own water supplies" (Haggis 2005, 67).
[75] Haggis 2005, 120–121 (site no. 44).
[76] Haggis 2005, 95–98 (site no. 5). The catalogue entry heading says MM I, whereas in the text it says EM III.
[77] See Haggis 2005, 65.
[78] Haggis 2005, 65.

population increase or perhaps climate changes at the end of EM II"[79]. However, from the data available so far, it seems that EM III-MM IA was the climatically more critical period, with very dry conditions, especially in east Crete[80]. Haggis admits that distinguishing between EM III and MM IA pottery is often not possible, thereby making it difficult to draw relevant conclusions referring to a particular period. At the very least, compared to the Neolithic, the settlement pattern of the region was fundamentally changed in EM III[81].

**Chrysokamino 'Metallurgical Site'** The 'Metallurgical Site' at Chrysokamino is situated on the saddle of a limestone and phyllite promontory, about 40 m above the sea[82]. Dolomite is visible in the vicinity, while farmable patches have developed on weathered phyllite. In some limited areas, *terra rossa* is also present; in the case of the depression called Lakkos Ambeliou it has been washed down from the carbonate rock hillsides around. This clayey sediment can be used for coarse ware ceramics[83]. Access from and to the sea was probably only possible via the small bay of Agriomandra. The setting of the Metallurgical Site is in fact highly unattractive for settlement: the soils mentioned are not productive, there are no other resources around and the topographic characteristics are not favourable to an efficient system of transport and communication[84]. There is no freshwater source here either. Because of its exposure above the sea and its location in a depression, the metallurgical site is one of the windiest spots in the region. These climatic conditions are less than favourable to plant life, but it is probable that people chose this spot for their purposes exactly because of these characteristics. This was not a place to live but to work.

[79] Haggis 2005, 67.
[80] Weiss 2000, 90; Moody 2009b, 245–246.
[81] Haggis 2005, 67–68.
[82] The Plattenkalk limestone is part of the African tectonic plate, whereas the phyllite belongs to the European plate (Betancourt *et al.* 2006, 48). The site had been known for more than 100 years but was never systematically explored until 1995, when an American team under the direction of Philip Betancourt started a large-scale survey and excavation project. (For a detailed account of previous research on Chrysokamino see Betancourt 2006, 3. 14–17.) Unless stated otherwise, all information on Chrysokamino is taken from Betancourt 2006.
[83] This is Kavousi pedon 3 (Morris 2002, 48–59).
[84] Betancourt – Farrand 2006. Cf. Morris 2002, 57.

The oldest pottery at the metallurgical site belongs to the Final Neolithic-EM I-II and was found in a pile of slag underneath the earliest floor of the later architecture described below. The very limited size of the pottery assemblage makes it unlikely that the site was used with high frequency before EM III-MM IA. Not much is known about the earliest occupation. The lack of certain shapes in the assemblage of FNL pottery has led Betancourt to suggest that wood or gourds were used to make drinking vessels. The only faunal remains from the slag pile that were associated with FNL to EM III-MM IA pottery are seashells (61 limpets, 6 top shells) and the vertebra of a hare[85]. Whether the metallurgical activities at Chrysokamino started at this early date is not clear[86]. On top of this slag pile

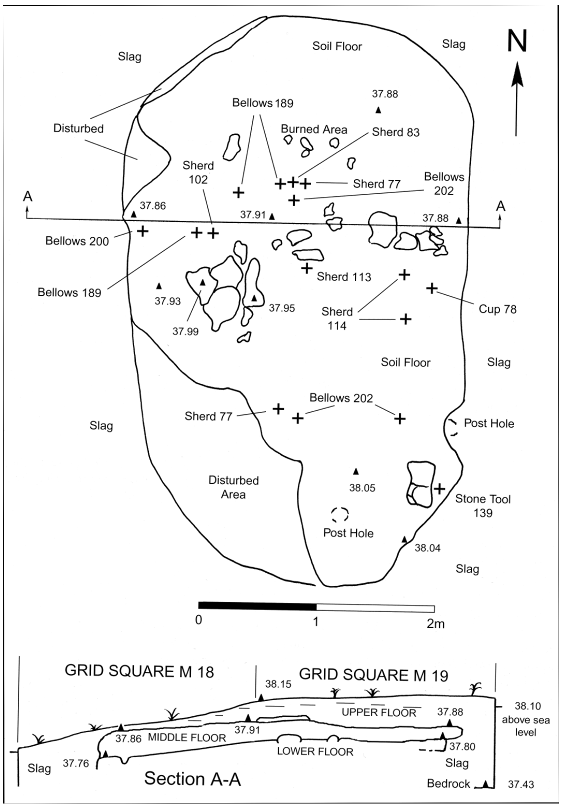


**Figure 8.6:** Plan of the hut at Chrysokamino 'Metallurgical Site' (from Betancourt 2006, 59 Fig. 4.6)

[85]Reese 2006, 149.

[86]"It is true that no direct association can be made between metallurgical activities and the FNL sherds, but it is hard to imagine any other reason for human presence on this isolated, windswept point of land" (Muhly 2006, 155). See also Betancourt *et al.* 1999c, 363. 367.

were six post holes arranged in a U-shape, indicating an apsidal structure made from perishable materials, erected in EM III-MM IA (see Fig. 8.6). In contrast to other areas in Greece, very little (if any) non-stone architecture is known from the Cretan Bronze Age, making the structure at Chrysokamino a remarkable feature[87]. Evidence suggests that this was more some kind of unroofed windbreak than a proper building[88]. Its floor was renewed twice by bringing in soil from somewhere else before it was given up within the same ceramic phase[89]. Only five pieces of ore were found, but remains of at least nine pot bellows and uncountable numbers of fragments of furnace chimneys used for smelting copper were strewn across the site. Their fabric is different from the one used for the coarse pottery: chaff was added as temper, making the material more resistant to thermal shock during metallurgical operations[90]. Evidence from several geological surveys and from the site make it "very unlikely" that copper ore could be extracted in this region[91]. This is a very important finding in terms of man-environment relations.

[87] The excavator thinks it possible that the building was set upon a deposit of slag and other debris because it is difficult in this area to find a location with sufficient soil to dig post holes.

[88] The metallurgical character of the site was apparent from the great amount of slag distributed across an area of ca. 10 × 40 m and piling up to 60 cm depth in some places. It seems that it was mostly the secondary copper ores malachite, azurite and chrysocolla that were smelted at Chrysokamino. Some of the slags contained arsenic, but it is not entirely clear to what extent the inclusion of such ores was planned rather than coincidental (Betancourt 2006, 179–189). Other scholars from the Chrysokamino team seem to be more confident of intentional addition of arsenic ores (Catapotis – Bassiakos 2007, 72–73). The temperature in the furnaces reached up to 1250–1350 °C (Stos – Gale 2006, 307).

[89] Betancourt 2007, 60. It has been proposed that the soil, possibly brought to the site from where the workers lived, may have had some symbolic meaning (Betancourt 2006, 183).

[90] The chimneys were probably not fired before use and they were used only once, since they had to be smashed after the smelting process to extract the slag (even though a part of it was probably tapped) and any copper left in it. The pot bellows were in fact cylinders in whose closed tops holes were cut before the clay was fired (Betancourt 2007, 64). The black colour on their inside, caused by hot air drawn back out of the furnace, contradicts statements by Don Evely about possible bellows from Kommos (Evely 2000, 363). Likewise, the reconstruction in Betancourt – Muhly 2006, 127 Fig. 8.2 differs from Evely's statements about the position of the nozzle. The pumping device must have been made from some perishable material like leather. The results and the efficiency of the smelting practices at Chrysokamino are rated very good (Betancourt 2006, 188–189).

[91] Stos – Gale 2006, 304. Besides the geological evidence, the fact that waste materials such as rocks, low-grade ore and tools are missing in the assemblage rules out both the possibility of a mine close to the site and that beneficiation of copper took place here. Apparently, only beneficiated ore was transported—maybe by sea—to Chrysokamino to be processed (Betancourt 2006, 144). See also Betancourt 2006, 41–42.

Organic residue analysis was applied to twelve potsherds from the site. Some of them testified to the presence of milk. In other cases, the vessels must have held resinated wine mixed with aromatic or medicinal plants. In at least one instance, this liquid was covered with a layer of (olive?) oil to prevent its oxidation to vinegar. Since the cooking of meals would have left traces of animal fats and vegetable oils in the pots, the results from Chrysokamino probably indicate that these pots were not used for the preparation of ordinary food[92]. A number of plants with medical properties were known to the Minoans, and although the use of no single one of them can be proven from residue analysis, the evidence makes the presence of any of them highly likely. A great number of herbs are known to relieve gastrointestinal problems which the workers were prone to suffer because of their exposure to arsenic[93]. Some of these plants, such as fennel, licorice, verbena or saffron, are native to Crete and could have been collected, whereas others (coriander, anise, cumin, rue) may have been imported, or in some cases possibly grown from imported seeds[94]. According to Arnott, the resinated wine contained in the remedies was added to make their taste more pleasant[95].

As for other plant remains, two-row barley has been identified, though not from real botanical remains but from impressions in terracotta[96]. Evidence for

[92]Beeston *et al.* 2006; Beeston *et al.* 2008. See R. Arnott 2008, 109–110 for the damaging effects that the work at the smelting site would have had on the health of the workers: "the condition of the skin and their consequent external appearance may have been quite shocking for the local population and they may have lived up at Chrysokamino like 'lepers' in their own community, having very little contact with them". Such more or less permanent social marginalization is contradicted by the lack of a building suitable for habitation however. Nonetheless, it is probably safe to assume that burns would have occurred quite frequently, and more often than not they would have been grave: "Although some believe otherwise (see the illustrations in Betancourt 2000), the idea that Early-Middle Minoan copper smelters wore only a loincloth whilst undertaking this hazardous work is most unlikely. There must have been some form of personal protection against the heat, embers, flying debris and the occasional exploding furnace" (Arnott 2008, 111).

[93]Or, in Arnott's words: "What this particular group of herbs [rue, fennel, cumin, anise, coriander and possibly verbena] [...] would have been used to treat seems fairly clear. [...] The vast majority of the plant remedies are likely to have been used to self-treat digestive complaints which would have been the most noticeable and dominating symptom of their poisoning" (Arnott 2008, 115–116). See also Beeston *et al.* 2006, 427.

[94]Arnott 2008, 116. For medicinal use of saffron see Day 2005, 51; see also p. 141 footnote 89. For coriander see also Moody 2012, 252–253.

[95]Arnott 2008, 111.

[96]Jones – Schofield 2006.

grain cultivation comes from the chaff temper of the smelting chimneys. It has been argued that "[t]he cylinders must have been made shortly after the harvest, in the fall of the year, when chaff was available. Perhaps the work was seasonal, performed in late summer to early fall when the harvest was completed, the seasonal north wind (the *meltemi*) was blowing fiercely, and the autumn rains had not yet begun"[97]. However, when they were made is not the same as when they were used[98], so that this is not a valid argument. One of the fragments[99] displays the impression of an olive leaf. Even though I have no reason to doubt olive cultivation in eastern Crete in the Early Bronze Age, in contrast to P. Betancourt I do not think that the impression of an olive leaf is sufficient evidence, even if the leaves of wild and domesticated olive trees are distinguishable[100]. Moreover, wild olives have their advantages too, and may have been exploited in their own right[101]. Another indirect argument in favour of olive cultivation and processing by the people at Chrysokamino however is based on the absence of charcoal from the archaeological record: it has been suggested that the remains of pressed olives were used as fuel for the smelting operation[102]. The fact that no charcoal was found also contradicts Haggis' suggestion that the motivation for the foundation of a number of new settlements in the Kavousi Mountains in EM III was the need for fuel for the metallurgical activities at Chrysokamino[103]. From the floors within the apsidal structure, that is from EM III-MM IA contexts, 35 limpets, 34 top shells, 3 sea urchins, 1 crab claw and some other types of shell have been retrieved. D. S. Reese concludes: "the species here are mostly edible species from shallow water on rocky shores. All of the marine invertebrates could have been collected casually from the seashore in the vicinity of the workshop site. The rarity of mammal and

[97] Betancourt 2006, 113.
[98] Betancourt 2006, 182.
[99] Betancourt 2006, 110 Fig. 7.2.
[100] For various problems concerning the distinction of remains of wild and domesticated olives see Riley 1999, 37–38. Leaves are unfortunately not mentioned however. See also footnote 180 in the section on pollen cores from Crete, p. 97.
[101] Due to their lower grease content, the oil of wild olives is said to be more suitable for perfumes and the likes (Rackham – Moody 1996, 82; Riley 1999, 43; Tartaron 2004, 143). Their extensive use is denied, however, by Chadwick 1976, 122 and, following him, Melena 1983, 98. See also Moody 2012, 249.
[102] Betancourt 2006, 186. For olive-pressings as fuel see Smith 1998, 193. 200. See also Forbes 1996, 84.
[103] Haggis 2006, 228.

fish bones suggests that meat did not play a significant role in the diet consumed here"[104]. The site was abandoned before MM IB.

### 8.4.1 Interactions

The natural limits of agriculture in the Kampos plain seem to have been felt for the first time in this period. Not surprisingly for people living in close interrelation with nature, the inhabitants of settlements such as the new foundation at Agios Antonios were well aware of the value of the fertile valley soil—as opposed to the sediments on the hill slope—and took care not to waste any of it by building over. Moreover, for the first time now people went to live in the mountains of the area, at elevations up to 800 m, perhaps less by choice than driven by the need to find enough arable and grazing land to feed the growing population[105].

On the land available, barley and olives were grown. The most was made of both crops in that processing waste was employed industrially, as temper in the first case and (perhaps) as fuel in the latter case. The use of olive crushings as fuel may have been a strategy to overcome the lack of wood in the area, or simply a convenient way of obtaining fuel without extra effort. People collected herbs, in most cases probably growing wild, and possibly used them not (or not only) for culinary, but for medicinal purposes. Unless the resinated wine (or the resin) was imported from elsewhere, it must be conjectured that not only pines existed in the area and where tapped for resin, but also that vines were cultivated in the area. The faunal remains from Chrysokamino seem to indicate that people ate more marine than terrestrial animals, though of course meat brought to the site without any bones or the discarding of bones elsewhere would leave no trace in the archaeological record. In the area south of the site, an in-depth analysis of the alluvium in a sinkhole revealed that sediment had accumulated probably in the Late Pleistocene/Early Holocene and had definitely been stable since the Middle Bronze Age. Although settlement activities are attested for the EBA (see above), no human influence on soil development is suggested[106].

[104]Reese 2006, 149–150.
[105]Haggis 1992, 278; Haggis 2005, 68.
[106]Morris 2002, 58.

The coastal environment was not (and could not have been) exploited for any natural metallic resources. Nonetheless, the location of the metallurgical site was probably chosen for its natural and topographical features, namely its exposure to winds and possibly the proximity to the natural port at Agriomandra.

## 8.5 MM IB-II (Protopalatial Period)

All in all, 53 sites in the Kavousi region have yielded MM IB-II material. This is a greater number and the distribution is across a wider area than at any other time in the Bronze Age. They are situated in the same areas as before, but within these, some sites were given up and new ones were established. Examples for this development include the abandonment of Alykomouri and the foundation of a new site in the plain below or the establishment of ten new sites in the Chordakia area, notwithstanding continuity of all other communities there[107]. Occupation at Lakkos Ambeliou continued; Late Prepalatial and Protopalatial larnax fragments hint at the existence of a cemetery nearby. Whether this evidence is enough to interpret the remains as a possible "centralized organization in the cluster" and this site as a focal point of cult is open to debate[108]. Haggis compares his findings from the Chordakia cluster to evidence from Xerambela-Chondrovolakes and identifies Chondrovolakes/Panagia Skali (265 m ASL), likewise founded in EM III-MM IA, as an equivalent to Lakkos Ambeliou[109]. Fragments of larnakes were recorded here, too.

The settlements at both Vronda and Agios Antonios continued to be inhabited, and the latter even appears to have grown in size in this period. At Vronda a large wall may be all that remains of a sizeable Protopalatial (MM II) building (Building P)[110], and Haggis hypothesizes that this might have been yet another example of the type of site which is represented by Lakkos Ambeliou and Chondrovolakes.

[107] Except for the Metallurgical Site at Chrysokamino, but since this was no residence but only a workshop, it has different implications. For the settlement pattern see Haggis 1996a, 393. See also Haggis 1995, 373. For the new site in the plain see Haggis 2005, 102 (site no. 11).

[108] Haggis 2005, 72. He also suggests this might have been "the residence of a family of high status, the community leader's house whose ancestral cemetery and cult place were located nearby".

[109] Haggis 2005, 128–129 (site no. 68).

[110] Day *et al.* 2009, 7. 65–71.

Like these, the locality of Vronda allows command of certain mountain routes into Papoura and Thriphti, and there is a spring and good farmland (ca. 25 ha) nearby. The excavation of Building P revealed a nodulus with a sealing, reinforcing the idea of a connection between this and other rural sites in the region. The faunal remains found here include sheep/goat, pig and dog bones, very limited numbers of cattle and badger and some shells, among them a triton, a limpet, a dog cockle and four murex shells, but they all come from a mixed fill and their dating is not certain[111].

Four new sites are known in the Avgo valley and as much as eleven in the Papoura area. The settlement in the location of modern Kavousi village seems to have been reoccupied. It should be noted, however, that the sites themselves appear to have been rather small, hamlet-sized or possibly even only "single houses or household complexes"[112]. Even though it is difficult to determine their dimensions in a particular period, several sites seem to have grown to a considerable size only after the Protopalatial period[113].

### 8.5.1 Interactions

All that can be said about the relationship between man and the environment in this period is inferred from the distribution of settlement as known from survey. No hierarchical structure of settlement can be made out. Instead, Haggis has suggested the grouping of settlements into five 'clusters': Tholos, Avgo, Agios Antonios, Chordakia and Chondrovolakes-Xerambela[114]. According to him, farmsteads in each cluster are grouped closely around patches of fertile phyllite soil and a spring, carefully avoiding the arable land by building on bedrock outcrops[115]. The internal structure of a cluster would, although architecturally different, have resembled that

[111] Day *et al.* 2009, 67.
[112] Haggis 2005, 71.
[113] These are Haggis' site no.s 11, 15, 16, 17, 23, 27, 28, 34, 69, 85 (Haggis 2005).
[114] The late Prepalatial site clusters of Agios Antonios, Chordakia and Xerambela continue and grow in size (Haggis 2005, 70).
[115] "At Chordakia, Xerambela, and Avgo, where the patterns are clearest, the small size of the individual sites would have permitted the inhabitants great flexibility in locating their houses" (Haggis 2005, 71). From Haggis' description of the MM I-II and LM I site at Petras in the Kampos, possibly a Minoan farm (Haggis 2005, 123 site no. 52), it seems that the avoidance of farmable land as building ground does not apply in this case.

of a nucleated village such as Gournia. Moreover, "[i]f the essential ties between sites in a cluster were kinship based, then the identity of the community would have been linked to the landscape, the agricultural and pastoral lands exploited, and the resources shared by that cluster"[116]. In this way, social and economic aspects connected people and environment.

Several reasons could have caused the development of such a settlement pattern in this period: besides the collapse of the social structure of EM II and population influx from outside, Haggis names climatic change as a possible factor[117]. He does not specify this claim, but as has been said above, EM III was an especially dry spell and an unstable climate period, comparable to the Medieval 'Little Ice Age', began in MM I (see chapter on past climate). If one tries to link this to the new settlement pattern of the Kavousi area, one could argue that people adapted to the unpredictability of climate by distributing their habitations fairly evenly to make the most of the available soils and maybe by pooling their resources to a certain amount or at least helping each other out[118].

It has been argued that such systematic land use would only have been possible if organized by some institution within a complex socioeconomic system. As mentioned before, the survey data do not permit the ordering of sites into such an organizational pattern. Haggis thinks it nonetheless possible that one site acted as a central managing unit for the otherwise decentralized and heterarchically organized region[119]. For the arrangement of daily agricultural work this may have meant that "the primary subsistence and surplus needs of each cluster were sat-

[116] Haggis 2005, 72–73. While this claim makes sense for the wider spacing of sites discussed here, it would probably be less pronounced in a nucleated village like Gournia. Although Haggis may be right about the relationship between the land, its resources and the farmsteads, I do not understand how Haggis arrives at placing the circles in his Fig. 20 where he did; it seems arbitrary to me, especially the two northernmost ones (Agios Antonios and Chordakia).

[117] Haggis 2005, 69. Cf., however, Haggis 2005, 71, where he associates the cluster pattern to "agricultural diversity, self-sufficiency, and the variability of productivity in diverse environments" or possible cultural conventions. The climate change hypothesis is reinforced in an earlier paper by Haggis, stating: "Thus, I would argue that the clustering of settlements in the Middle Minoan period is most likely a manifestation of human adaptation to purely local environmental factors" (Haggis 1995, 379).

[118] Cf. Haggis 2005, 72. Though not relating these thoughts to possible climate change, he thinks that irrigation, the construction and maintenance of terraces, crop specialization and large-scale storage may all have been communally organized.

[119] Haggis 2005, 74.

isfied through three levels of production and spatial scales of activity: household gardens, family-owned fields, and cooperative exploitation of fields beyond the immediate area of the cluster"[120]. This three-partite system is basically identical to the division of agricultural land suggested by Betancourt[121], though both are entirely conjectural. Betancourt distinguishes gardens (close to the respective habitation and used for pulses, vegetables and other crops requiring more intensive care, grown in comparatively small amounts and identifiable by sherd scatters resulting from manuring), grazing lands (further away from the dwelling and with little or no agricultural potential) and fields (terraced phyllite hills used for dry farming of cereals and olives). This system would have gone hand in hand with a certain degree of division of labour: tasks such as pruning trees or harvesting grain would have employed people for full days of hard work and were therefore not feasible for everyone. However, even though crops such as pulses or grapes require much care, tending garden plots and small numbers of goats or other livestock near the house would have been (more) manageable for household members taking care of small children or engaged otherwise[122].

## 8.6 MM III-LM I (Neopalatial Period)

At the beginning of the Neopalatial Period, the clusters that characterized the settlement pattern in the Early and Middle Bronze Age disintegrated, and the number of sites falls from 53 to 40. Some places were given up—people may have swapped habitation in isolated farmhouses for life in larger nucleated settlements in the plain—, while at the same time new sites were founded in patches of land formerly belonging to one of the clusters. The pattern is the same in the Avgo valley, at Xerambela and Chordakia: "the cluster of Protopalatial houses was eventually replaced by a large single building ('megalithic farmsteads') strategically positioned to command both routes and discrete areas of arable land"[123].

[120] Haggis 2005, 72.
[121] Betancourt 2006, 243–252.
[122] Cf. Widmann 2007, 150 (with further references).
[123] Haggis 2005, 75. Cf. Haggis 1996a, 401.

Examples of these large Neopalatial buildings exist at Chondrovolakes, Katsoprinos, Agios Antonios[124] and Panagia in the Avgo valley. The last-named was excavated by Harriet Boyd in 1901[125]; the date of the structure is by no means certain, but Haggis favours LM I, possibly even earlier, and maybe continuing into LM III[126]. It probably measured ca. 15 × 22 m with walls of 1 m thick megalithic blocks. The entrance may have been on the north side. Storage rooms equipped with pithoi were identified in the eastern part of the building, and a hematite sealstone was found[127].

Yet another example of this type is Chrysokamino Chomatas ('Chrysokamino Habitation Site', 120 m ASL, ca. 8 × 11 m), where the earliest preserved architecture dates to LM IB (see Fig. 8.7). Five rooms were constructed from rubble and soil mortar set directly on the bedrock. Little can be said about activities at the site, since finds consist only of pottery, stone tools, some clay loom weights, a bronze dagger and a stone bowl[128]. There are good arable soils and pastures in the vicinity, and this may have been the incentive for the erection of a residence or farmhouse here, although the water supply was probably rather inadequate[129]. The site seems to have been deserted rather suddenly although no signs of destruction were detected[130]. Besides these isolated buildings, nucleated settlements developed in the plain at Chomatas and Agios Antonios, both of which grew from their Protopalatial extent to the size of a hamlet and "a large village or small town" respectively[131]. The LM I settlement at Tholos extends over an area of at least 3.5 ha, thereby constituting "the first clear indication of nucleation of

[124] Chondrovolakes: Haggis 2005, 129–130 (site no. 69). Katsoprinos: Haggis 2005, 110–112 (site no. 28). Agios Antonios: Haggis 2005, 95–98 (site no. 5).

[125] Boyd 1904, 18–20; Haggis 2005, 138–139 (site no. 87).

[126] Haggis 2005, 139. On this building see also Hayden 1997. B. J. Hayden supports the function of the building as a 'megalithic farmstead', but limits the date to LM III only.

[127] A division between storage and living quarters, as suggested by the excavators and not denied by B. J. Hayden, seems highly hypothetical (Hayden 1997, 198).

[128] Floyd 2006, 209.

[129] Betancourt 2006, 258.

[130] Floyd – Betancourt 2010, 477.

[131] Haggis 2005, 76. See also Haggis 1995, 377; Haggis 1996a, 401. Chomatas: Haggis 2005, 102 (site no. 11). Agios Antonios: Haggis 2005, 95–98 (site no. 5). Other sites occupied in this period, most of which have produced some MM I-II, but more MM III-LM I pottery: Kampos: Haggis 2005, 103–105. 107. 109 (site no. 15–19. 23. 25). Lakkos Skaphos: Haggis 2005, 105–106 (site no. 20–21). Chordakia: Haggis 2005, 110 (site no. 27). Petras: Haggis 2005, 123–124 (site no. 50–52. 54).

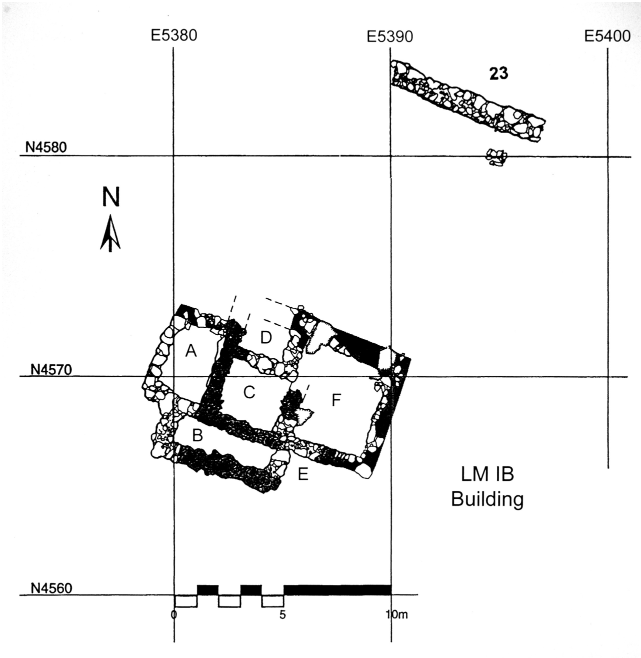


**Figure 8.7:** Plan of the LM IB structure at Chrysokamino Chomatas (from Floyd – Betancourt 2010, 475 Fig. 11)

population and definable site-size hierarchy since the Early Minoan period"[132]. Its position on the coast makes it plausible that it may have been a port, possibly belonging to Agios Antonios.

### 8.6.1 Interactions

No detailed studies of faunal or botanical evidence for this period are available from the Kavousi area, but the results of the survey allow some conclusions to be drawn. Donald Haggis has promoted the hypothesis that the large isolated buildings appearing in this period were held by members of a rural elite and positioned so as to make the most of the soils. Each would have specialized in growing one or several certain crop(s) such as flax, vines, olives, fruits, nuts or wheat in both the Kampos plain and the surrounding uplands and may have satisfied local needs but also have been shipped elsewhere via Tholos and Agriomandra. Even though they are bigger and of higher constructional quality than earlier houses,

[132] Haggis 1996a, 403–404.

these buildings are not to be confused with the so-called villas of Neopalatial Crete: there are no signs of 'palatial' architecture, and "formal characteristics" are also lacking[133]. Nevertheless, they are supposed to have fulfilled certain "specific agricultural functions or [to have had] special economic significance" and the term "country houses" may be suitable[134]. Haggis has argued that the "function [of these buildings] within the landscape is related to a settlement hierarchy and perhaps a new economic system within the wider region"[135]. It is not clear to me how an administrative function could satisfactorily be proven other than through written documents or sealings (both of which are unlikely to turn up in survey)[136]. In contrast to Haggis, Philip Betancourt thinks that at isolated Minoan farmsteads such as Chrysokamino, people practised a mixed economy with a broad range of crops and animals, and explicitly sets this apart from "more specialized palatial productions"[137].

The villages in the plain probably benefited from the fertile soils and the nearby spring. In addition, settlement also clustered in the north Kampos to the east of the river bed, although the land is rocky and water both for domestic needs and for irrigation would have had to be fetched from the river. Despite the fact that no evidence has been found, Haggis puts forward the hypothesis that there may have been a dam, since "landscape modification was surely practiced in LM I in the area, as suggested by the agricultural terrace walls found at site 5 in the Hagios Antonios Valley"[138]. Furthermore, it is striking that sites situated in areas with good agricultural soils were given up. Referring to similar observations by P. Warren, Haggis thinks these changes could be due to a depletion of resources exceeding the carrying capacity of particular patches which would have forced people to move elsewhere. In his view, "the effects of even minor increases in local

[133] Haggis 2005, 77; Haggis 2006, 229–230. See also Haggis 1995, 377; Haggis 1996a, 401.

[134] Haggis compares them with the farmhouse at Chalinomouri near Mochlos (for which see Soles 2003; Soles 2004; Widmann 2007, 123–133).

[135] Haggis 1996a, 401.

[136] By far not all Minoan villas have yielded Linear A documents, yet an administrative function has been attributed to them (Betancourt – Marinatos 1997, 97). See Schoep 2002, 20 Fig. 1.3 for a map of the find spots of Linear A in Crete.

[137] Betancourt 2006, 272. Cf. Barker 2005, 58. Betancourt estimates the number of inhabitants to have ranged between ten and fifteen—including slaves (Betancourt 2006, 236). The existence of slaves can be debated, however (for a discussion of this topic see Widmann 2007, 157).

[138] Haggis 2005, 76.

population would have been profound, especially set against a backdrop of environmental changes that might have encouraged economic diversification and new sociopolitical configurations manifest in the development of the Minoan palatial economy"[139].

Betancourt has also considered other factors of the natural environment: "At Chrysokamino, there was surely no forest in the Late Bronze Age because few wild animal bones are present in the archaeological record, and large numbers of sheep/goat bones indicate extensive grazing. [...] It is likely that human activities during the Bronze Age curtailed or eliminated any local forest cover still in place before the Final Neolithic"[140]. According to Betancourt, trees would have been cut down to clear land for agriculture and grazing but also to provide fuel for the metallurgical activities as well as for burning lime to make plaster. However, the absence of charcoal from the metallurgical site at Chrysokamino rules out at least one of these possible reasons for any potential deforestation. It is probable, however, that the new settlement pattern was influenced not only by environmental but also by social and economic factors.

In contrast to late Pre- and Protopalatial times, when lots of ceramics were imported from the region of Gournia and Kalo Chorio, all (MM III-)LM I coarse ware in the Kavousi region is locally made from the same clays and in standardized shapes[141].

Haggis concludes that "the settlements are no longer integrated clusters of farmhouses in arable zones; they now appear decidedly separate, placed strategically to take advantage of trade routes, ports, and perhaps the Platys River for irrigation"[142]. It seems that by LM I, a large portion of the inferior land in the Kampos plain was intensively farmed. According to Haggis, the pattern of self-sufficient farming households tilling their own plot with a wide and diversified range of crops, adapted to the microregional environments gave way in LM I to a hierarchical system in which the fields would have been planted with standardized species such

[139] Haggis 2005, 77.
[140] Betancourt 2006, 43.
[141] Haggis 1996a, 407–408 (MM III-LM I); Haggis 2005, 79 (LM I). This shift is supposed to reflect the growth of local markets, possibly triggered off by an alteration in production strategies of the centre in Gournia, which may have focussed more on inter- than on intraregional export and on goods other than pottery.
[142] Haggis 2005, 79.

as wheat, olives, fruit trees and vines[143]. Haggis proposes a "three-tiered hierarchy of settlement" in the Kavousi area during Neopalatial times, even though the position and function of the three ranks are not evident[144]. At any rate, this change meant that settlement focused in the coastal area—and therefore in less mountainous areas than before. Comparable developments of what Haggis calls a "contracted pattern" are also recorded around Gournia, Vrokastro, Malia, in Lasithi and the Agiofarango[145]. It is not clear whether this pattern can be linked to the abandonment of many MM peak sanctuaries which in turn has been suggested to be connected to the growth of "household cult activity". In the Kavousi area, this phenomenon may be indicated by chance finds such as a (rather crude) bull rhyton[146].

An important piece of evidence for man-environment relationships in the Kavousi area comes from a steep slope of the Platys river bed. Here, an alluvial event is visible in the deposited sediments. The pottery within this alluvium belonged to MM-LM I, and the layer above it has been radiocarbon-dated to 3040 ± 90 B.P. It has been suggested that this erosion was triggered off by the changes in land use that went with the restructuring of the settlement and economic pattern in LM I: according to Haggis, the abandonment of the small dispersed farms would have meant that the plots so far tilled by them were in many cases converted into pasturage or left fallow, and this would have resulted in the disappearance of the soil[147].

[143] Haggis 2002, 134–135; Haggis 2005, 79.
[144] Haggis 2005, 78.
[145] Haggis 1995, 377; Haggis 2005, 75.
[146] Haggis 1996a, 401–403. Cf. Widmann 2007, 156. The rhyton is shown in Haggis 1996a, 405 Fig. 15.
[147] Haggis 2006, 230–231. The notion that abandoning land leads to erosion is also expressed by Brückner 1986, 15 (with further references), Sarpaki 1992, 62 and Morris 2002, 76 (with respect to the very end of the Bronze Age in the Kavousi area). However, C. N. Runnels and T. H. van Andel have contended that leaving land fallow indeed means the development of a maquis cover which will protect the soil, and they explicitly state that shortening the fallow period leads to sheet erosion (van Andel – Runnels 1987, 142).

## 8.7 LM IIIA-LM IIIB

No pottery attributable to LM II has been found, presumably because LM IB continued in this area[148]. However, evidence for LM II-IIIA occupation is so slight that Haggis speaks of "near abandonment of the Kavousi area"[149]. Only eight habitation and three cemetery sites[150] are known, and these are smaller than those from LM I: habitation sites of the Postpalatial period in this area typically consist of single or only a few houses. This pattern is taken to mirror a marked decrease in population after LM IB.

Remarkably, the locations chosen by people in this period are all in some distance from the sea—the port at Tholos was probably given up after LM IB—and orientated towards the plain. Perennial water supply from springs and cultivable phyllite soils near the site apparently were of significant concern for people[151]. Interestingly, in most cases this meant returning to the areas of the Protopalatial site clusters, examples being the site at Kavousi village, Agios Antonios and others[152]. Since these reoccupied settlements tend to be small, their dispersal has been described as "a retracted form of the Neopalatial settlement pattern. [...] In Kavousi some farmhouses were reoccupied, while others were not. Towns and villages were reinhabited, but only on a reduced scale. In every case, the areas were chosen for their constant water supplies and arable land suitable for rain-fed agriculture. Agricultural dependence is reinforced by the lack of a site hierarchy that might help explain the nature of site interaction in the region"[153].

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[148] Haggis 2005, 80. Cf. chapter on Lasithi, p. 246.
[149] Haggis 1996a, 408.
[150] Kamara tou Tholou (Haggis 2005, 109 (site no. 26)), Ridopoulia rock shelters (Haggis 2005, 126–127 (site no. 60), Trapeza (Haggis 2005, 139 (site no. 88)). It is not clear to me why the sherd scatter at Trapeza is identified as the cemetery belonging to the nearby LM I-LM III farmhouse at Panagia (Haggis 2005, 80. 138–139 (site no. 87)).
[151] Haggis 2001, 45; Haggis 2005, 80.
[152] Haggis 2005, 80. Kavousi village: Haggis 2005, 107–109 (site no. 24). Agios Antonios: Haggis 2005, 95–98 (site no. 5). Chrysokamino Habitation Site: Haggis 2005, 115 (site no. 34); Floyd – Betancourt 2010. Kephalolimnos: Haggis 2005, 116–117 (site no. 36). Sta Lenika: Haggis 2005, 125–126 (site no. 57). Panagia: Haggis 2005, 138–139 (site no. 87). Trapeza: Haggis 2005, 139 (site no. 88).
[153] Haggis 2005, 81.

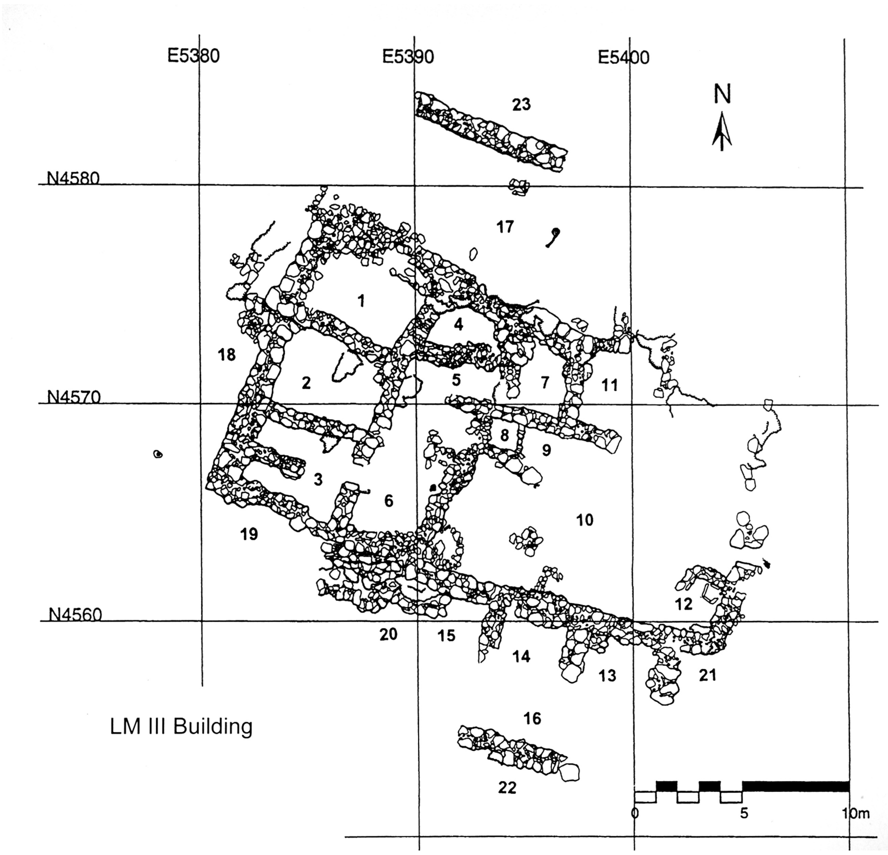


**Figure 8.8:** Plan of the LM III building at Chrysokamino Chomatas (from Floyd – Betancourt 2010, 481 Fig. 14)

The best-known example of a site reoccupied in LM IIIA is Chrysokamino Chomatas ('Chrysokamino Habitation Site')[154]. Because of the sloping terrain[155], the series of at least 15 rooms or open spaces was erected on terraces. The building (ca. 20 × 26 m, see Fig. 8.8) has a south-western aspect and an internal courtyard accessible via the main entrance on the east side of the structure. The walls, made of large irregular boulders bonded with mortar, were often set on soil, not on bedrock like in the LM IB phase at this site, resulting in inferior stability. C. R. Floyd has detected a concern for defensibility in this architecture[156]. The bedrock

[154]The pottery ranges from LM IIIA1 to LM IIIB though most is LM IIIA2. Unless stated otherwise, all information on the Chrysokamino Habitation Site is taken from Floyd 2006, 211–213 and Floyd – Betancourt 2010.

[155]This is said to have been a preference of the Minoans (Floyd – Betancourt 2010, 482).

[156]Floyd 2006, 213.

had to be packed in with soil in places to make even floors. Besides pottery (both fine and coarse ware) and mostly ground stone tools, a bronze chisel and other metal objects were found. Faunal remains from the site (mostly from LM IIIA[157]) include domestic, wild and marine animals. Sheep and goat predominate, but cattle and pig are also present. If this was indeed evidence for meat as an important element of the inhabitants' food supply, as Betancourt claims, this would go well with recent new insights into diet in the prehistoric Aegean[158]. A thorough evaluation of this claim will have to await final publication of the bones, however. Hare, weasel, shrew, an unspecified bird and possibly deer represent hunted wild species. Limpets and top shells made up the greatest part of a wide variety of marine animals, while a number of crabs and triton shells were also found[159]. A cist-like installation in one space could have acted as a trough for animal fodder. It has been concluded that this was an all-year isolated farmstead with an economy based on farming and the herding of sheep and goats, for which the surrounding area would have been suitable[160]. In an LM IIIA2 deposit in one room, some ceramic fragments were found associated with a complete triton shell, sheep or goat bones[161] and two pairs of long goat horns, in both cases still joined to a piece of frontal bone. This has been explained as a ritual deposit indicating cult activity.

A single ceramic sherd, measuring 4.3 × 5 cm, with a scored interior has been found in the maquis around the site. S. C. Ferrence and E. B. Shank take the sherd as proof that besides their agricultural activities, the people from Chrysokamino kept bees. They declare that beekeeping would in fact have been indispensable to make sure the planted crops were pollinated. This is certainly true for some crops[162], but I disagree that the findspot of the sherd is "significant because of its distant location from the habitation site, indicating that beekeeping was not

[157]LM I and LM III remains are not separated in the preliminary publications but according to Floyd – Betancourt 2010, 471 belong mostly to the later period.
[158]Fitton 2002, 17; Betancourt 2006, 239. 272.
[159]The latter are not classified with the food species; cf. below, footnote 340.
[160]Floyd – Betancourt 2010, 480–481 with footnote 22. 485.
[161]Sheep and goat bones are reported only in Floyd 2000, 68.
[162]N.B. however that *e. g.* vines, wheat and barley are self-pollinating.

always limited to the immediate surroundings of a house or farm"[163]. In my view, a single sherd somewhere in the middle of nowhere does not really signify much at all, even though it may well be true that "[t]he area in which the sherd was found would have been ideally suited for beekeeping and casual pasturage". A single sherd on the surface could have reached this location in a number of ways, none of which would have any connection whatsoever to an ancient beehive in this spot.

Nothing is said about water sources. There seems to be no spring in the area, and the rock fissure said to have acted as a reservoir in Early Minoan times[164] would surely not have been sufficient for the Late Bronze Age occupation. In modern times, wells are dug to ensure water supply for the fields, and this could be a possibility for earlier periods. The site was abandoned without evidence for destruction, "probably gradual[ly]" and possibly in the same spirit that caused the desertion of almost all other settlements near the coast at the end of the Bronze Age[165].

### 8.7.1 Interactions

Evidence for man-environment relations from this period is not substantial and mostly comes from Chrysokamino Chomatas. On the basis of what has been excavated, it is plausible to assume that the structure was inhabited by people who farmed the nearby fields, herded livestock on the pastures in the area and maybe

[163] This is in contrast to M. Melas who states: "Archaeological evidence, common sense and modern ethnography indicate that they were positioned near the house in leeward places facing south and south-east, either in well protected rock shelters or hillsides, preferably in areas with vegetation consisting of aromatic shrubs and stunted pines" (Melas 1999, 487). The conclusions drawn by Ferrence and Shank are even more puzzling since they follow a passage in which they announce their doubts on the prevalent identification of scored pottery as fragments of beehives. According to them, the majority of this type of sherd is found *inside* rooms, in settlements (Kommos, Pseira) or for example in the sanctuary at Kato Syme, and they question the current notion that all these examples represent stored beehives (Ferrence – Shank 2006). The findings from the Sphakia survey seem to me to contradict the ideas of Ferrence and Shank. Scored pottery identified as beehives: Jones 1976, 88 (for Classical times; highlighting that combing/scoring is unnecessary); Melas 1999, 485–486 (for Minoan times; with further references for later periods); Moody *et al.* 2003, 89 (for the Classical to Roman period).

[164] Betancourt 2006, 258.

[165] Floyd – Betancourt 2010, 485–486. 493.

tended a garden for vegetables close to their house[166]. Faunal remains indicate that sheep, goat, cattle and pig were kept and wild species such as hare and weasel were hunted. Marine resources were also made use of. Although there is no convincing evidence for it, beekeeping would certainly have been a sensible occupation for the people at Chrysokamino. Access to the alluvial phyllite soils of the area known as Chordakia—said to be perfect for rain-fed agriculture of wheat, olives and garden crops—and to grazing land seems to have been more important to these agriculturists than proximity to the sea or to the forests of the mountainous hinterland[167]. Betancourt has stressed the fact that this very location was occupied for about 2000 years and thinks this should be taken as an indication of the employment of sensible land use techniques and soil management[168]. This practice, however, may have changed with time: "The abandonment of coastal settlements at the end of the Bronze Age has usually been attributed to warlike raiding and other unsettled political conditions. This explanation may be partly correct, but additional factors must be invoked to explain why a part of the coast that had supported permanent residents for two millennia was not resettled in the more stable Classical and Roman periods. The new Dorian farming methods using serf labor on large estates may have been one of these factors. It is also likely that the climate had become too dry to support a local population on the coastal strip at Chrysokamino. As a result, the land, which had always been less than desirable, may now have been so poor that it did not merit permanent settlement"[169]. Gournia, Pseira and Mochlos experienced similar drops in population numbers in this period (LM II-IIIA)[170].

[166]Floyd 2006, 213. Betancourt estimates that more than 10 individuals may have lived here (Betancourt 2006, 236) and reckons: "We are probably observing a fairly stable agricultural strategy in which successive groups of people adopted similar practices, owing to the nature of their landscape and its resources. Moreover, because similar crops required similar farming techniques, the land was probably exploited in a generally unchanging way by the residents of the isolated farm in FN-EM IIB, the cluster of tiny sites of EM III-MM IIB, and the LM I-III farmhouse" (Betancourt 2006, 234–235).

[167]Haggis 2006, 221; Betancourt 2006, 257. To go by the shells found during excavation, the sea nonetheless featured in the lives of people, and unspecified trade goods may be a sign of access to a harbour (Betancourt 2006, 239).

[168]Betancourt 2006, 240. 242. Cf. Betancourt 2006, 269: "That Chrysokamino was founded in the Final Neolithic and continued to exist in LM I and LM III is a testament to the stability of the system of land management it used, but it is also proof of the limits of its immediate landholdings, which were never able to support anything more grand."

[169]Betancourt 2006, 21.

[170]Haggis 1993a, 143.

## 8.8 LM IIIC

The very end of the Bronze Age is the period with the most substantial evidence in the Kavousi region. There is an evident shift of settlement from the coastal plain (Kampos) to the mountains in this area in LM IIIC, and settlements grow not only in size, but also in number: ten "large village-size (ca. 0.60–2.00 ha)" sites in proximity to farmable upland valleys, terraces and springs were recorded by Donald Haggis, whereas all settlements in the Kampos were given up[171]. In the ensuing 'Dark Ages', villages are for the most part concentrated in two areas: in the Avgo valley and the north Papoura drainage (Xerambela). Haggis believes that this development is related to "a significant influx of population"[172].

On the slopes above the Avgo valley, four locations have been identified as dwelling places of this period. They are clustered around the principal spring of this locality. One of them is modern Melisses (ca. 500 m ASL), where pottery is scattered over an area of 5600 square metres[173]. An ancient terrace wall has also been recorded in the Avgo valley, possibly dating to this period[174].

Vronda, Kastro, Azoria and Panagia Skali are the modern names of the ancient settlements on the Papoura range. Unless other springs have dried up, the nearest water source for all of them is the spring at Xerambela (east of Vronda), which means that carrying the daily supply for both humans and animals to the respective settlement or the pens required considerable effort. By far the biggest of these settlements was Azoria (6 ha), while Kastro extended over at least 8000 $m^2$ and Vronda over circa 6000 $m^2$ in LM IIIC, in contrast to Panagia Skali ("just north of and below the Kastro and neighbour to Azoria"), which seems to have been only approximately 2500 $m^2$ in extent[175].

Haggis stresses that the two areas (Avgo and Papoura) are markedly separated from one another. Nevertheless, both are similarly structured in that sites are situated on rock scarps within a 0.5 km radius of a perennial spring or wellhead

[171] Haggis 1993a, 143; Haggis 1996a, 410; Haggis 2005, 81. Cf. the definitions given in the Introduction, p. 4 footnote 10. Haggis estimates that 600–1200 people may have lived in the mountains.
[172] Haggis 2001, 47.
[173] Haggis 2005, 137–138 (site no. 85). The three other sites are located at Trapeza at ca. 560 m ASL (Haggis 2005, 140–141 (site no. 89–91). See also Nowicki 2000, 100–101.
[174] Haggis 2005, 137 (site no. 83).
[175] Haggis 2001, 47.

(although the hodological distance would have been bigger in some cases). These springs may have been used to water small gardens, in addition to the rain-fed farming possible on the phyllite and mixed *terra rossa*-phyllite soils around. It seems that agricultural land was deliberately not built over.

### 8.8.1 Vronda

As with so many other sites, the early exploration of Vronda represents, in some ways, a wasted chance for archaeological insight. Although Harriet Boyd Hawes is often praised as working more carefully than most of her contemporaries[176], statements such as "there may have been patches, particularly along the walls, that she had not removed, but basically all the information about what was in the building when Boyd excavated is now gone"[177] or "the importance of household analysis in the interpretation of the entire site can be explored in further detail by focusing on one of the complexes not previously investigated by Boyd"[178] speak a very different language. Information usable for reconstructing man-environment interaction can be gained solely from the new excavations under Geraldine C. Gesell, Leslie Preston Day and William D. E. Coulson; unfortunately the specialists' analyses have not been published at the time of writing, and only scraps have been revealed in preliminary reports.

**Topography** The LM IIIC-SubM settlement on a foothill of the northern edge of Thriphti, to the south of the modern village, was first inspected—or should 'rummaged' be a better word?—by H. Boyd in 1900. The location, at 421–427 m ASL, was known as Vronda (Thunder Hill) at the time of its discovery, and this name has survived to designate the archaeological site, although the area is today called Xerambela[179]. A spring is situated in close vicinity of the ridge to the east. According to an estimate by D. Haggis, the surrounding area adds up to 25 ha of arable land, but he nevertheless thinks that the upland plain of Papoura

[176] Day – Snyder 2004, 63.
[177] Day *et al.* 2009, 17.
[178] Glowacki 2004, 127. See also Coulson *et al.* 1983, 393–394.
[179] Day *et al.* 2009, 1. For the modern name see also Kanta 2001, 14 footnote 1.

would have been cultivated by the people from Vronda too, their settlement being situated on the route from the Kampos to Papoura[180].

A massive terrace wall bounded the eastern side of the settlement[181], of which an estimated 90% have been explored. The ruins uncovered seem to be those of 15–20 houses. They are arranged in clusters on top of the ridge rather than according to an elaborate plan, nor are there proper streets between them; the passages between houses appear to have consisted of the unmodified bedrock[182]. The layout of the buildings was determined by the topography: in the case of building complex C-D, the natural east-west slope was stabilized with three terraces, the bedrock chiselled into a flat surface on which walls could be erected and ten rooms installed on the different levels. The same applies to Building I-O-N, which was enlarged down the slope in three phases[183]. The entrances of the buildings were often placed on the north side[184].

**Building materials, floors and roofs** Rough breccia and the occasional dressed limestone block, both from the neighbouring mountains, were used in the construction of the walls. Those of the stones that were unworked may have been chosen for their manageable size, *viz.*, easily movable by two people[185]. The bedrock was often incorporated into the lower courses and the stones were held together by mud mortar. The upper parts of the walls may have been of mud-brick, but this is purely conjectural[186]. The roofs were probably flat, and a local clay-like material was used for roofing. Floors proved difficult to identify during excavation, but it is thought likely that in most cases the original surface would have been bare bedrock, sometimes (but far from always) levelled where necessary[187]. It is not always

[180] Haggis 1996, 399 with footnote 70.

[181] A defensive function of this wall is debatable, see Nowicki 2000, 100; Alusik 2007, 38–39; Glowacki 2007, 131–132.

[182] French *et al.* 1990, 73; Nowicki 2000, 98; Day – Snyder 2004, 73. Day 1996, 177 states that because of the eroded terrain, streets were not easy to identify. For the clusters see also Glowacki 2007, 131 Fig. 14.2.

[183] Glowacki 2004, 127–129. It is believed to have accommodated four or five separate households in the last phase of use.

[184] Day *et al.* 2009, 79.

[185] Klein 2004, 96.

[186] Coulson *et al.* 1986, 385. Cf. however the single mud-brick found in MM I-II layers at Vronda, see above p. 282.

[187] Day 1996, 175 footnote 6; Day *et al.* 2009, 6.

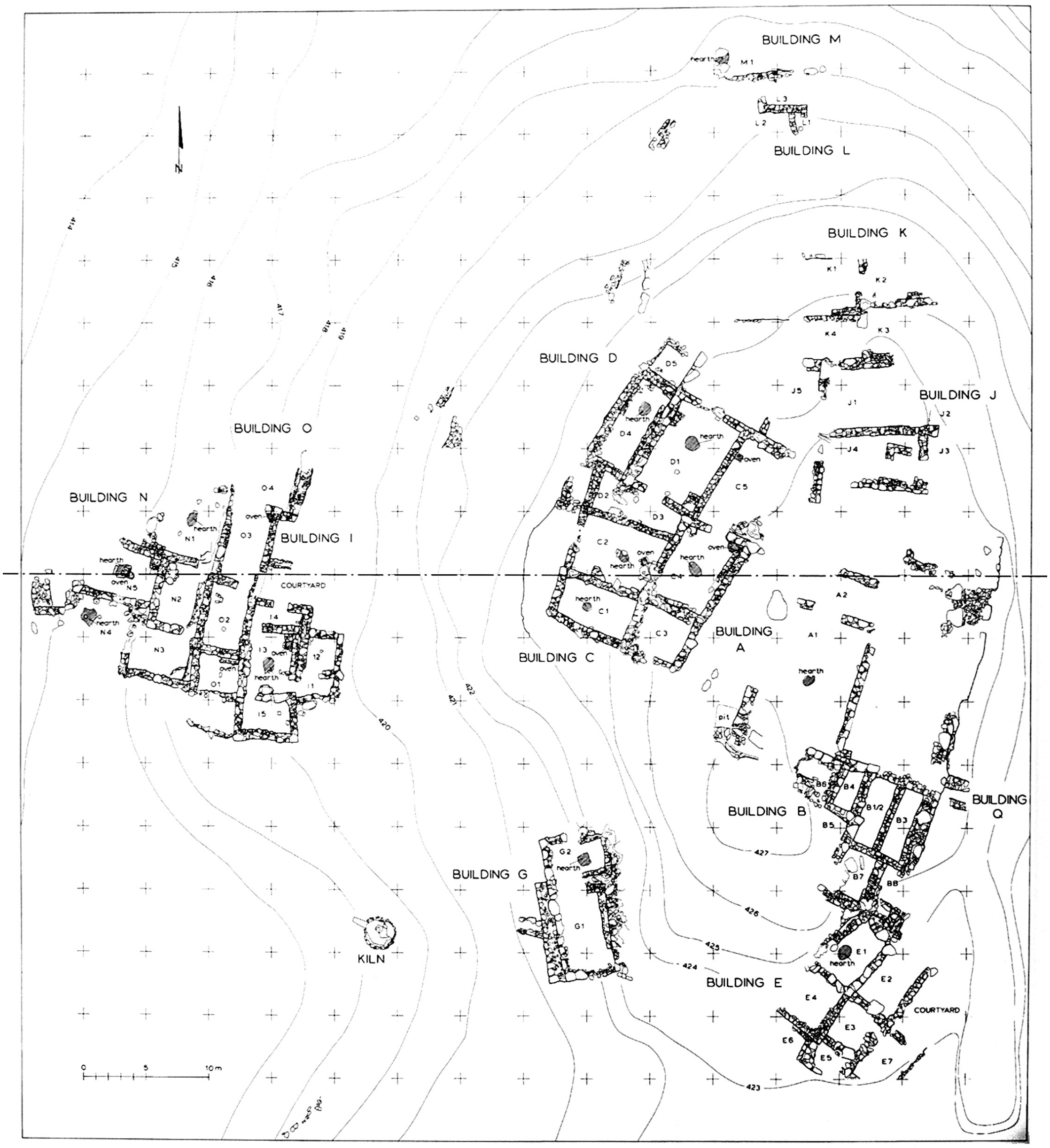


**Figure 8.9:** Plan of the LM IIIC-SubM settlement at Vronda (from Day *et al.* 2009 Fig. 4)

clear though on which level people actually lived: a number of units do not show any doorways. Whereas in most of these cases the walls are so badly damaged that the excavators think it possible that doors may have been positioned above the preserved height, this has been ruled out for Building B. Here, what can be seen today is interpreted as a basement-like substructure used for storage purposes, as indicated by the pithoi found on the floor, and accessible through trap doors from above[188]. Slightly puzzling is the excavators' statement that room B7 must be a storeroom since the floor was too uneven to be a living surface[189].

From a pit near Building A comes the fragment of a U-shaped terracotta tile which cannot be dated with certainty but may correspond to a series of bedrock channels and represent part of a drainage system[190].

**Hearths and ovens** A striking feature of the houses at Vronda is the ubiquity of fixed hearths and ovens, often more than one in the same complex. A particularly interesting example is room C2, where an oven was constructed from limestone slabs in front of the east wall next to a bedrock outcrop (see Fig. 8.10). A channel was cut into the rock, following a natural fissure, and lined with clay. Although a flue or chimney springs to mind, technical considerations seem to rule this out: to function properly, a chimney would have to lead up to the ceiling rather than through the wall to another room. Another artificial depression in the rock may have been used as a pot stand, indicating that the natural environment was integrated into the interior living space and modified if necessary[191].

**Faunal remains** In general, preservation of faunal remains at Vronda was very poor; about 80% of bones were so small, fragmented and eroded as to render them unidentifiable[192]. What can be identified belongs mostly to LM IIIC and shows that the faunal assemblage is basically the same in all buildings. Sheep and goat prevail (70%), but pig and cattle are also frequently encountered (ca. 16 and 5%

[188] Day *et al.* 2009, 34. 52. 61–62. Cf. Day 1990, 175. For a discussion of statements like "Rooms without doorways are generally used for storage" cf. Widmann 2007, 66. 92. 97. 132.
[189] Day *et al.* 2009, 52.
[190] Day *et al.* 2009, 22. The pit may have been deliberately lined with a lime coating. See also Coulson *et al.* 1986, 363 with footnote 11 (with references); Day 1990, 176.
[191] Day *et al.* 2009, 83.
[192] Day *et al.* 2009, 42. 80.

**Figure 8.10:** Oven in room C2 at Vronda (April 2011)

respectively). Dog and equids (horse, donkey, mule) also feature in the assemblage, albeit in very small numbers[193]. Some poorly preserved remains from Building Q may stem from frontal-and-horn-pieces, one from goat, one from cow[194]. A number of dog bones are thought to be later intrusions—not all of them though; cutmarks and a comparison with Kastro has led to the suggestion that dogs were consumed as food at least occasionally[195] (see also below).

An extraordinary deposit was discovered in the southern part of room B4 (which, as should be noted, was only accessible from above). It was exceptional

[193] The record is basically the same in Buildings A, B, C, D, I-O-N, J, K and Q; see Glowacki 2004, 130; Glowacki 2007, 133; Day *et al.* 2009, 17. 19. 23. 48. 50. 54. 58. 74. 80. 98. 130. 145. For the attribution to LM IIIC see Klippel – Snyder 1991, 179. Cf. Moody 2012, 259.

[194] Day *et al.* 2009, 74.

[195] Day *et al.* 2009, 80. 107. 130.

not only in terms of quantity—circa 2000 bone fragments were recorded—but also in terms of quality: while the northern part of the room comprised butchering and food remains from sheep and goat, the south contained almost no such debris. Instead, skull parts were concentrated here, among them "two left pig mandibles, one of which appears to be from a male or boar", which on the next page are referred to as "the boar mandibles"[196]. Even more notable are several animal skulls, mostly cattle, which despite their poor state of preservation showed clear signs of modification into front plates with the horns attached[197]. At least one pair of articulated *agrimi* horn cores were also part of the deposit which is reported to have been found arranged in a roughly circular fashion. All this points to a special, perhaps ritual, deposition rather than to the remains of a meal; the skulls have been suggested to have served as some kind of symbolic wall decoration[198].

Otherwise, wild animals do not feature prominently in the assemblage. The only identifiable species are rabbit or hare and possibly *agrimi*; horncores from J1 and J2 were too badly eroded to be classified with any certainty[199].

Marine shells complete the picture: limpets, topshells, dog cockles and murex shells have been found, albeit in limited numbers; some of them were apparently brought in with the roofing material and do not relate to food consumption (*e. g.* C5). A concentration of shell fragments (limpet, topshell, cockle) was deposited in a bin in C4. Some oyster shells were also present, most notably one found inside the oven in C5. A small number of cowrie shells was found as well. Since the species is not edible and the shape is "suggestive to some of female genitalia" (who these "some" are is unfortunately not specified), they have been connected to fertility[200]. Two triton shells (one from B7, one from J2) may also have had uses other than culinary[201].

[196] Day *et al.* 2009, 42–43.
[197] Day – Snyder 2004, 70.
[198] Day *et al.* 2009, 42–43. 62, in contrast to Mazarakis Ainian 1997, 295–296 and although the idea of a meal was still promoted by the excavators in 1990 (Day 1990, 176). See also Glowacki 2007, 136.
[199] Klippel – Snyder 1991, 180; Glowacki 2004, 130; Glowacki 2007, 133; Day *et al.* 2009, 58. 130. 135.
[200] Day *et al.* 2009, 43. 89. 93.
[201] See below, footnote 340.

**Botanical remains, charcoal *etc.*** The botanical remains have not yet been published at the time of writing. However, since the settlement suffered no destruction by fire, charcoal will probably not have been abundant; from a contemporary pottery kiln no botanical remains have been reported either[202]. In the sole exception to this, namely building D, charred wooden beams were revealed, along with stone column bases; the excavators take this to have been a support of the roof (rather than a second storey)[203]. In one of the few instances where burning was detected in the soil, no traces of ash were present; if there was indeed a cooking fire in this location (room D1), it can only have been used once or was carefully brushed after every use (including the last one)[204].

**Objects** A small number of animal clay figurines has been found. From C4 comes a bovine figurine, and on and near the platform in room D1 were found representations of two horses and a cow. Evidence for wool processing is scarce, but it should be taken into account that the abandonment of the houses appears to have taken place peacefully and orderly, so that valuable or treasured belongings (of which a set of loom weights of equal size and weight may well have been part) could have been packed and conveyed to wherever it was that people went. A probable spindle whorl and a terracotta loom weight were found in C4[205].

Building A-B is by far the largest structure of the settlement, and exceptional in that it would have had a (kind of) second storey[206]. In combination with its location on the summit, it would therefore have been visible from all around, and in turn offered a good view of the surrounding terrain. Adding to these architectural features are the finds: although the building is equipped with a hearth like the other houses, the quality and quantity of pottery seem to indicate an elevated status. An ornamental terracotta window frame found here adds another argument in favour of this. The excavators favour the interpretation as the residence of the "leader of

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[202] Day *et al.* 1989.
[203] Coulson *et al.* 1991; Day *et al.* 2009, 96.
[204] Day 1990, 175; Day *et al.* 2009, 95.
[205] Coulson *et al.* 1991; Day *et al.* 2009, 88–89. 97–98.
[206] A second storey is also postulated for Building E, which has not been published in detail yet (Coulson *et al.* 1986, 385).

the settlement", although a communal function like a very early andreion is also deemed possible[207].

Although the community may have been rather small, the group had its own pottery kiln (potters probably exploited the local phyllite clays)[208] and a cultic shrine (Building G; identified through the presence of objects such as snake tubes, kalathoi and a fragmented female figurine with upraised hands[209]); at least ten tholos tombs in the immediate environment of the settlement have often been associated with the habitation phase[210]. The abundance of fixed hearths is striking and a clear sign that such facilities were not shared. However, it must be borne in mind that a communal oven[211], had it existed, would not have warmed the inhabitants of individual houses in winter, making it well understandable that they all wanted one; indeed, the hypothesis that certain buildings were (at least in the last phase of use) occupied by more than one household is based on the presence of several hearths[212]. The houses at Vronda were inhabited for only three to four generations before the settlement was abandoned for unknown reasons in the early 11$^{th}$ century (towards the end of LM IIIC). No signs of a violent destruction, fire, earthquake or expulsion of the inhabitants have been detected, and it is not known where they went to live instead either[213].

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[207] Day *et al.* 2009, 62. Glowacki 2007, 136 (with further references) suggests a kind of Big Man or ruler. The pottery from the storerooms in Building B has been interpreted as evidence for a drinking ritual: the feet of the kylikes are not big enough to grant them sufficient stability, leading the excavators to argue that they were turned over after emptying them in a ritual act (Day – Snyder 2004, 73; Day *et al.* 2009, 36). However, if the pottery drawings are exact, the handles sticking out above the lip do not support this idea. For the window frame see Day 1999; Day *et al.* 2009, 58.

[208] See Coulson *et al.* 1988, 290–293, Day *et al.* 1989 and Day *et al.* 2006 for details. A small group was postulated by Nowicki 2000, 97.

[209] Coulson *et al.* 1990, 73. On the objects and figurines see Gesell 1997; Gesell 1999; Day *et al.* 2006. "Religious activity at the communal shrine did not, apparently, include rituals of food preparation, eating or drinking that left any recognisable trace in the archaeological record" (Glowacki 2007, 135).

[210] However, there are no indications whatsoever as to when the tholoi were built, since they were used for multiple burials, possibly over two generations each, and finds are very scarce. The earliest scraps of pottery belong to Subminoan, while other tombs held Late Geometric sherds. For the tombs see Coulson *et al.* 1983, 394–420 (with an overview over which tomb was in use when on p. 405). See also Haggis 2005, 82.

[211] Which Glowacki 2004, 134 seems to have expected.

[212] Glowacki 2004, 127–129; Day *et al.* 2009, 80. 94.

[213] Day – Snyder 2004, 65; Day *et al.* 2009, 6. Kastro is often considered as the new home of the group (Coulson *et al.* 1986, 387; Wallace 2003, 605). J. McEnroe seems to propose that people

### 8.8.2 Kastro

The Kastro, part of the Papoura ridge, is an outcrop of crystalline limestone (Plattenkalk series) sitting on the phyllite schist bedrock (see Fig. 8.11). Situated at ca. 710 m ASL, Harriet Boyd experienced that the top of the Kastro, an "almost inaccessible ridge", could only be reached "by a hand and foot scramble"[214] when she came here to excavate in 1900 and 1901. A new exploration project by the American School took place in 1987–1992. The archaeological remains cover an area of ca. 40 × 70 m in the very uneven terrain[215].

**Figure 8.11:** Kavousi Kastro as seen from Vronda (May 2009; photo courtesy of Torben Keßler)

from Kastro moved to Vronda and then back again: "the higher component was founded first as an impregnable defensive refuge and the lower, more sustainable component slightly later" (McEnroe 2010, 147. 159).

[214] Boyd 1901, 137. The path is slightly better now.

[215] Gesell *et al.* 1992, 120.

H. Boyd dated the ruins she unearthed here to the Geometric period and stated that "in general the pottery is coarse, such as would befit the daily use of a rude people"[216]. More recent research has shown that the earliest traces (Kastro Phase I) belong to initial LM IIIC or the end of LM IIIB[217] and that settlement continued throughout the Dark Ages. Habitation "in substantial fashion", however, is indeed said to have begun only in the time of Protogeometric pottery, gaining momentum in the time of Late Geometric pottery[218].

Kastro has often been cited as a typical refuge site of the Bronze Age/Iron Age transition, although this notion has lately been challenged by some (see below). The site commands all routes from the coast into the mountains and has hence been called "the most strategic location in the north-eastern corner of the Ierapetra Isthmus" which can be seen from great distances[219].

The decisive element in settlement design at the Kastro were the characteristics of the terrain[220]. The natural irregularities of the bedrock were integrated into the foundations and wall faces when a new house was built so that room plans from LM IIIC, for example in Building K, often lack symmetry[221] (see Fig. 8.12). Because of the precipitous terrain, ten rock-cut steps led down to the entrance of the two-roomed house which was erected on the north-west slope (NW 1/NW 2–4). Clay was used to even out irregularities in the bedrock floors; only in NW 1 was

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[216] Boyd 1901, 143.

[217] Nowicki 2000, 99. If the Kastro was indeed occupied already in LM IIIB, it would have been the first settlement in such an elevated position and it has been suggested that Azoria and Vronda could have been 'colonized' from there (Haggis 2005, 83). Mook and Coulson have contended that the people who moved to the Kastro in LM IIIC were "indigenous to LM IIIB Crete" (Mook – Coulson 1997, 363–364). Penelope Allison has argued plausibly against notions such as "[t]he builders of the Northwest Building, like many builders of vernacular architecture [. . . ], were probably the very people who inhabited these houses" (Mook 1998, 57; see Allison 1999, 4. 8; cf. Widmann 2007, 9). Mook goes on to declare that the family would have been the basic unit at Kastro (cf. McEnroe 2010, 149); for a discussion of such statements see Widmann 2007, 4–6. 156. Mook's remark that "the families of each identified household were related and evolved from the first nuclear family to build in this neighbourhood of the Kastro" (Mook 1998, 57) has an uncomfortable incestuous feel to it.

[218] Coulson 1998, 40; Mook 2004, 164. "Ceramic material from levels with subsequent or superimposed habitation on the Kastro is usually very fragmentary, with few restorable complete profiles and fewer intact vessels. Only in the 7$^{th}$ century, when rooms were abandoned at the end of the life of the settlement, are more complete pots found with any frequency."

[219] Nowicki 2000, 99. Cf. Wallace 2003, 605; McEnroe 2010, 147.

[220] Coulson *et al.* 1997, 333.

[221] Coulson 1997, 63; Coulson *et al.* 1997, 353. See also footnote no. 254.

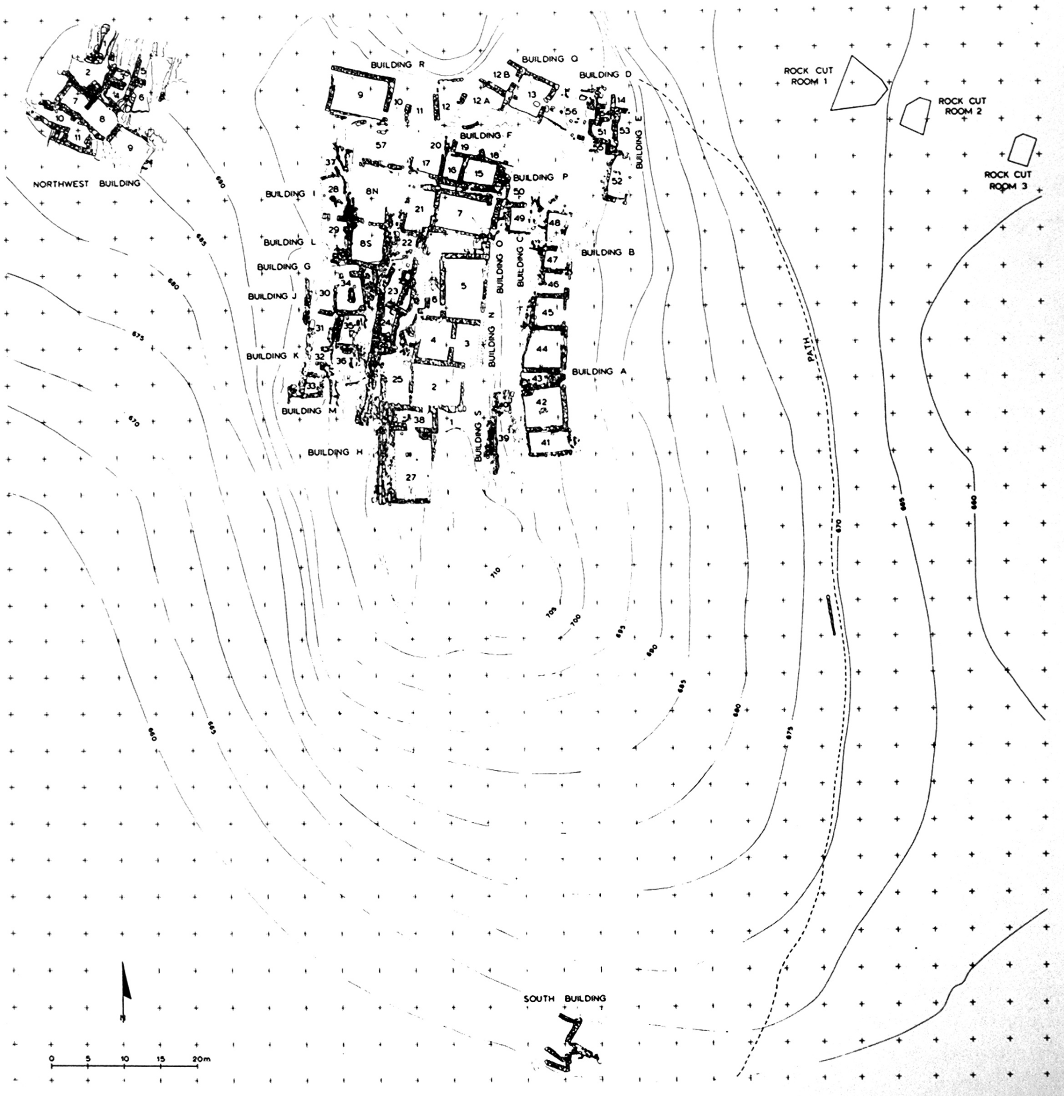


**Figure 8.12:** Plan of the excavated areas at Kavousi Kastro (from Coulson *et al.* 1997, 316 Fig. 1)

the rock hewn away to produce an even surface[222]. Two natural fissures in this floor may have served as drainage channels. In NW 2, where the rock stuck out above the clay in some places, this initial floor was paved over with schist slabs in a second phase of use, still in LM IIIC[223].

In Building G, on the west slope below the summit, the bedrock was incorporated into walls[224] and also served as initial floor surface. A large hearth was made of terracotta. In contrast, in a LM IIIC context underneath Building L, a natural rock fissure was lined with clay; the ash found within suggests cooking or heating. A stratum of animal bones, potsherds, charcoal and ash was found in room 25 above the second floor layer [from below] of the LM IIIC structure[225]. The animal bones from Kastro were not divided into phases for preliminary publication and are therefore treated as a LM IIIC-PG concoction below.

No period-specific botanical analyses have been published so far, but the presence of emmer, einkorn, olive, grape, almond and fig remains as well as various legumes has been leaked to the public[226]. According to the excavators, "[b]ones and microfaunal remains [...] indicate the exploitation of a wide area from upland terraces to seashore"[227].

### 8.8.3 Azoria

After the Neolithic and Late Prepalatial occupation, Azoria remained unsettled until LM IIIC (ca. 1200–1050 BC), when, judging from surface pottery, the village covered an area of at least six hectares[228]. However, only scant traces of the architecture and activities in this period have been found—on the hilltop almost nothing at all is left since Early Iron Age architecture is largely obliterated by later walls built on top[229]. What can be said about walls from this period is that they differ markedly from earlier (Neolithic) ones: the boulders used—both dolomite

[222] Mook 1998, 56. "This floor was used for an extensive period of time, no doubt in part because it was easy to maintain."
[223] Coulson 1995, 186.
[224] Coulson *et al.* 1997, 343.
[225] Coulson 1997, 64.
[226] Wallace 2010, 36.
[227] Gesell *et al.* 1992, 120.
[228] Haggis *et al.* 2004, 390; Haggis *et al.* 2007b, 707.
[229] Here, the pre-Archaic remains are "preserved only in bedrock deposits" (Azoria 2003).

and *sideropetra*—are much larger[230]. Apart from potsherds[231], the only significant finds are two bovine terracotta figurines; these, although apparently dating to LM IIIC and LM IIIC-O respectively, come from secondary Archaic contexts[232]. An LM IIIC bench shrine containing fragments of a terracotta statuette of a figure with upraised arms was excavated on the west slope[233]. Finally, a tholos tomb with four inhumations and pottery dating to LM IIIC-EPG discovered underneath an Archaic drain in sector B3700[234] indicates that at least some individuals were buried within the settlement (or very close to its limits).

### 8.8.4 Interactions

The inhabitants of the settlements in the Kavousi area adapted to their environment in various aspects. The incorporation of bedrock outcrops into walls of buildings is a recurrent feature of Bronze Age architecture. Rather than suppose a deliberate symbolic unification of the natural and the built environment[235], I would simply stress the practicality of this strategy, adding to the stability of the building and saving labour to remove the rock.

Although Azoria was by far the biggest settlement in the region, the main body of evidence for man-environment interactions comes from the faunal assemblages from the smaller sites of Kastro and Vronda. Excavation at these two sites has yielded more than 100,000 animal bones from all periods (of which 65,000 come from the Kastro, where preservation was a lot better than at Vronda[236]). Most bones from Vronda date to LM IIIC, those from Kastro mainly to Late Geometric; unfortunately, the published statistics available do not always distinguish between phases, and the numbers given in different reports vary in a highly confusing manner. In LM IIIC, the overwhelming majority of bones (96%) belongs to domestic animals, almost all of which were sheep/goat (ca. 80% of the total assemblage) and

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[230] Haggis *et al.* 2007b, 675.
[231] For the EIA pottery see Haggis *et al.* 2007b, 702–705.
[232] Haggis *et al.* 2007b, 699–701 with Fig. 30. 31.
[233] Azoria 2006.
[234] Azoria 2006; Eaby 2010.
[235] Hitchcock 2007, 94.
[236] Snyder – Klippel 1996, 284; cf. Day *et al.* 2009, 42.

of these, about two thirds were sheep[237]. Neither at Vronda nor at the Kastro does the age structure of the flocks as reflected in the bones indicate a specialization on one product (wool, meat): at Vronda, most animals were apparently killed at the age of two to three years and at the Kastro in their third year[238]. This seems to confirm the popularity of a mixed strategy[239]; I do not think this is contradicted by the hypothesis forwarded by Klippel and Snyder (see below, p. 327).

Kastro has often been cited as a typical 'refuge settlement' of the period following the end of the Bronze Age[240]. However, recent reevaluations of the concept of these sites have cast doubts on this identification[241]. M. S. Mook denies that seeking refuge could have been the decisive factor for the choice of this location and negates the difficult access, stating: "I can get up there"[242]. It is far from my intention to question this, but I would like to point out that there is a difference between 'getting up there' in hiking gear and no luggage to look at an archaeological site (a walk of about 45 minutes from Vronda[243]) and climbing the steep path once every day to get water from the spring.

The pattern emerging for the so-called Dark Ages suggests two[244] "clusters of interdependent nucleated hamlets and villages that are situated in topographically distinct and isolated regions. It has been demonstrated that the settlements within a cluster are disparately located because of purely local factors like topography and proximity to arable land and water supplies"[245]. The Xerambela cluster, located to the south of the modern village, comprises the ancient settlements at Azoria, Vronda, Kastro and Panagia Skali, all of which are in 'defensible' locations with a spring and arable soils within reach (see Fig. 8.3), plus the necropoleis at Chondrovolakes, Vronda, Aloni/Skala and Skouriasmenos. Sites within this cluster are connected by natural routes, possibly running along the same tracks as

[237] Klippel – Snyder 1999, 56.
[238] Klippel – Snyder 1999, 55–59. Cf. Klippel – Snyder 1991, 184–185. See also section 2.4 (p. 26).
[239] See above, p. 28 and below, p. 382.
[240] Drews 1993, 29; Nowicki 1999a, 164; Nowicki 2001, 26.
[241] Haggis 1999; Kanta 2001.
[242] M. S. Mook in discussion following Mook – Coulson 1998, 369.
[243] Another 30 or so minutes must be added from modern Kavousi village, although the 17 kilometres given on the sign are certainly wrong; they did put me off first time round though.
[244] A third cluster around Monastiraki near the Cha gorge, with settlements at Chalasmenos and Katalimata, lies outside the study region as defined here.
[245] Haggis 1996a, 410.

the *kalderimi* which according to Haggis may well be much older than the Turkish period to which it is attributed by the locals[246]. Interestingly, all known routes today meet at the Vronda spring. The upland plain of Mount Papoura is believed to have belonged to these settlements. Secondly, there is the Avgo cluster, with settlements at Melisses (504 m ASL; 1 ha) and at Trapeza plus possible necropoleis at Panagia and Trapeza[247]. Both Melisses and Trapeza are 'defensible' locations close to the Avgo spring, the farmable soils in the valley and on the hills to the east and grazing land on the slopes of Kliros, Orno and Bebonas[248].

The notion of clusters is drawn from modern parallels. In traditional Kavousi (*i. e.* before the Second World War), people felt themselves to belong not to a certain hamlet, but to a larger unit for which no Greek term exists. A cluster consists of several habitation sites grouped around a spring and in proximity to farmland and is therefore economically independent of other clusters. Kinship ties between the hamlets within one cluster are possible[249]. The study of the modern settlement pattern has enabled Haggis to draw an important conclusion: "Subtle and changing agricultural or pastoral emphasis, climatic changes, intermarriages, and land transactions between households and between clusters, all have changed the topography. The basic pattern, however, has remained intact and constant by virtue of the bonds formed by the identification with the cluster, and agricultural necessity; both are, in this environment, mutually reinforcing principles. The apparent instability of individual hamlets (usually caused by economic changes in agricultural strategies) is less important than the stability of the entire cluster and continuity of land use in the region"[250]. The cluster system is not applicable to

[246] Haggis 1993a, 144.

[247] Panagia Skali: Haggis 2005, 131 (site no. 70). Aloni/Skala: Haggis 2005, 134–135 (site no. 78). Skouriasmenos: Haggis 2005, 136 (site no. 81). The location of the chamber tombs at Chondrovolakes is no longer known (Haggis 2005, 82). Melisses: Haggis 2005, 137–138 (site no. 85). Trapeza settlement: Haggis 2005, 140–141 (site no. 89–91). Panagia necropolis: Haggis 2005, 138 (site no. 86). Trapeza necropolis: Haggis 1993a, 143.

[248] Haggis 2005, 82–83.

[249] Haggis 1993a, 140–141.

[250] He continues: "It is not suggested that a single economic or social event caused the changes in Dark Age and traditional settlement patterns. It may be argued, however, that the impetus for the formation and long duration of settlement in Dark Age Kavousi may be directly tied to (1) a sense of community which is strengthened by the demands of the agricultural environment, and (2) the *absence* of the Bronze Age palatial system and mobilized market economy" (Haggis 1993a, 142–143.

periods with "large-scale surplus production, external trade and a complex political and social organisation", *i. e.* the Neopalatial, Classical-Roman and recent modern periods (post-1950). Nonetheless, the modern settlements interestingly still occupy roughly the same locations as the Dark Age habitation sites[251]. At any rate, it is clear that the settlements, despite their appellation as 'defensive', where far from isolated or remote (two characteristics often ascribed to sites of this period, see below, chapter 12). D. Haggis estimates at least 600–1000 people for the entire Kavousi area in LM IIIC; this approximation is based on the eight known settlements in the region with a conjectured average of 15 households per settlement and five persons per household.

Pedogenic evidence from two profiles from within a two mile radius around Vronda indicate that at some point after the Late Bronze Age, alluvial sediment was deposited. One of the pedons is located in the alluvial fan of the Avgo river, where it buried a surface that contained Late Minoan artefacts and has been radiocarbon-dated to 1407–1209 BC. A connection to terrace abandonment and 'deforestation' has been suggested[252].

## 8.9 Early Iron Age

### 8.9.1 Protogeometric Kastro (1000–900 BC)

In the time of Protogeometric pottery, settlement on the Kastro expanded. The Northwest Building was enlarged, the main room was split up into NW 1–2 and NW 3–6 (see Fig. 8.12). To the south of this structure, a house with three axially aligned rooms was constructed (NW 7–9), and a one-roomed structure (NW 10) attached to its southern wall. The LM IIIC bedrock floors were covered with clay. In the new rooms, if the bedrock was quite level, as in NW 5 and NW 8, it was left as it was; but as in the preceding period, clay was used to surface portions of the room in the case of NW 7 and NW 8. In some rooms, the rocks stuck out above the level of the clay surface, as in NW 2 and 7. Comparable situations of

[251] Haggis 1993a, 143. 154.
[252] Morris 2002, 72. 75–76.

bedrock projecting above floor surfaces have been noted at Vrokastro and Karphi, both located at similarly steep slopes[253] .

In the case of Building K, the rock is incorporated into the walls[254]. Only in one instance was the bedrock hewn to provide a stable base for a wall (western end of wall U)[255].

The area of Building G had been occupied already in LM IIIC, but its three-room plan was laid out only in PG and kept until the building was filled in during LG. The rooms were axially arranged according to the limits of the bedrock[256].

The tholos necropolis at Vronda continued to receive burials in this period. A possible Protogeometric deposit consists of a pit, probably dug before or at the time of construction of the tomb (X; on the north slope of the hill), with articulated dog and puppy skeletons, interpreted as a sacrifice[257].

### 8.9.2 Protogeometric – Late Geometric Azoria (1000–700 BC)

According to the excavators, the 'South Acropolis' at Azoria seems to have been occupied without a break from LM IIIC to the time of Early Orientalizing pottery[258]. However, excavation has not yielded detailed evidence for the pre-Archaic phases; all that is left from PG to G are pottery fragments in secondary contexts of the 7$^{\text{th}}$ and 6$^{\text{th}}$ century[259].

[253] Mook 1998, 56. Cf. also Hayden 1995, 127. This phenomenon can also be noticed for example in the MM IA building at Agia Photia Kouphota near Sitia, which is set on a fairly level hilltop, or the Minoan villa at Makrigialos in the coastal plain east of Ierapetra. Jennifer Moody (*pers. comm.* 2011) has suggested that at least in some cases, these seemingly uneven patches may have been filled with dirt which has been washed out over the millennia.

[254] There are architectural remains from LM IIIC, but the preserved plan dates to PG and a new clay floor was laid out in this period (Coulson *et al.* 1997, 351).

[255] Coulson *et al.* 1997, 319; Mook 1998, 51.

[256] The excavators' remark that "[a]lthough no hearth was discovered belonging to this phase [LM IIIC/EPG/PG], ovens and hearths have diverse and overlapping cooking functions" (Coulson *et al.* 1997, 343) remains utterly enigmatic to me.

[257] Coulson *et al.* 1983, 405–409.

[258] Haggis *et al.* 2007b, 696–697.

[259] Haggis *et al.* 2007b, 697. Ceramics dating to LM IIIC and Subprotogeometric-Geometric and LG were found in D400 (Haggis *et al.* 2007b, 699).

Traces of the Late Geometric period (770–715 BC) are not very abundant. The only substantial remains discovered so far at Azoria (apart from pottery and a clay floor in B3500) are the yet unexcavated walls of "an unusually large LG-EO building (B3000/3900), with possibly cultic functions" that was abandoned at the end of the 7$^{th}$ century[260]. Nonetheless, project director Donald Haggis is confident that "[t]he site of Azoria (its maximum size possibly over 2.0 ha.) may have become a nucleated center by the end of the 8$^{th}$ century, representing a transitional phase of depopulation on the Kastro, with population moving to a lower elevation and in direct contact with transportation routes linking East Crete with the Isthmus through the Avgo valley"[261].

From a possible shrine near the tholos tomb at Plagi tou Kastrou come terracotta figurines of bulls and a possible stag (which, judging by the angle in which the horns start at the back of the head, could well be an *agrimi*) and a dog which is not very dog-like either[262]. Another cult place was situated between the Avgo and the Xerambela cluster, at Pachlitzani Agriada (240 m ASL). A small rural shrine or temple was established here in Protogeometric times and its use continued into Archaic times. Like other rural sanctuaries, it may have served both as a boundary marker and a place where people from the respective cluster met, even more so since the connecting routes between the Avgo valley and the coastal plain led past. Because of these characteristics, the cult place may also have been connected to the reinforcement of local identity[263].

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[260] Azoria 2006.

[261] Haggis 1996, 414 no. 97. Haggis has also declared: "While the social organization is not, as yet, conclusively indicated by the burials themselves, it is likely, considering the settlement data, that even as late as 750 BC (LG), the basic unit in question is the household or extended family" (Haggis 1993a, 152). This is, in my opinion, not a sensible statement, since the basic unit of any sedentary society is always the household. The household may not, however, be equated *per se* with a family of any size (see Widmann 2007, 4–6. 20).

[262] Boyd 1901, 149; Pl. V.

[263] Haggis 2001, 49; Haggis 2005, 137 (site no. 82); Sjögren 2008, 213. For sanctuaries as territorial markers see Pedley 2005, 53. Cf. above, p. 154. For a skeptical view on such hypotheses see Malkin 1996.

### 8.9.3 Late Geometric Kastro

At the Kastro, people arranged themselves with the rough terrain not only by incorporating it into their architecture, but also with the help of terrace walls[264]. Harriet Boyd uncovered 13 rooms in the northern part of the peak which she interpreted as one single house[265]. She found "not a single hearth, bath, or column-base" and only few "household objects". These include "milk-bowls", stirrup jars, "trumpet-shaped funnels of coarse clay, admirably adapted for drawing liquids from large pithoi", loom weights of stone and clay, whetstones, grindstones or rubbers and "stone bowls for pounding corn"[266]. The structure excavated by Boyd is now called Building H, and it has been shown that the limitations of the natural topography were overcome by the construction of a retaining wall into the west slope, creating new building ground on an artificial terrace. More than one metre of room width was won through this measure[267]. Room 27 covers 48 $m^2$, so it is not surprising that, in contrast to Boyd's statement, two pillar bases are placed on its longer (north-south) axis. However, the longest distance to span would still have been ca. 4.5 m. Unspecified animal bones and marine shells were found in this room[268]. On a similar scale and also in LG, the summit of the Kastro was enlarged to the west by filling in the areas inhabited in LM IIIC-Geometric and Building G (rooms 21–26) was (re)built upon it[269]; the structure was abandoned at the end of LG.

[264] Examples are the western (rear) wall of Building A on the east slope (Coulson *et al.* 1991, 71) and the whole of the west slope (Coulson *et al.* 1997, 333).

[265] This goes to show how difficult it is to define houses or even households when buildings are not clearly separated from one another; see Widmann 2007, 9–11.

[266] Boyd 1901, 138. 141. "That these mountaineers enjoyed quiet amusement is proved by a stone and clay 'counter' found in Room 1m [...], which must have been used for some game like draughts or roulette" (Boyd 1901, 142 Fig. 7); cf. Hillbom 2003, 32. 58. 67; Hillbom 2005, 69. A later date and different function has been suggested by Haggis *et al.* 2011a, 27–28 with footnote 56.

[267] This is "arguably the most ambitious example of slope modification on the Kastro, involving the construction of the two-meter-high façade and stereobate platform. While slope modification is commonplace on the Kastro, this example is exceptional in terms of architectural embellishments, expense of resources, and the interest in expanding the area of the central Room 27, in some areas more than two meters beyond the limits of the natural bedrock shelf" (Coulson *et al.* 1997, 339). For a plan and section see Coulson *et al.* 1997, 336 Fig. 13. 337 Fig. 14.

[268] Coulson *et al.* 1997, 340.

[269] Coulson *et al.* 1997, 333. Building G was continuously occupied from LM IIIC to O, resulting in nine stratigraphical phases (Coulson 1992).

**Figure 8.13:** Kastro Building A, from south (April 2011)

Building L was erected in LG; its plan was changed in EO. In the huge room 8N (ca. 6.25 × ca. 8.15 m), which had been excavated by Boyd, no traces of internal supports were found, but evidence for a wooden staircase suggests a second storey[270].

Building A is aligned axially to the narrow natural terrace on which it was set in LG-EO (see Fig. 8.13). Where required, irregularities in the bedrock were levelled out with clay or stones[271]. Room 42 features two central column bases on an east-west axis. These would not have carried the roof, but an upper storey: the walls are preserved up to a height of 2.5–3 m so that the cavities which would have held the supporting beams are still visible. The room was equipped with a stone bin (1.4 × 0.8 m) for dry storage in the north-west corner and a hearth[272]. The small space numbered 43 has a roughly paved floor and an oven and is therefore

[270] Coulson *et al.* 1997, 345.
[271] Coulson *et al.* 1997, 320; cf. Coulson 1997, 63.
[272] Coulson *et al.* 1991, 71, where the structure is compared to the "temples" at Dreros and Prinias. Later, Coulson *et al.* (1997, 325–326) spoke of the "main living room" of Building A because

thought to have been an unroofed court used for cooking[273]. The steepness of the east slope has led Coulson and his colleagues to suggest that people used wooden ladders to reach the buildings built on narrow terraces at different levels[274].

Also in this period, NW 3 and NW 4 of the Northwest Building were rebuilt as a single room connected to NW 5, and NW 10 and NW 11 were constructed (but given up after LG). The flat roofs of the houses that make up the NW Building were made of clay and earth on a wooden substructure. According to M. S. Mook they were, however, not designed to be walked upon and hence do not represent additional living space[275].

The animal bones found belong mainly to this period (see p. 317)[276].

### 8.9.4 Late Geometric Vronda

Vronda was used as a cemetery in this period, possibly by the people from Kastro[277]. 36 graves, holding the remains of 107 individuals, were built into the ruins of the settlement. Cremation seems to have been the prevalent burial custom, but some inhumations have also been discovered[278]. The latter could provide a valuable source of data about diet, but skeletal isotope analysis (see p. 16) has not been carried out. The pit of Grave 26 had hard-fired walls, and five beams of wood were found on the floor. Analysis of these pieces and other charcoal remains indicate that olive and oak were used as fuel for the pyres[279]. The suggestion that Vronda was the cemetery of Kastro is based on the geographical proximity and, more interestingly, on the evidence for great stress on the human leg bones found in the

three loom weights, a quern, a stone polisher and three pithoi from LG-EO were found here. Photos: Coulson *et al.* 1997 Pl. 78b. c. d; 79a.

[273] Coulson *et al.* 1997, 324–325.

[274] Coulson *et al.* 1991, 71.

[275] Mook 1998, 47 Fig. 4.2; 51. This contrasts with a remark by Coulson about the buildings on the *east* slope at Kastro: in the course of rebuilding during the Orientalizing period, the doorways along the central axis of rooms were blocked, so that movement between the rooms may have taken place along the flat roofs (Coulson 1995, 176); I understand this to mean there must have been trapdoors in the roofs.

[276] Klippel – Snyder 1991, 179.

[277] Day 1995, 789. 792; Sjögren 2008, 213.

[278] Day 1995, 795. See also Liston – Day 2009.

[279] Gesell *et al.* 1991, 153; Day 1995, 789–790.

graves, attributed to frequent climbing up to and descending from the peak[280]. Cranial analysis has moreover shown that probably related individuals seem to have been buried in adjacent graves, which may indicate family descendants burying their dead in the former family home[281]. Iron tools found in the graves include sickles, axe-heads, saws and arrowheads (which can be used both for war and for hunting). Animal bones from the graves belong to sheep, goats and, apparently especially in association with children's burials, rabbits. Some bones had been modified into tools, although the majority is interpreted as provisions for the dead or a funerary meal[282].

### 8.9.5 Interactions

In the Protogeometric and Geometric periods, village layout was adjusted to the natural topography, and the bedrock was incorporated into both floors and walls where appropriate. Only in LG do people seem to have started modifying the terrain according to their needs with the help of terrace walls.

The faunal data from Kastro and Vronda come from preliminary publications in which phases and sites were not always distinguished and hence range from LM IIIC to Geometric. However, the majority of bones published this way comes from Kastro (because of better preservation) and its Late Geometric layers, which seems to justify the inclusion in this section here. Ovicaprids make up about 80% of the assemblage from Kastro. The remainder comprised pigs (8.5% at Kastro, ca. 16% at Vronda) and cattle (ca. 8% at Kastro, 5% at Vronda), and a small number of mule or donkey. Among the wild species frequently encountered are brown hare, fallow deer, agrimi and badger. Remains of shrew, hedgehog, beach marten, rat, pigeon, partridge, owl, hawk, eagle, fish and reptiles occurred only very rarely; weasel and European wild (and/or domestic) cat have also been

[280] Day 1995, 789 footnote 3.

[281] Liston 2007, 60. Kinship ties between the former inhabitants of Vronda and the people who kept coming back to bury their dead there have also been put forward by Haggis *et al.* 2004, 341 and Sjögren 2008, 213 ("a wish to bind local identity to a past").

[282] Day 1995, 794 with footnote 21.

mentioned[283]. Interestingly, even at an elevated location like the Kastro, people consumed fish, sea urchin and crab[284].

Bones from dogs, *agrimi*, deer, sheep, goats, cattle and pigs were all manufactured into tools by the people at the Kastro. The presence of certain parts of the skeletons of sheep and goats suggest that the animals were killed in the settlement or at least that their carcasses were not butchered elsewhere[285]; the same applies to Vronda: both wild and domestic animals were apparently dismembered within the village, as the faunal remains *e. g.* from the courtyard north of building I-O-N indicate[286].

Because of the treatment of the bones, in combination with the age profile described above, Walter Klippel and Lynn Snyder argue that animals were slaughtered at an age that promotes a maximum yield of bone marrow fat[287]. This notion developed because of another characteristic of the assemblage: cutmarks on long bones of mature animals were recorded in many cases, and the fact that most bones were cracked when they were still fresh hints at marrow extraction[288]. Gnaw marks from carnivores, on the other hand, were recorded in only 10% of the long bone sample. This is the figure that can be expected if the marrow is removed before carnivores get the opportunity to have a go. Why people would have been particularly keen on bone fat in the Early Iron Age at the Kastro is not known, but it may have been a strategy to cope with a possibly seasonal shortage in food[289].

Snyder and Klippel have also scrutinized the possibility of dogs as a meat source for people at the Kastro[290]. With 178 pieces recovered, dog bones represented less than 2% of domestic animal remains and were evenly distributed across time

[283] Klippel – Snyder 1991, 180; Snyder – Klippel 1996, 284; Snyder – Klippel 2000, 68. See also Moody 2012, 247.

[284] Snyder – Klippel 2000, 67–68.

[285] Snyder – Klippel 2000, 70.

[286] Glowacki 2004, 130.

[287] See also Snyder – Klippel 2000, 70–80.

[288] For the varying marrow content of bones and other studies about bone fat see also Klippel – Snyder 1991, 182–183 (with further references).

[289] Klippel – Snyder 1991, 183. See however the ethnographic examples given by Halstead – Isaakidou 2011, 168, which does not seem to be connected to any form of shortage. If the cracked bones were distributed unevenly across the site, this could potentially hint at social differences between households, see Fillios 2007, 80.

[290] Snyder – Klippel 2003; see also Day *et al.* 2009, 80. 107. 130.

(LM IIIC-Orientalizing) and space at the site. The position of the cut marks on a very high percentage (27.5%)[291] of these bones clearly points to their having been prepared for cooking: the carcasses were skinned, disarticulated and defleshed. Many bones and mandibles retrieved were deliberately broken, the former probably to adjust them to cooking pot size, the latter presumably to remove the tongue. However, the overall low percentage of dog carcasses indicates that dogs were not eaten very frequently[292]. Dogs were not the only unusual species in the cooking pots at Kastro: of the 35 specimen of badger bones from the Kastro, 18 showed cut marks, some of which can be connected to skinning for pelts, but most of which are clearly traces of butchering for cooking. The taste of badger meat, however, apparently is so peculiar that it has been called inedible[293]. Badgers still live in the region today[294]. Although the context of the bones makes a connection to sacrifice unlikely, it is not clear whether the infrequent consumption of dogs and badgers in combination with the frequent extraction of marrow can be taken to indicate a real shortage of food[295].

The higher proportion of cattle bones at Kastro as compared to Vronda surprised the zoologists: they feel that the topography in the vicinity of Kastro is not suitable for moving cattle around. However, the assemblage of cattle bones includes cranial and foot bones which are unlikely to feature if ready-to-eat butchered meat portions are brought to the settlement, indicating that either whole carcasses or, in my view more probable, living animals were conveyed to the site[296]. It should not

[291] This number is not significantly higher than the percentage of cut marks on bones of pig (23.1%) and cattle (25.6%), but such proportions are remarkable in general (Snyder – Klippel 2003, 223). Sheep/goat bones from the Kastro showed cut marks in 14.3% of the sample.

[292] On dogs as food see also Brothwell – Brothwell 1998, 40; Halstead 2002, 185 with footnote 141; Trantalidou 2001, 268 footnote 4.

[293] Jarman 1996, 217. Badger fat has been ascribed medicinal value (Outram – Mulville 2005, 2).

[294] "Indeed, although rare and endangered on Crete today, a very flattened badger was collected on the Avgo road, within a few kilometres of Kastro, during the summer of 1989" (Snyder – Klippel 1996, 284). The bones from Kastro came from all occupation periods. Only few and badly preserved examples come from Vronda (Snyder – Klippel 1996, 284. 290). See also Yannouli 2003.

[295] For dogs in a sacrificial context at Vronda see p. 321. For useful differentiations between food shortage, famine *et cetera* see Haidle 1997, 33–34.

[296] Snyder – Klippel 2000, 70. The unsuitable terrain is also stressed by Wallace 2003, 607–608. A topography unsuitable for moving cattle around surely does not exactly lend itself to moving a 200 kg carcass around either (for this number—much smaller than what other people estimate for Minoan cattle (cf. Moody 2012, 235 with footnote 10)—see Sloan – Duncan 1978, 64).

be forgotten that in the Alps, cows are regularly kept on steep rocky terrain, too, and seem to cope all right[297]. S. Wallace suggested that "members of the group settling at Kastro may have had a background in cattle rearing and/or control of substantial cattle resources at the time of relocation"[298]. Be that as it may, cattle were important (though not irreplaceable) for ploughing, and if settlements and fields had to be in the uplands, there would not have been much choice for the animals[299]. At any rate, if vegetation was anything like it is today, providing appropriate fodder for cattle would have been a serious problem[300].

The large herds of sheep on the other hand could have grazed the extensive mountain plains of Papoura and the lower pastures around Azoria, Vronda and modern Kavousi[301]. Following P. Halstead's hypothesis, it has been suggested that the flocks of a village, in this case Kastro and Vronda, were herded together; this would have been "at some distance" from the two sites[302].

No one has commented on the great contrast in the proportion of pigs in the bone assemblages, although it seems quite remarkable that (LM IIIC) Vronda had twice as much pig remains as (LG) Kastro (16 and ca. 8% respectively). The difference cannot be explained by different retrieval methods[303]. The less extreme terrain around Vronda was certainly better suited to looking after pigs, but nonetheless they probably had to be led somewhere else to roam.

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[297] Prof. Dr Thomas Meier, *pers. comm.* 2012; Netting 1981, 25. See also p. 380.
[298] Wallace 2003, 608. See also Hayden 2004, 152.
[299] Cf. Wallace 2010, 38. "Manual grain production was commonest on marginal areas, where plots were too narrow, steep or boulder-strewn for ploughing, provision of fodder was difficult (on poor soils, under low rainfall) or the period of stall-feeding was extended (at high altitude)" (Halstead – Isaakidou 2011b, 62).
[300] Cf. Klippel Ð Snyder 1991, 181.
[301] Haggis 1993a, 149.
[302] Klippel – Snyder 1999, 58, with reference to Halstead 1990a, who however, as I understand it, merely stresses that there is no evidence for long-distance transhumance (Halstead 1990a, 22–23).
[303] Cf. Snyder – Klippel 2000, 70 Table 7.3. 78.

## 8.10 Archaic

### 8.10.1 Orientalizing (Early Archaic) Azoria (700–600 BC)

Evidence from this phase is not plentiful, but the scale of a restructuring of the natural terrain that was undertaken at the end of the 7$^{th}$ century shows that the polis was not without ambition: the erection of a 'spine wall', apparently encircling a substantial part of the hilltop, is equivalent to a fundamental adaptation of the slope to the needs of the settlement's inhabitants. Large dolomite boulders and occasionally sideropetra, placed upon a bedding of clay and cobbles, were employed in the construction of the massive wall[304]. The excavators noticed that earlier architecture seems to have been deliberately removed: "In contrast to the documented EIA practice of using earlier remains as visual, ritual, and ultimately symbolic focal points of community consciousness, the physical transformation of Azoria was clearly a process of erasing the visible indicators of the EIA past, avoiding even the most subtle reuse of foundations"[305].

Grape pips and traces of cereal grains on a 7$^{th}$ century/EO surface were found in the 'Service Building', constructed in the 7$^{th}$ century (see Fig. 8.14)[306]. A stone-built drain was constructed in the 7$^{th}$ century in B3700 to collect the run-off from a street on the terrace above. Although the drain fell into disuse in a later Archaic phase[307], the fact that it was installed at all seems to indicate that it was considered necessary to drain the street (or worthwhile collecting rainwater).

The excavators have observed that the small pyramidal loom weights found at Azoria are of relatively uniform shape, size and weight (65 g). They concluded that there must have been a change in weaving practice on the warp-weighted

[304] Haggis *et al.* 2007a, 265.
[305] Haggis *et al.* 2007b, 708. This is in stark contrast to Kastro, where earlier structures were deliberately incorporated into new buildings (Haggis *et al.* 2007b, 708 no. 163). The socio-political implications of a large-scale communal project like at Azoria are immense but not relevant here: "Although we lack historical documentation of Azoria's "civic" identity—namely, an inscription identifying the city—we think that evidence of new building practices, the reorganization of communal and domestic space, and changes in the agropastoral economy and suprahousehold activities are material reflections of social configurations in keeping with a civic status and an urban environment" (Haggis *et al.* 2011a, 4). See also Small 2010.
[306] Azoria 2005; Haggis *et al.* 2007a, 274. Moody 2012, 246 mentions badger bones with cutmarks from "EIA-Archaic Azoria".
[307] Azoria 2006.

loom: the cloth produced with such weights would have been finer, lighter and tighter than before, like twill[308]. They are probably made from local clay and were found distributed across the site. In contrast to the proposal of the excavators, four of them in a 6th century context in the small north room (7.5 $m^2$) of A1100 are not enough to indicate the presence of a loom, even less so considering the restricted space[309]. The chronological implications of these objects, namely that their use began around 600 BC or even earlier, is of course nonetheless valid[310]. (Unfortunately, the introduction of the finer weave cannot be related to a change in climatic conditions at that time: between 900 and 450 BC, especially the winters were very cold and it became increasingly dry[311]).

The broader historical context as well as the results of the regional survey make it clear that in "[t]he 7th and early 6th century inhabitants of Azoria were linked to a world that was decidedly wider than the mountain clusters with their local agricultural and pastoral interests"[312].

### 8.10.2 Orientalizing Kastro

In the times of LG-EO pottery, the buildings on the Kastro were constructed of stone, mostly undressed schist rubble from a local source, set on the limestone bedrock[313]. Mud mortar was used to bond the stones into double-faced walls[314]. Most houses seem to have had their entrance to the south or to the east, at any rate protected from the cold northern winds[315]. The massive artificial terrace on the west slope (which included filled-in earlier architecture) proved unstable. In the 7th century, a number of lateral retaining walls were hence built to support this fill, at the cost of a substantial reduction in the size of Building L. At the end of

[308] Haggis *et al.* 2004, 371. The one (almost) complete loom weight (K90.315) from the Northwest Building at the Kastro weighs an astonishing 555 g; the others are all fragmentary but even as such most of them weigh more than 65 g (Mook 1993, 283–289).

[309] Haggis *et al.* 2004, 372. A loom needs at least twelve weights (see Widmann 2007, 24 for discussion and further references).

[310] Evidence from Knossos had so far led to the assertion that they were not used before 500 BC (Haggis *et al.* 2004, 372).

[311] Moody 2005, 464; see also section 3.2.2.

[312] Haggis 2005, 86.

[313] Local schist: Coulson *et al.* 1997, 319. Cf. Gesell *et al.* 1992, 122.

[314] Mook 1998, 50–51.

[315] Mook 1998, 55.

the Orientalizing Period, the only parts of the Northwest Building that were still inhabited were the renovated NW1–2, NW5 and the room above NW 3–4. The size of the settlement decreased until the Kastro was abandoned completely.

Of the 39 spindle whorls that were recovered from the Northwest Building, most are made of terracotta and a few of stone. The 28 fragmentary loom weights on the other hand are all terracotta. Although these numbers are, considering the length of occupation, not large, it seems reasonable to suppose that the inhabitants produced yarn from the wool of their sheep and wove it into cloth[316].

A large number of querns of different sizes has been found, as well as possible grinding pebbles. Three pieces of abraded pumice come from the Northwest Building. Only two pieces of worked bone were found, one is a goat metatarsal, the other—a fragmentary pin or needle—cannot be specified further than 'mammal'[317].

### 8.10.3 Interactions

Information on man and the environment in this period is very sparse. What can be said is that local materials were used for construction and that there is evidence for the cultivation of vines and cereals and for the rearing of goats. Unfortunately, botanical and faunal remains from the Orientalizing period cannot elucidate how people lived in the mountains. L. P. Day has suggested that Kastro may have been a seasonal settlement at first, whereas in later phases people buried their dead nearby and therefore probably lived up there year-round[318]. W. D. E. Coulson and D. C. Haggis have argued the reverse: "The size of the settlement on the Kastro, spreading as it does all the way down the S slope, is a major factor in identifying it as a flourishing permanent settlement [. . . ]. Only in the seventh century BC, when the settlement shrinks in size, could we entertain the possibility of seasonal habitation"[319]. In search for support of either theory, it has been argued that the construction mode of the roofs suggests continuous habitation, since they would

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[316] On the frequency of spindle whorls (albeit in settlements of the palatial periods) see Burke 2006, 282 and, contrasting, Evely 2000, 485. 488.

[317] See Mook 1993, 274–311 for a catalogue of all artefacts mentioned.

[318] Day 1990, 173.

[319] Coulson 1998, 40. He refers to an idea brought forward by Haggis 1993a, 159.

have collapsed without constant maintenance and no such roof debris was found on any floor level[320].

Haggis names several aspects through which the Kavousi area and Crete in general differ from other Mediterranean regions in the Early Iron Age: "population increase, settlement dispersal, clan or family collective tombs and multiple burials, self-sufficient agricultural communities, and *regional* continuity from Late Minoan [LM] IIIC to the Archaic [A] period. The emerging picture is one of stable and autonomous settlement groups that were concentrated in well-watered and agriculturally productive highlands of the Kavousi and Thriphti mountains"[321].

### 8.10.4 Archaic Azoria (600–475 BC)

Between the 7th and the early 5th century, Azoria developed into the main settlement of the region, spreading over 15 ha, at the cost of some smaller rural habitation sites which were abandoned: survey has produced very few localities with Archaic pottery[322]. The small shrine or rural house temple at Pachlitzani Agriada, founded in Protogeometric times, continued into the Archaic or even Classical period[323], but the only substantial information for this period comes from Azoria (see Fig. 8.14). However, at the end of the Archaic period, Azoria too was destroyed and given up[324].

**Slope modification** Following the construction of the 'spine wall' at the end of the 7th century (see above, p. 330), people at Azoria took further measures to adjust the natural terrain to their needs. For the erection of the 'Monumental Civic Building'[325], the former EIA topography was entirely altered in the 6th–5th

[320] Mook 1998, 51.
[321] Haggis 1993a, 133.
[322] Apart from Azoria, only Panagia Skali (Haggis 2005, 131 site no. 70), Sopata (Haggis 2005, 137 site no. 84) and Trapeza (Haggis 2005, 140 site no. 89).
[323] Haggis 2005, 137 site no. 82 (with further references).
[324] Haggis 2005, 85–86.
[325] The exact function of this building, which covers 180 $m^2$, is as yet uncertain. Food remains and serving vessels indicate that meals were consumed here, but parallels are hard to come by. The excavators cite the 'prytaneion' at Lato which is similar in size and certain characteristics but supposedly later in date (4th/3rd century (Haggis *et al.* 2007a, 299)); the buildings in Lato are very hard to date however (Kirsten 1940, 347–348). The absence of a hearth in the case of the Azoria building has been specially noted by the excavators (Azoria 2005) and should be stressed

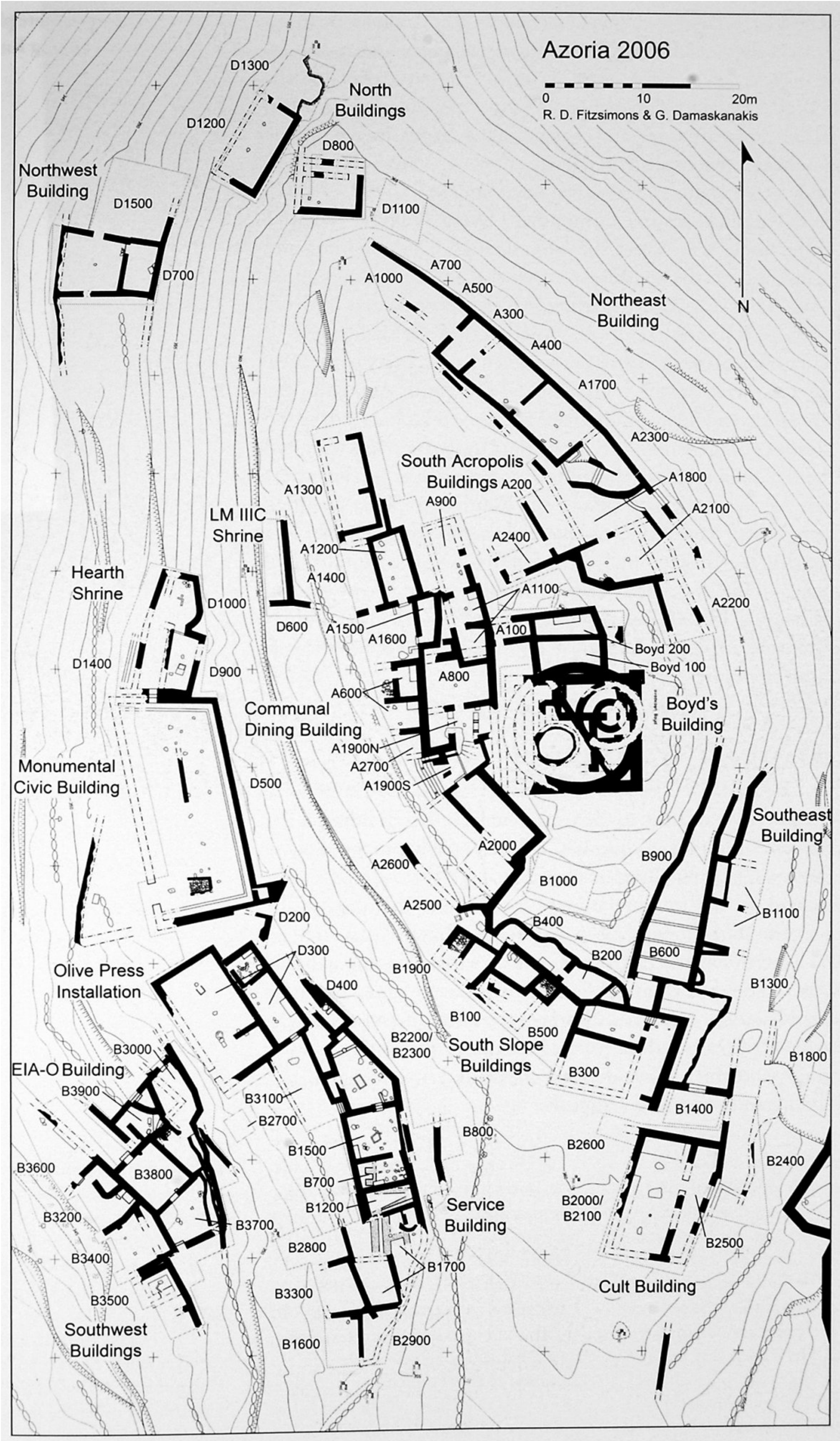


**Figure 8.14:** Plan of the excavated area at Azoria (Haggis *et al.* 2011a, 3 Fig. 2

century: huge amounts of earth and rubble were moved to the slope between the Monumental Civic Building and the 'Service Building' (D300) to build a ramp. Another example of the ways in which people coped with the natural topography is represented by the three-roomed structure in A900 and A1100. Here, the limited space available was enlarged by the construction of an artificial terrace[326].

**Animals** Since no detailed analysis of the faunal remains retrieved during excavation has been published yet, statements about the exploitation of animals must remain tentative and fairly unspecific. The bulk of animal protein came from domestic species: the majority of mammal bones belong to ovicaprids, but pig and cattle are also frequently encountered. A noteworthy deposit was encountered in an abandoned part of a public building: In what looks like a bone dump delimited by a specially-built wall were the disjointed left and right mandibles of at least twenty goats of prime meat-age (18–24 months), but no other faunal or food remains. It seems therefore that this is not killing and/or processing waste, but that the mandibles were cut off the rest of the body and purposefully deposited separately. It has been suggested that this may have been "to prove the age, number, and condition of animals supplied for dining in nearby public buildings"[327]. This context raises the interesting question of who owned the goats eaten in public buildings: were they reared by the polis, maybe especially to provide meat for such purposes, or did the citizens have to supply them as a kind of tax? According to one possible reading of Aristotle (*Pol.* 1272a 14–21), one part of all crops and livestock raised on public land had to be given to the polis to be used in cult, public

here. Despite the oblique north wall, I think D500 rather resembles the 'Exedra' at Lato which however, according to Haggis and his colleagues, was probably hypaethral, in contrast to the Azoria edifice (Haggis *et al.* 2007a, 300). Another structure with steps along one wall has been unearthed at Sybrita/Thronos Kephala; it has two destruction horizons from the Roman Period but no statements as to when it was built have been made (D'Agata – Karamaliki 2003, 801).

[326] Haggis *et al.* 2004, 372. It is not clear to me whether the "large rectangular Archaic building on the hilltop, excavated by Harriet Boyd in 1900, [...] constructed on top of a massive artificial terrace supported on the west by a line of large boulders, fitted with smaller boulders and cobbles" which is referred to in Azoria 2003 and in Haggis *et al.* 2007a, 253 indeed is the same structure discussed here, since Boyd does not mention anything like it. From the published plans (*e. g.* Haggis *et al.* 2004, 350 Fig. 5) it seems that A900/A1100 is to the north-west of Boyd's trench and not touched by it.

[327] Haggis *et al.* 2007a, 277. Cf. Azoria 2004. Halstead 2005, 40 points out that because of their low meat content, mandibles are usually a good indicator of on-site butchering.

**Table 8.1:** Animal remains from Archaic Azoria. xx denotes more than 10 bones published, x denotes fewer than 10 or unknown numbers. ? denotes uncertain identification

| | | ovicaprid | sheep | goat | cattle | pig | dog | agrimi | rabbit | hare | wild boar | sea shells | other marine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6c. | public | | | | | | | x | | | | | |
| | private | | | | | | | | | | | | |
| 5c. | public | x | x | x | x | x | x | x | x | | x? | x | x |
| | private | xx | xx | xx | xx | xx | | | | x | | x | x |
| 6/5c. | public | x | x | x | x | x | | x | | | | | |
| | private | x | x | x | x | x | | | | | | | |

services and *syssitia* (public meals of male elite citizens in Cretan poleis). Communal ownership cannot be supported by evidence from other sources, so that it is more likely that this would have been privately owned animals grazed on public pasture. This is a social and political issue, but one that touches the interaction of man and environment too, since it may have implications as to the use of and rights to the surrounding pastures[328].

This question can also be posed in the case of the Monumental Civic Building (D500). Here, substantial amounts of bones from the meaty parts of pigs, rabbits, sheep, goats and cows were found. It seems that "whole leg segments and even whole animals were spitted and roasted" and then distributed in the building at communal feasts[329]. Some of them showed traces of (repeated) burning—either from the early 5$^{\text{th}}$ century fire destruction or, as the excavators have suggested,

[328]The passage in Aristotle may be corrupt; see Viviers 1999, 226–227 with footnote 21. For the possible emendations see Chaniotis 1999b, 193–194; A. Chaniotis thinks that the tributes and tithes collected from the unfree population was used to finance the *syssitia* (cf. however Chaniotis 1988b, 67–68). Cf. Horster 2004, 196. For pasture rights see Jameson 1988, 103–104; Chaniotis 1995, 41. 44–45; Howe 2008, 120. Cf. also Burford Cooper 1978, 173 (regarding Athens): "The fact that the only publicly owned pasture we hear of appears in a single record of the deme of Piraeus provides a sad comment on the state of the evidence, not on the Athenians' lack of common grazing." Surviving leasing contracts concerning land belonging to a sanctuary seemingly allow the leaser to keep all yields (see Horster 2004, 180–185).

[329]Haggis *et al.* 2011a, 26. Note the contradictory remark about the variety of species in D500 and the Communual Dining Building/"putative *andreion*" in Haggis *et al.* 2007, 298 and Haggis *et al.* 2011a, 27.

because they were burnt on an altar[330]. An insight into the cuisine of the time is offered by a situla found upside down on the floor, containing "a stew that included chickpeas, grapes, onionlike bulbs, small carbonized twigs from the mint family (possibly herbs such as thyme and oregano), and sheep or goat meat"; a broken lekane held a concoction of wheat, broad beans and grapes[331] (see Fig. 8.14).

The presence of apparently disarticulated dog bones in the context of food debris should be noted—it seems that dogs were eaten at least occasionally[332].

Non-domestic animals were exploited, too. Noteworthy is a deposit of two pairs of agrimi horns in a possible 7th–6th century context[333]. One pair each was laid down in A1700 and A400 in the so-called Northeast Building, on either side of the connecting door between the two rooms. In both cases, the horn cores were still attached to a piece of frontal bone which had been disconnected from the rest of the skull, according to the excavators—no picture of the horns is available—not unlike modern trophy antlers. The contexts of these finds are largely devoid of other bones indicating butchering or meat processing. In combination with their position on either side of the doorway, it seems reasonable to assume "that these specimens were deliberately retained objects perhaps used as hunting trophies, ritual expressions of power, or votive objects"[334]. Despite their seemingly ritual

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[330] Haggis *et al.* 2007, 298. Cf. Haggis *et al.* 2011a, 25–27.

[331] Haggis *et al.* 2011a, 25.

[332] Haggis *et al.* 2004, 384; Haggis *et al.* 2011a, 27. Cf. the results of faunal remains from LM IIIC to Orientalizing Kastro.

[333] This chronological attribution must remain very speculative since no pottery dates are given by the excavators; the only clue as yet may be a silver dress pin from A1700 that is being compared to (but found to be plainer than) 7th- or 6th century examples (Haggis *et al.* 2007a, 248).

[334] Haggis *et al.* 2007, 248. Deposits of few (*"ὀλίγα"*) *agrimi* (*"αἰγάγρον"*) horns are known from a 7th century context at Aphrati (Lebessi 1969, 417); while D. Viviers stated that the building in which they were found was probably a bouleuterion or an andreion and that "cornes de chèvres et autres ossements pourraient n'être que des reliefs de repas" (Viviers 1994, 248), M. Prent suggested that exactly because it might have been an andreion, the horns may have been hunting trophies (Prent 2005, 453 no. 1253). An altar with horns in a temple at Dreros are mentioned without further references by Lebessi (Lebessi 1969, 417). At least one wild goat skull with horns was found in a sacrificial context containing MM III/LM I, but also LM IIIC pottery at Kato Symi (Lebessi 1984, 455, Pl. 226). Another example comes from Vrokastro (Hall 1914, 101); the date is unclear (see also Prent 2005, 295. 427). A pair of horns from below a layer of burnt earth is known from Sybrita; they were associated with LM III pottery (Rocchetti 1994, 244 Fig. 17. 245; Prokopiou 1994, 251 with Fig. 2; Rocchetti 1995, 814; Rocchetti 1996, 1481). *Agrimi* horns, still attached to a piece of frontal bone, may have been used for display at Kavousi Vronda and were also found at the Kastro (Day – Snyder 2004, 69–71 with Fig. 5.9; 73). A bovid cranium was found in a probably public building of LM IIIC Smari (Wallace 2010, 133 with Fig. 73).

connotations, wild goats were not too sacred to be eaten: *Agrimi* bones have also been reported from the 'South Kitchen' in A600[335]. The only other wild species exploited for food is rabbit. A (wild?) boar's tusk and cranial fragments were recovered in the Archaic shrine in D900[336].

As yet, marine animals are almost exclusively represented by shells (this may change once the results of flotation are published). Limpets and top shells were found in food debris contexts[337]. In the Archaic shrine with a hearth (D900), some sea shells including triton's trumpet, clam, limpets and murex were found associated with terracotta figurines (mostly female; one representation of a bovine hindquarter), a glass bead, a spindle whorl and a piece of folded bronze. The marine molluscs could be the remains of a ritual meal—all of them are edible species—but may also have been dedicated to the deity as empty shells[338]. Interestingly, the only other instance of triton shells at Azoria are two specimens found in a food preparation context (A1600, a "kitchen")[339]. This is remarkable since, as mentioned, tritons are edible but not normally considered in that way[340]. The shell of a spiny oyster (Spondylus gaedoropus) was used as a sccop[341]. Remains of fish, sea urchin and crab were also present. Skull remains of parrot fish (*Sparisoma cretense*) show that in the early 5th century, fish arrived whole. Even though seafood makes up more than 70% of faunal remains from one context, the excavators

335 Azoria 2002c.

336 Azoria 2006; Haggis *et al.* 2011a, 33.

337 "*Trunculus*" is mentioned in Azoria 2002a and Azoria 2002c; it is not clear to me which species this would be, since '*trunculus*' is not the first part of any Latin taxon. *Murex trunculus*, commonly used for dyeing, was also esteemed as food; since 60,000 shells were needed to make 0.5 kg of dye (and it is, because of the smell, unlikely that purple dye would have been produced within a settlement, see Moody 2012, 257), the latter would seem more probable in this context. See Wentworth Thompson 1947, 218; Bicknell 2000, 100–101; De Cupere 2001, 17.

338 Azoria 2006; Haggis *et al.* 2011a, 32–34. Shells as a gift to Apollon are known from an epigram (*AP* VI 230), as is the dedication of a marine snail to the nymphs (*AP* VI 224). In Herakleia in southern Italy, seashells were dedicated to Aphrodite (Pianu 2003 (*non vidi*)). See also Bodson 1980, 49. 57. I would like to thank Cathrin Grüner, Lehrstuhl für Klassische Archäologie Würzburg, for providing the last two references.

339 Haggis *et al.* 2007a, 259.

340 Cf. the catalogue in Åström – Reese 1990, which lists only sanctuary and tomb context. Tritons were eaten around 1900 in Crete however, see Bosanquet – Welch 1904, 201; Reese 1985, 353–362. Karali 1999, 16–17 lists them among food species, too. For triton trumpets see Karali 1999, 22.

341 Haggis *et al.* 2011b, 468. 475.

**Table 8.2:** Plant remains from Archaic Azoria. xx denotes more than 10 specimens published, x denotes fewer than 10 or unknown numbers. ? denotes uncertain identification

| | | | cereal | | | pulse | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | olive | grape | wheat | barley | unidentified | lentil | chickpea | vetch | broad bean | unidentified | almond | pistachio | pine nut | poppy | fig | pear | hackberry | elderberry |
| 6c. | public | x | xx | | | x | | | | | x | x | | x | x | x | | x | |
| | private | x | x | x | | | | | | | x | | | | | | | x | |
| 5c. | public | xx | xx | xx | xx | x | x | xx | x | x | x | x | x | | x | x | x? | | |
| | private | xx | x | | x | x | | x | | x | x | x | | | | x | | | |
| 6/5c. | public | x | x | x | x | x | | x | | x | x | x | | | x | x | | | |
| | private | x | x | x | x | x | | x | | | x | x | | | x | x | | | x |

have pointed out that in terms of volume, their contribution to food supply would have been almost negligible[342].

**Plant remains** Destruction debris all over the site contained plant material indicating that the flat clay roofs probably had an underlying thatch-like support[343].

Microscopic study of charcoal from Azoria has enabled the identification of 21 different species. "Particularly high relative quantities, if not over abundance" of olive wood was recorded[344]. It must therefore be conjectured that olive wood very regularly served as fuel[345]. There was only one context where another taxon, namely almond, dominated the charcoal sample[346]. In at least a number of cases the retrieved olive wood apparently formed part of the architecture. In the case of the irregular shaped storeroom D1000, destroyed in a conflagration in Late Archaic times, a burned olive wood beam was clearly visible on the excavated floor. The room had a width of approximately 3 m[347].

[342] Haggis *et al.* 2004, 384.
[343] B200, dating to before the 6$^{th}$ century destruction: Haggis *et al.* 2004, 361. B700, B1500 and B2200/2300, dating to before the destruction at the beginning of the 5$^{th}$ century: Haggis *et al.* 2007a, 274. A1200, abandoned late in the 6$^{th}$ century: Haggis *et al.* 2004, 378 with footnote 80.
[344] Azoria 2007.
[345] Cf. Forbes 1996, 84; Rackham – Moody 1996, 80; Vanhaverbeke – Waelkens 2003, 44.
[346] Azoria 2007.
[347] Azoria 2006; Azoria 2007.

Sixth century contexts (mostly late 6$^{th}$ century) have yielded olive pits in different quantities and minor quantities of mostly unspecified cereals, among which wheat. Grape remains seem more abundant, especially in certain contexts: Hundreds of grape pips and some skins and stalks were retrieved from the possible industrial area in A1300, dating to before the end of the 6$^{th}$ century; their chronological relation to a thick-walled giant lekane (D 75 cm) in this room is not clear (see below), but wine production has been postulated, despite the absence of a stone press[348]. In the storeroom in A1200, more than 1000 fragments of grape pips and skins were found, confined to the north part of the room where they may have been stored before the building was given up in the late 6$^{th}$ century[349]. They were found inside pithoi and are now interpreted as the remnants of "wine must with lees (including pips, skins, and stems)"[350].

Other plant species identified in 6$^{th}$ century contexts at Azoria are diverse but never present in great quantities. They include unidentified pulses, chickpeas and broad beans, vetch and a small number of seeds from an as yet unidentified species of grass found in the earlier of two late 6$^{th}$ century contexts in B300. Almonds, poppy seeds, pistachio, figs and a single pine nut were also found. In a part of the 'Andreion complex', A1900N, which may have been only partially roofed, two floor levels are preserved, but the date given for each is only very broad: the original floor surface belongs to the Archaic period, the latter belongs to after the early 5$^{th}$ century destruction[351]. Deposits from the beginning of the 5$^{th}$ century include olive stones, grape remains (pips and skins, "most likely derived from wine lees"[352]).

Where cereal species have been identified, both wheat and barley are frequently present. Pulses are also regularly part of the assemblage: chickpeas, lentils, broad beans where stored, eaten, and, as the evidence from D900 indicates, seemingly also offered to the gods[353].

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[348] Haggis *et al.* 2004, 370. 391.
[349] Haggis *et al.* 2004, 378.
[350] Haggis *et al.* 2011a, 7.
[351] As indicated by comments in Azoria 2005.
[352] Haggis *et al.* 2011a, 43.
[353] Haggis *et al.* 2011a, 31.

As for tree crops, figs are reported and what has tentatively been identified as remains of pear[354]. Hackberry and elderberry are also attested[355]. Almonds appear frequently in early 5th century contexts, mainly in the private dwellings. Pistachios seem to have been consumed in public buildings. Poppy seeds were found in small quantities[356].

The comparison of plant foods from the private and public structures seems to indicate that, "at least as far as plant foods were concerned, civic dining in the public buildings was distinguished more by abundance, setting, distinctive equipment, and perhaps recipes than by the ingredients per se"[357].

The analysis of the thread preserved on a fragment of a 7th century (?) bronze helmet crest (found in A1400) has shown that a vegetal bast, probably linen, was used for sewing in Archaic Azoria[358].

**Architecture, roofs and building materials** It seems that the choice of building stones might have varied with time. A preference of dolomite may be detectable for the earlier Archaic structures, for example the foundations of the 'spine wall', constructed at the end of 7th century. The possible dining hall (A200) of the 'Andreion Complex' (see Fig. 8.14) has a west and east wall of dolomite boulders; finds from the building are Late Archaic, but it seems reasonable to suggest that it might have been put up earlier. The Monumental Civic Building (D500), erected sometime in the 6th century, consists of large dolomite boulders in its lower courses, whereas for the upper layers *sideropetra* (grey crystalline limestone) cobbles were used. According to the excavators, they may have been added in a later renovation. (The steps running around the inner walls, however, are of *sideropetra*; still, as far as I can see, no one so far has suggested the steps may not have been part of the original interior.) The same phenomenon has been recorded in the case of the 'Service Building': its initial 7th century walls are made of massive dolomite cobbles and small boulders, some of them roughly worked, but always bonded with

[354] Haggis *et al.* 2011a, 43.
[355] For hackberries in ancient Crete see also Moody 2012, 250–251.
[356] Haggis *et al.* 2011b, 445.
[357] Haggis *et al.* 2011b, 447.
[358] Azoria 2007. The only known parallel for the helmet comes from Aphrati and has been called "orientalizing" (Hoffmann 1972, 2).

lots of mud mortar. In contrast, in a second building phase sometime in the 6th century, naturally regular blocks of *sideropetra* were used. It can only be conjectured that this may be due to changing attitudes towards the optical properties of the material, or maybe the often astonishing rectangularity of the limestone was only now appreciated. That local resources of dolomite were exhausted seems rather unlikely.

For the private dwellings, which are said to have been built in the early 6th century, both dolomite and sideropetra were used. Because of the close resemblance of the building technique to the one used for the public buildings, the excavators suggested the involvement of "specific groups of workmen"[359].

In front of the porch (A1900S) of the 'Andreion main building' are two postholes, interpreted as evidence for an "overhanging roof"[360]. Whether this canopy would have been horizontal or inclined is not clear. As mentioned above, the roofs of the Archaic houses were flat and made of clay and thatching[361].

**Textile production, tools and objects** Loom weights, spindle whorls (biconical/lentoid, spherical, discoid) and a bronze awl or bodkin are testimony to the textile production in the city. Not surprisingly, spindle whorls and loom weights are found more frequently in the private than in the public structures, and they often appear in conjunction. A room in a private dwelling on the southwest slope (B3800) yielded 'several' loom weights and spindle whorls and is therefore suggested to have held a loom[362]; more loom weights from two other rooms in the same structure (B3700, B3900) support the notion of textile production in this household. Nonetheless, one of the greatest concentrations of textile-related objects comes from the 'Three-room Building' (A900/A1100) on the summit[363], although it is not quite clear why implements used in textile production should be used or stored in public buildings[364]. The presence of a loom has also been suggested in the case of the 'kitchen' B2200/2300 in the Service Building: here, 16 metacarpals

359 Haggis *et al.* 2011b, 432. 449.
360 Haggis *et al.* 2007a, 257.
361 For flat roofs cf. p. 447 footnote no. 64.
362 Azoria 2006; Haggis *et al.* 2011b, 460.
363 Haggis *et al.* 2004, 370–372.
364 State-controlled manufacture is a possibility; see Haggis *et al.* 2007a, 301.

and metatarsals from sheep or goat (and possibly one from cow[365]), all of them perforated close to the distal joint, were found associated with several terracotta loom weights and spindle whorls. From ethnographic parallels they are interpreted as bobbins for braiding straps or decorations for textiles[366]. In the case of a pyramidal loom weight found in the 'Service Building', the clay indicates that the object was imported from the region of Istron/Oleros or maybe even Lato[367]. Why anyone would bother to carry such an everyday terracotta object across Crete remains a mystery.

Two other bone implements are of unknown function: a goat horn core with an abrasion or bevelling and a cow metatarsal with a vertical hole drilled through its entire length, with a socket at its proximal end and a hollow at its distal end[368]. These objects appear to have been found in a destruction horizon of the beginning of the 5th century[369].

Equipment for food processing from Archaic levels at Azoria is not very specific. There are (saddle) querns and mortars (in at least once case made of terracotta with a spout[370]. Most of the querns are said to be unsuitable for grinding grain into flour, which goes well with the scarcity of cereal remains—it seems that storage and processing of cereals did not happen in the *asty*. The stone implements were better designed for coarsely crushing grain, pulses and nuts[371]. Two large stone mortars, seven pithoi, three transport amphorae (one of them from southern Ionia) and four hydriae all stood in storeroom B700, as well as a two-handled vessel with a spout above the base that is supposed to have been used for oil-separation[372]. A huge terracotta basin with a diameter of 80 cm and a peculiar conical base—on which it cannot stand on its own—is suggested to have been used as a *ὅλμος*, a

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[365] This attribution does not appear in the print report (Haggis *et al.* 2007a, 288. 290 Fig. 35) but only in the online version (Azoria 2004).

[366] The cluster of loom weights, spindle whorls, bobbins and burned wood along the south wall of the room has led the excavators to suppose a loom either stood or was stored here (Haggis *et al.* 2007a, 288). In the online report it was suggested that the modified bones may have been loom weights; this notion seems to have been abandoned (and, in my opinion, rightly so).

[367] Haggis *et al.* 2007a, 277.

[368] Haggis *et al.* 2007a, 289.

[369] At least to me it is not entirely clear from the report whether this destruction meant the end of the use of the room (Haggis *et al.* 2007a, 274).

[370] From A1200 (Haggis *et al.* 2007a, 250).

[371] Haggis *et al.* 2011b, 473–475.

[372] Haggis *et al.* 2007a, 277. 279 Fig. 26.1.

mortar for hulling cereals[373]. However, even if the material may be strong enough to bear the pressure, the shape is not very practical for the purpose[374].

More than twenty stone tools indicate the ongoing use of this material even in the times of iron and bronze (objects of both metals were also part of the assemblage). In the centre of the room was a square hearth with a sizeable terracotta strainer standing within.

In the private storeroom (B3600) of a house among the Southwest Buildings, a pithos with an epic capacity of 727 litres, made from Kalo Chorio clay, testifies to the agricultural wealth of the area and its inhabitants[375]. In the 'Service Building' (B2200/2300), pithos fragments and a transport amphora set in a bin provided storage facilities. A piece of abraded pumice was also found[376]. An iron grater from this room was certainly not limited in its use to grating cheese on special occasions; the excavators nonetheless think that the identification as a "tyroknestin (Ath. 4,169), might allow us to associate the implement with the social rituals of feasting"[377]. Another cheese grater, which may originally have been fitted on a wooden block, was found in a private context[378].

The presence of a couple of fish hooks made of bronze, at least one of them barbed, and a lead plummet may suggest that people from Azoria went fishing from time to time[379]. The only agricultural tool found so far is an iron hoe from a private dwelling[380].

The large building (ca. 5 × 11 m) excavated in area D300 seems to have been used for pressing olives. A low bench-like tongue wall that divides the room prob-

[373] Haggis *et al.* 2007a, 293–294. Cf. Moritz 1958, 22–23; Sparkes 1962, 126.

[374] Experiments have shown that broad, open vessels are not very efficient for hulling grain; most useful is a high and slender wooden mortar, *e. g.* made from a tree trunk, used with a wooden pestle (Meurers-Balke – Lüning 1990, 97–106).

[375] Haggis *et al.* 2011b, 454. This fabric had been popular already in much earlier times, see above, p. 297.

[376] On the different uses of pumice see Faure 1971, 424–425.

[377] Haggis *et al.* 2007a, 289. Moreover, "the cheese grater is usually thought to be an important item among the Iron Age warrior's personal property, and, by extension, at aristocratic banquets of the 7th century B.C."

[378] Haggis *et al.* 2011b, 469–470.

[379] Azoria 2006; Haggis *et al.* 2011b, 448. Despite the Archaic context and despite the fact that Azoria was not settled in Classical times, their shape has been called typical for the Classical period.

[380] Haggis *et al.* 2011b, 470.


**Figure 8.15:** Olive oil pressing equipment from the Service Building in Azoria (from Haggis *et al.* 2011a, 52 Fig. 34)

ably once supported the three olive press-beds found in the building; niches in the opposite wall are thought to be sockets for press beams. A sizeable press weight and fragments of two others, an oil separation jar and fragmentary large rectangular vats as well as crushed olive stones and residue analysis lend further support to this notion. A drum-shaped block of *sideropetra*, ca. 30 cm in diameter and 25 cm in height, was apparently used as a roller crusher, usable both for olives and for grinding grain (see Fig. 8.15). An olive-oil separator and a small *trapetum mortarium* (lower part of an oil press) were stored in B700, and it is thought that the Service Building and the adjacent D300 formed a complex devoted to all kinds of food processing and preparation[381].

## 8.10.5 Interactions

In Azoria, there are no obvious differences between man-environment interactions in the 7th, the 6th and the early 5th centuries. Modification of the natural terrain took on a new scale in the Archaic Period, with buildings for example being constructed literally within the slope. Building materials were still local, but there

[381] Azoria 2006. See also Haggis *et al.* 2011a, 46–59.

is evidence for a change with time in the preference from dolomite to *sideropetra*. Timbers used for construction were found to have been almost exclusively of olive, which seems to have provided beams of sufficient length. Olive was also the most prominent wood used as fuel, and remains of other tree species are very sparse. This is a clear indication of managed olive orchards, where trees would probably have been coppiced on a regular basis (cf. p. 109). Olive cultivation is further attested by numerous olive pits, and pressing equipment and vessels point to the processing of the crop in the city. The oil would then have been stored in the pithoi found. It his not quite consistent when the excavators conclude: "We imagine that olive-oil processing at Azoria was the purview of the household, most likely on rural estates near the trees or orchards (or within buildings in the city not yet excavated); what we have found so far is archaeological evidence for storage and consumption within both domestic and public buildings. The olives found in household assemblages across the site were no doubt a staple for regular family consumption, but the largest quantities by far come from storerooms in the Communal Dining Building and the Service Building. Thus, we can assume that olives would have had a special place in the political economy of early Cretan cities, where the best arable land would have been given over to subsistence foods such as barley and wheat and small garden crops". They further describe oil production at Azoria as "scaled-up and presumably state-managed" and as "an important part of the physical identity of the civic complex and the urban transformation of the site", the olives possibly coming from publicly owned land or even sacred trees[382].

Grape remains may indicate the production of wine. Whether the transport amphorae conveyed goods from elsewhere to Azoria or would have been used for the export of surplus oil and wine is not known[383]. There is evidence that flax was used to make yarn.

Other crops attested at Azoria and presumably grown by people living here include wheat and barley as well as pulses such as chickpeas and broad beans.

[382] Haggis *et al.* 2011a, 60–61.

[383] It has been shown that in contrast to A. Chaniotis' statements, wine production and possibly export *did* begin before the second half of the 1st century BC (Vogeikoff-Brogan – Apostolakou 2004, 417; cf. Chaniotis 1988b, 67. 71; Harris 1999, 357; Marangou 1999, 270). Cf. also Chaniotis' later comments on this subject (Chaniotis 1999b, 184; Chaniotis 2008, 86. 88–91).

Hackberries, elderberries, figs, poppy seeds and different kinds of nuts, namely almonds, pistachios and pine nuts were all collected or grown.

D. Haggis has pointed out that although a total of nine 'kitchens', both public and private, have been excavated so far, there is very little grain and no primary processing remains at all, and that Azoria—in contrast to EIA Kastro, where chaff abounded on floor deposits—can hence be characterized as a consumer city. He pictures a pattern of dependent farms, the holders of which may well have lived in the city[384].

As for exploitation of animals, it is reasonable to assume that sheep and goats were kept somewhere within the territory of the city; they were certainly eaten and their bones made into tools or craft implements. Pigs, rabbits and cows were also consumed, and in some cases dogs, too. *Agrimia* were apparently hunted and eaten and some cultic meaning may have been attached to them, since their horns seem to have been used as a kind of foundation deposit. Marine shells and fish were consumed, but in far lesser numbers than domestic animals; a small number of fish hooks hints in the same direction.

## 8.11 Classical, Hellenistic and Roman

**Classical Kavousi** In the Classical period, the Kavousi region seems to have been completely depopulated, possibly because people moved into the coastal urban centres of other regions. For about two centuries, there are no signs of human presence at all, and they continue to be hard to come by until the 1st century BC. Less than ten sherds have been recorded in the whole of the region; and while there is some evidence from Azoria, this is very limited both spatially and in terms of quantity (and quality)[385].

The abandonment of Azoria in (or after) the first quarter of the 5th century should probably be viewed in this wider context of settlement patterns, too—maybe Azoria lost ground and people to the growing power of Hierapydna[386].

[384] D. Haggis *pers. comm.* 2011; Haggis *et al.* 2011a, 62. See also Haggis *et al.* 2011b, 474–475.
[385] Haggis 2005, 86.
[386] Haggis *et al.* 2004, 393.

**Hellenistic Azoria** The only Hellenistic traces come from Azoria, which was eventually reoccupied in the 3rd century BC, but neither the extent nor the function of the site are clear. It has been suggested that the hill may have served as the base of a garrison in the course of the interstate rivalries of that period[387]. This hypothesis was probably inspired not only by the geographical advantages of the site but also by the architectural remains: Boyd's workers unearthed three circular structures in the central part of the summit, the two smaller ones concentric and situated off-centre inside a larger (and older) one. A circular cistern with a diameter of 3 m was also recorded[388]. They have been dated to the Hellenistic period and reconstructed as a tower-like building. Roof tiles and other debris found on the slopes are thought to originate from it[389]. Although these structures were supposed to be cleaned and re-studied in the course of the recent Azoria project, they are shown only as weak traces on the published plans and no comments on them have been made[390].

Apart from this, architectural remains from the Hellenistic period at Azoria are not substantial. In at least four cases it seems as though parts of the Archaic settlement were reused in some way. To begin with, there is the so-called Cult Building (B2000/2100) on the South Slope (see Fig. 8.14), above a presumed agora[391]. The function of the building in the Archaic period is totally unknown. Within a small stone-lined pit sunk into the Archaic floor surface stood an amphora, first thought to be an Archaic import but now ascribed to the Hellenistic period. Its bottom had been deliberately removed and the vessel was filled with the bones of a goat of prime meat age. They were not burned, but nonetheless the whole feature appeared to the excavators very much like some kind of sacrifice[392]. The second instance of reuse appeared in the former storage room D300. Here, a new floor was laid out in Hellenistic times within the Archaic walls. A small Archaic square limestone press bed (34 × 34 cm) was set on a low platform, ca. 50 cm above the

[387] Haggis *et al.* 2007a, 305.
[388] Boyd 1901, 150–153. Her methods (which have been called "aggressive" (Haggis *et al.* 2004, 340 footnote 3)) may have been common practice at the time but are nonetheless nothing short of disastrous for all modern research. Cf. above, p. 305.
[389] Haggis 2005, 86.
[390] Haggis *et al.* 2004, 340 footnote 3.
[391] For the 'agora' see Haggis *et al.* 2007a, 245. 269–273; Haggis *et al.* 2007b, 697.
[392] Azoria 2004; Haggis *et al.* 2007a, 270–271.

Hellenistic floor. Exactly below the press's spout was a fragmentary pottery vessel with a hole above the base, apparently serving as an oil-separator[393]. Room B3500 of the Southwest Building had two low benches built from sideropetra, a hearth and a potstand on a clay floor. A burned ovicaprine tibia indicates roasting of meat, and a single young sheep or goat seems to have been butchered or consumed in this room[394].

Finally, the 'Southeast Building' (B1100/1300), which was erected in the Archaic period, maybe as a private habitation, was reused and renovated in the 3rd century BC. Evidence "suggest[s] temporary and make-shift accommodations—perhaps sheds for animals installed long after the disuse and collapse of the Archaic-phase constructions. The dump discovered on the north-east side of B1100 further indicates the nature of the Hellenistic reuse of the lower slopes and terraces"[395]. Finds from this context are not informative for the present study[396].

All in all, the excavators are probably right when they state that "[t]he material recovered in 2003 and 2004 can only tell us that the Hellenistic occupiers had weapons, portable storage vessels in both local and imported amphoras, and the full range of cooking utensils"[397]. Evidence from post-Hellenistic layers suggests an earthquake may have destroyed at least parts of the site[398].

**Roman Kavousi** Remains from the Roman period in the Kavousi region are concentrated around Chordakia and Agios Antonios. Because of the arable soils there, Haggis has suggested "farmhouses dependent on a nucleated settlement in the north Isthmus or perhaps at Kavousi village"[399]. On the hill called Sta Lenika to the south-west of modern Kavousi, a number of buildings identified as small warehouses were constructed at an unknown date within the Roman period; pottery has been attributed to both the early and the late stages of this period[400].

[393] Haggis *et al.* 2007a, 294.
[394] Haggis *et al.* 2011b, 455–457.
[395] Azoria 2003.
[396] Haggis *et al.* 2004, 268–269; Haggis *et al.* 2007a, 266. Hellenistic (or possibly earlier) architecture, though very badly preserved, has also been recorded in the area of A1100 and A800.
[397] Haggis *et al.* 2007a, 305.
[398] Azoria 2003.
[399] Haggis 2005, 87.
[400] Haggis 2005, 125 (site no. 57).

A granary or warehouse was built at Tholos in the 2nd (?) century AD[401]. In contrast to Mochlos and Pacheia Ammos, its sheltered position meant that Tholos (like Pseira) had a geographical advantage for transport[402]. Thus, despite the negligible agricultural potential of its environs, the site grew to ca. 2.5 ha and and was equipped with a spring house and a number of special-function buildings. Domestic architecture on the other hand seems to be lacking. Haggis suggests that Tholos may have been part of the overland transportation route across the Isthmus, possibly even constituting the most important port of Hierapydna on the north coast and part of the 'corn route' and other trade connections from Egypt into the Aegean and to Rome. The structures at Sta Lenika and Tholos are therefore "probably less facilities for the storage and mobilization of local agricultural and pastoral produce for export, than temporary storage and transshipment points for Aegean and eastern Mediterranean goods falling within the sphere of Hierapytna's influence or direct control"[403]. A further indication of the trading activities is a large number of Roman (1st century AD(?)) amphorae three metres below the present water-table at Agriomandra[404].

Kavousi village, Agios Antonios, Chordakia and Lakkos Ambeliou were also occupied again by the 1st century BC[405]. The advantage of the location of Chordakia are the alluvial phyllite soils nearby, now as in the past: there was a Late Roman settlement at Kephalolimnos where besides pottery and stone tools, both a basin for crushing olives (D ca. 1.8 m) and a millstone (D ca. 1 m) were found[406].

At least from the end of the 2nd century AD onwards, the Kavousi region was probably part of the territory of Hierapydna[407]. Hierapydna also controlled Oleros and thereby important routes through the mountains to the northern Isthmus. In

[401] Haggis 2005, 90–93 (site no. 1). Cf. Haggis 1996b, 199. See also Sanders 1982, 140 (no. 2/18). Depicted in Muhly – Sikla 2000, 92–93.

[402] Haggis 1996a, 422.

[403] Haggis 1996a, 416. 419–421; Haggis 1996b; Haggis 2005, 87. The trade route from Egypt would normally have led along the south coast of Crete, so that Tholos may have been a port for ships meeting difficult winds driving them too far north (Haggis 1996b).

[404] Haggis 1996a, 418; Haggis 1996b, 189. For the importance of trade in Roman Crete see also Chaniotis 2008, 86–87. 91 (with reference to Tholos).

[405] Kavousi village: Haggis 2005, 107–109 (site no. 24). Agios Antonios: Haggis 2005, 95–98 (site no. 5). Chordakia: Haggis 2005, 110–112 (site no. 28). Lakkos Ambeliou: Haggis 2005, 119–120 (site no. 40–42).

[406] Haggis 2005, 117–118 (site no. 37); Haggis 2006, 221.

[407] Haggis 1996a, 416; Haggis 2005, 87 with references.

that century, it seems that at least some people reestablished themselves in the mountains around Kavousi, while others lived in farmhouses around the coastal plain where they processed olives and constructed both cisterns and cemeteries nearby[408]. It is possible that the dense Late Roman occupation in fact utilized fully the maximum carrying capacity of this region, even though it was apparently not felt necessary to exploit the good soils and water resources of Mount Papoura and the Avgo Valley; these seem to have lain completely abandoned from the Early Iron Age to the Byzantine period[409].

### 8.11.1 Interactions

Environmental evidence from after about 480 BC is very sparse. As stated above, the region was apparently virtually abandoned in the Classical period. For Hellenistic times, all that can be said is that apparently goats were sacrificed and olives pressed at Azoria.

It seems that during the Roman period, at least some of the arable soils of the region were farmed. A millstone and equipment for the pressing of olives testifies to the processing of the crops. The possible granary or warehouse at the natural harbour at Tholos, however, may not have been used for local produce, but, as has been suggested, for overseas trade in grain and other commodities from Egypt. Agricultural activities continued into Late Roman times, when cisterns were constructed and may have helped overcome some of the natural limitations of water supply in the area.

## 8.12 Summary

The Kavousi area does not represent a fully-blown upland region, but rather the steep flank of a mountain range with a number of foothills above a coastal plain, with site elevations ranging from sea level to 800 m above it. Although many sites mentioned here are hence strictly speaking not mountain settlements, it does not seem sensible to leave them out: they are part of the overall settlement pattern

[408] Haggis 1996a, 416.
[409] Haggis 2005, 87.

of this region and would surely have interacted in some way. Moreover, without them the shift to elevated locations in LM IIIC would be less evident: it is these lowland sites that are being abandoned. Besides, Kavousi offers an almost unique wealth of data from survey, excavation and geological analysis, thereby enabling the emergence of a much more detailed picture of man-environment interactions and how they changed over the centuries and indeed the millennia.

The soils of the area were extensively used for agriculture; because of the nature of the terrain, this in most cases required the help of terraces. The Kampos was mostly too dry; the only two locations that were suitable for agriculture were exploited both in Minoan and in Roman times.

In the Final Neolithic, a couple of locations were used for the first time that would remain popular for a long time, albeit not necessarily continually: Kavousi village, Chondrovolakes, Vronda and Azoria. All but the first-mentioned are situated in elevated locations, and all have easy access to water and agricultural land. From FNL Azoria there is evidence for pig-keeping. Local stones and clays were used for tools and pots.

Some Final Neolithic sites continued to be occupied in the Early Bronze Age. Although a number of them are located on hills, there is also evidence for settlement close to the coast, as at Tholos and Alykomouri, making it unlikely that elevated locations were chosen for reasons of security. Seafood supplemented the agricultural food basis. Caves may have been used for burials, though solid evidence is meagre.

In the later Prepalatial period, settlement, seemingly in the form of isolated farmsteads, seems to have expanded into previously unexploited areas up to 800 m height. Moreover, the Chrysokamino 'Metallurgical Site' testifies to the importance of metal working, since the location would not have offered the possibility of self-sufficient subsistence and hence must have been a special function-site supported from elsewhere. Marine resources may have been exploited to a greater extent than at sites further inland, maybe to make up for lack of meat. Olive press cake rather than wood may have been used for fuel, and vines and barley were cultivated somewhere in the region.

In the Protopalatial period, it seems that settlement locations were chosen with a view to arable land nearby, and the onset of an unstable climatic situation may have encouraged the emergence of a new pattern. Whereas the Pre- and Protopalatial settlement pattern consisted of some villages and lots of dispersed hamlets or single houses, in the Neopalatial period it was dominated by larger nucleated settlements in the plain and 'megalithic farmsteads' in strategic positions, whose relation to and function in the palatial system of production is not clear. Nucleation concentrated on the coastal plains rather than elevated locations. This contrasts to some extent with the following period (LM IIIA-LM IIIB), which not only saw a severe decrease in settlement, but also a shift of activity away from the coast. This move may have been encouraged by climatic conditions which had become too dry for the soils in the coastal strip. Ovicaprids, pigs and cattle were kept, but wild and marine animals were also consumed.

The trend away from the coast becomes even more pronounced in LM IIIC; what is surprising is that the number of settlements grows. Elevations range from 300 to 700 metres; the best-explored sites are Azoria (by far the largest of them all), Vronda and the less easily accessible Kastro. In many cases, the architecture had to follow or incorporate the rocky terrain. Faunal assemblages have been published from Vronda and Kastro. The majority of livestock were sheep (and goats), which were seemingly killed for meat and bone marrow, but pigs, cattle and mule or donkey were also kept and wild animals such as fallow deer, hare and *agrimi* were hunted. At least occasionally, people consumed badgers and dogs. It appears highly unlikely that the change in settlement pattern was motivated by environmental factors, whereas there is a strong case for political unrest.

By the time of Late Geometric pottery, Vronda had been given up as a settlement but was reused as a cemetery. At the Kastro, terraces were now built to actively model the terrain according to the needs of the inhabitants. Cattle consumption continued at the Kastro despite the difficulties of topography.

In the Archaic period, the picture of man-environment interactions becomes more detailed: Kastro and Vronda had both gone out of use, and settlement seems to have nucleated at Azoria. Olive trees provided not only valuable calories, but also building material and fuel, probably from coppicing. Cereals (wheat and barley), grapes, pulses, figs, nuts and poppy also contributed to the diet; the meat of sheep, goats, pigs, cattle, *agrimia* and, though probably rarely, dogs was consumed too, and marine resources were exploited, albeit on a limited scale.

It is not clear why this early polis[410] was abandoned with the rest of the region before the Classical period; the pull of bigger (coastal) cities has been suggested, and there is no evidence for environmental deterioration. Occupation remained scanty until Roman times, though there may have been a small fortress at Azoria in the 3rd century BC and some renewed oil-production, which obviously also bears implications about land use. The Roman period probably saw some agricultural activities of patches of fertile soil, but this was seemingly unconnected to the more important role of the area as the northern end of the Ierapetra isthmus and hence for trade or transport: storehouses and some sort of functional harbour buildings were constructed at and around Tholos, on the coast—the mountainous hinterland had seemingly lost its value.

[410] For the problems of this term see Wallace 2010, 340–341; Erickson 2010, 248.

# Chapter 9

# The Praisos and Ziros Uplands

Despite their location in the hinterland of two important centres—the palace at Kato Zakros in the Bronze Age to the east, the polis of Praisos in Archaic and Classical times to the north—the tablelands around the village of Ziros in the very east of Crete never received attention in this respect. Their economic potential in times past has not been assessed, although today, they are one of Crete's main wine-growing regions[1]. The name Ziros is said to derive from εἰς ἄρον > Ζήρον > Ζήρος, "cultivable land, mountain plain", of which T. A. B. Spratt's 'Xeros' may be some dialectal variation[2]. The mountains are made of limestone, which is very vulnerable to solution and therefore has a strong karstic character. Dolines ranging from about 2–18 m in diameter are common[3] (see Fig. 9.1). Information on this area is mostly cursory and never backed up by thorough excavation. Two upland plains, Lamnoni (ca. 40 ha; 650 m ASL) and Katelionas (ca. 520 m ASL), have been fieldwalked by Keith Branigan[4]. Unfortunately, the report and interpretation of the project are not always consistent, which makes it even more difficult to coax any valuable information about man-environment interactions from the meagre data. The site of the ancient city of Praisos on the northern foothills of the Ziros

[1]Rackham – Moody 1996, 78.
[2]Spratt 1865a, 174; Tzedakis *et al.* 1989, 48. The latter apparently think of the verb ἀρόω, to plough, to till, to sow.
[3]Branigan 1998, 23. 31–32.
[4]Branigan 1998; Branigan 1999. The site numbers given here are Branigan's.

**Figure 9.1:** The landscape of the Ziros uplands (May 2009; photo courtesy of Torben Keßler)

mountains has been explored early in the 20$^{th}$ century and recently subjected to an intensive survey together with its hinterland[5].

## 9.1 Neolithic

The bulk of evidence comes from the two upland plains investigated by K. Branigan; it cannot be ruled out that this is due to a lack of research rather than of Neolithic activity. In Lamnoni, evidence for Neolithic settlement, arguably a small hamlet (L30A) and two single farmsteads (L40A and L65A), were found, but not on the farmable basin floor. This may be either because a 'new fill' was washed from the

[5]Whitley *et al.* 1995; Whitley *et al.* 1999; Whitley 2006.

slopes[6], rendering earlier sites invisible (but also enhancing the fertility of the soil in the basin), or because of deliberate positioning of settlements off arable land, a pattern that was followed in the later history of Lamnoni and also known from elsewhere in Crete[7]. K. Branigan however seems to favour the former theory—he does not believe that the settlers engaged much in agriculture at all because querns and rubbers are missing from the Neolithic survey assemblage. He adds: "At this altitude, and at a time when neither the grape nor the olive was an established domesticated resource, this is hardly surprising"[8]. I cannot quite follow his reasoning however, since people must have eaten, and that means that unless they stuck to a 'Mesolithic' economy or relied heavily on imports, they must have cultivated cereals and pulses. They cannot have lived on stock-rearing alone, although Branigan seems to suggest they did. On the other hand, he himself conjectures that the floor of the basin "was probably always reserved" for cultivation and singles out one of the sites as not only being close to a water source, but also having "some of best arable land in the basin immediately adjacent"[9]. What is more, I do not see how the absence of rubbers from a survey could be a valid argument against farming[10]. To explain the scarcity of evidence, seasonal occupation, which he only mentions in passing[11], is an option, but there is as yet no proof that seasonal transhumance existed in the Neolithic (see chapter 10). In addition, according to Branigan the pottery and lack of obsidian suggest limited contact with the coast, though like all survey results this must be taken with a pinch of salt[12].

One concentration of sherds was recorded on top of the central hill, which rises about 50 m above the valley floor, in an unsheltered position and with no water

[6]K. Branigan dates this erosion sequence to ca. 1500 BC—shockingly not on the basis of datable objects, but merely because of the scarcity of Neolithic traces, leading him to argue that only from MM onwards human activity was on a large enough scale to trigger off erosion (Branigan 1998, 52). This is, to say the least, a highly questionable argument.

[7]Branigan 1998, 52–53. 55. Building on arable land was avoided also, for example, in Lasithi and in the coastal plain of Kavousi.

[8]Branigan 1998, 81.

[9]Branigan 1998, 52; Branigan 1999, 61. Cf. also Branigan 1998, 64.

[10]This although C. N. Runnels claims it is possible to identify querns even from small pieces (Runnels 1994, 165–166). A couple of querns were found during the Sphakia survey, see the database in Nixon *et al.* 2000. See also Beckmann 2012, 308.

[11]Branigan 1999, 62.

[12]Branigan 1999, 64. For obsidian see discussion on p. 275.

available nearby, and has been interpreted as an open-air shrine (L23A). This may have been the "common ritual focus" of both Lamnoni and Katelionas[13].

Also in Lamnoni, Krzysztof Nowicki recorded what he described as one of the largest FNL II settlements in the Sitia peninsula—without reference to K. Branigan, who, although he recorded FNL sherds in a rock shelter in the same spur (L44A), seems to have missed the site[14].

In the Katelionas basin, concentrations of sherds are less obvious to identify. A Late Neolithic settlement of 2000 $m^2$ extent, with five to ten houses and 25 to 50 inhabitants, has been suggested by K. Branigan on the basis of a sherd scatter. Substantial amounts of Neolithic sherds were recovered from around the hill of Stavromenos, right in the middle of the study area. Human activities in this area "may have included agriculture as well as settlement, since the soils around the foot of Stavromenos seem reasonably deep and are today utilized for grapes and fruit trees"[15].

The marked difference between the ceramic assemblages of the two basins are interpreted by Branigan to have been brought about by the movement of the community from one basin to the other in the course of time. He suggests that people at first settled both areas but then gave up Lamnoni, eventually leaving the region completely before the end of the Neolithic[16]. He thinks that in this particular case people failed in their attempt to thrive permanently in uplands above 500 m, but contemporary settlers could well have been more successful even in the same area of Crete. This interpretation can at least be questioned if Nowicki is right about the large FNL II settlement in Lamnoni. It seems to me that contradicting results from t wo one-man-surveys are no firm basis for a history of the Ziros uplands.

Apart from these open air sites, caves were seemingly used, too. Neolithic sherds are reported from a cave (Keramos/Latsida) above a steep slope, 1.5 km east of Chametoulo; animal and human bones were also present, but are of uncertain

[13] Branigan 1998, 57. 59 Fig. 18. 67. 81; Branigan 1999, 61. A figurine has also been found. He compares the site to Atsipades, where traces of Neolithic (cult) activity have been found; however, in my view the landscape setting of Atsipades has a very different character.

[14] Nowicki 2002, 26. Cf. Branigan 1998, 59–60 with Fig. 19.

[15] Branigan 1998, 61.

[16] Branigan 1998, 84. For connecting paths between settlement pockets in eastern Crete and for potential site territories see Tomkins *et al.* Fig. 2.

date. The Skales cave near Nea Praisos also has traces of Neolithic use. Near Magasa (now Vrisidi) there is a rockshelter with Neolithic stone tools (among them "celts"), bone awls, obsidian, charcoal and a "millstone". Lots of sheep and goat bones led R. M. Dawkins to speak of a "prevailingly pastoral people". Not far away an L-shaped house dated to the same time ("early in the Neolithic period") was unearthed. Here, besides more stone tools and little pottery, three mill stone said to be designed for rotation, not for rubbing like on a quern, were found, each with a diameter of ca. 30 cm. In view of the elevation (ca. 500 m) and distance from the sea (ca. 7 km), it is noteworthy that several types of seashells were present, albeit in seemingly small numbers: broken triton shells, limpet, oyster and *Murex trunculus*[17]. Two further sites have been identified to the south-west of modern Ziros: one not far from Mesa Apidi, in a location called Rizoviglo, on a steep conical hill, where a circuit wall and FNL II pottery are reported, the other one on a summit called Patela, closer to Ziros village. K. Nowicki recorded another "non-defensible" site 800 metres to the north of Patela[18]. Further north, Kalamafki Kypia was also occupied in this period, as were two other upland sites in the Praisos area: Manoulis' Metochi, on an outcrop above a gorge, with (nowadays) "excellent if limited agricultural possibilities" and good water supply, and Platyvola, which also overlooks a good part of the surrounding landscape[19]. These topographical characteristics, the outlook and defence qualities, have been stressed as the decisive factors in the choice of settlement location.

On the western flank of the study area at Zakanthos in the Skalia polje is another FNL II site, interpreted as an individual farmstead or hamlet—"one of many of this kind scattered in the East Siteia plateau"[20].

Fear of floods or attacks in the coastal areas and/or population pressure in the plain have been suggested as incentives to move to the mountains in the Final Neolithic[21]. Evidence for all of these scenarios is slight. Whatever it was that prompted people to settle the Ziros uplands, its significance seems to have dimin-

[17]Keramos/Latsida: Faure 1969, 194. Skales: Rutkowski 1985b, 120. Magasa: Dawkins 1905, 260–268.
[18]Nowicki 2002, 25–27. For Rizoviglo see also Nowicki 2012, 144.
[19]Whitley *et al.* 1999, 224–228. 242.
[20]Nowicki 2002, 23.
[21]Raids and floods: Faure 1965, 29. Attacks: Nowicki 2008a, 72–76; Nowicki 2008b. Population pressure: Branigan 1998, 81.

ished in the following centuries, since the sites were apparently abandoned in the Early Minoan period "for greener pastures"[22]—no EM sherds were found in the area[23].

## 9.2 Middle and Late Minoan

In the Middle and Late Bronze Age the whole region was dotted with settlements and sites, even though it has to be borne in mind that dating is very imprecise and not all of them necessarily coexisted at the same time. Even in the intensively surveyed areas of Katelionas, Lamnoni and Praisos, the date range is only very broadly given as "MM I-LM I", equalling a span of 400–500 years[24]. In Katelionas, the sherd scatters seem to indicate a village at the foot of the Stavromenos hill, another one 600 m to the south and two single farmsteads. The proximity of two nucleated sites may seem surprising, but, as K. Branigan himself acknowledges, the very rough character of the survey chronology would easily allow for two successive rather than contemporary locations[25]. The Stavromenos hill rises about 30 m above the surrounding plain; the natural route through the basin passes by its foot. A Minoan structure on its summit which was first recorded by Evans and Bosanquet was identified as one of the guard posts of the Minoan road or route system by Y. Tzedakis and his colleagues, while Branigan thinks it may have been a Minoan 'villa'[26]. The "peak sanctuary" on the summit of Xykephalo (756 m ASL[27]) on the other hand overlooks the Katelionas basin from the south-east. The cult place "was certainly in use during the protopalatial period", although it is

[22] Whitley *et al.* 1999, 227. I wonder whether this is to be taken literally (cf. Fig. 9.1).

[23] A complete copper flat axe found in Katelionas is said to resemble most closely the EM I examples from Agia Photia however (Branigan 1998, 84). Another possible exception may be the Keramos/Latsida cave east of modern Chametoulo, from which EM sherds have been reported, see Faure 1969, 194.

[24] See Branigan 1998, 65 Table 2; Whitley *et al.* 1999, 228.

[25] Branigan 1998, 85.

[26] Tzedakis *et al.* 1989, 66; Branigan 1998, 87. On this type of site see also Beckmann 2012, 85–91.

[27] For a comment on the various wrong heights given for this site see Schlager 1995, 18 with footnote 137.

not clear for how long it was frequented afterwards. Human and animal figurines have been found; P. Faure saw cattle horns when he visited the site[28].

As for Lamnoni, traces of MM I-LM I settlement are not substantial, but a Neolithic cemetery was enlarged in Minoan times, and Branigan thinks that the earlier burials may have been discovered by the Bronze Age people and "the traditional 'sanctity' of the place [was] established". The burial ground was in use at least until LM IIIA. It is not clear whether the basin was still settled at this point[29]. Middle Minoan material was also found at the eastern edge of the Ziros polje, in a location called Pyrgales, 800 m south of Pentalitros[30].

These findings are well in keeping with those from the area around Praisos, where fieldwalking results indicate that "[u]pland use of the area [. . . ] begins again only in MM II at the latest, consisting of 'guard towers' and one ritual site". Dating problems however prevail here, too, so that four recorded sites can only be roughly assigned to MM-LM I. Some of them are marked by walls made from huge blocks, such as at the now partly destroyed 'Megalithic House' at Agios Konstantinos (see Fig. 9.2), where a rock-cut wine press was seen by early explorers[31]. Although the number of recordable sites is not large, finds of singular sherds over the whole area may indicate that human presence was more widespread.

The settlement pattern of the Praisos area in the First Palace Period seems to have been dispersed rather than nucleated, although it is not clear how many sites the survey might have missed due to reoccupation of earlier habitations or through modern destruction by bulldozing[32].

The settled landscape incorporates a number of peak sanctuaries, marking its ritual aspect (for peak sanctuaries see chapter 11). Besides the aforementioned Xykephalo, there is one with evidence for use in MM (I) times and figurines of sheep and cattle on the Plagia hill, ca. 820 m ASL, south-east of Ziros. Although "Faure's

[28] Faure 1967, 119. 121; Rutkowski 1988, 91 (with further references); Branigan 1998, 74. 87. The identification as a cult place is confirmed by Nowicki 2012, 140.

[29] Branigan 1998, 65. 87.

[30] Faure 1965, 28. He calls the structure a "villa", but this term may be misleading with regard to its connotations in present usage. This may be the "poste 'administrative'" mentioned in Tzedakis *et al.* 1989, 75 (G 28 bis). J. Reid argued for "an expansion into the pastoral high country during MM II" on the grounds of an alleged road system and also quotes the "continuity of practice" as evidence (Reid 2007, 81. 139).

[31] Whitley *et al.* 1999, 229–230 with references.

[32] Whitley *et al.* 1999, 234.

version of the finds [...] was probably entirely based on data from local informants and could not be verified by later investigations", K. Nowicki nonetheless thinks it likely that a peak sanctuary existed here. He also claims Rizoviglo, previously known for its Neolithic settlement, as a ritual place related to a site in the plain[33]. A third cult place is reported not far to the east at Korphi tou Mare, at almost equal height (798 m). Unfortunately, the destruction of both sites for military purposes in the 20th century and the current use of the area make further research for more precise dating or visual connections impossible[34]. Another peak sanctuary was situated on the eastern flank of the mountains, on a summit known as Vigla Zakrou (ca. 710 m ASL), about 2 km south-west of Epano Zakros. MM sherds are reported from the nearby upland plain, possibly marking a related settlement[35]. MM III, LM I and LM III pottery was seen 200 m north-east of Chametoulo in a location called Dochi (*Δοχή*); a cultic function has tentatively been suggested[36].

A seemingly fortified stronghold on the south-eastern flank of the hill called Agridomouri, south of the hamlet Chametoulo, has been assigned to the Old Palace Period. Its distinctly different design from the 'guardhouses' of the road system could hint at sociopolitical complexity (territorial control)[37]. On the other hand, a fortified rock plateau situated roughly between the modern villages of Kalo Chorio and Chametoulo may have functioned as a '*vigla*' or watch post for the Minoan road system[38]. Nearby is a site conjectured to be a megalithic farmstead of the

[33] Nowicki 2012, 140. 142. 144–145.

[34] Alexiou – Davaras 1964, 442; Faure 1965, 28 (mentioning MM and SubM pottery); Faure 1967, 119. 128 footnote 1; Leekley – Noyes 1975, 72; Schlager 1991, 5 footnote 14; Schlager 1995, 18; Jones 1999, 3. 77; map: Nowicki 2007, 14. See also Nowicki 2012, 142. For two other sites on the peaks of Trachilas which do not seem to have been peak sanctuaries see Schlager 1995, 2–3 and Nowicki 2012, 142 for a new interpretation.

[35] Faure 1967, 118; Schlager 1995, 17.

[36] Pendlebury 1939, 385; Schlager 1997, 41–46. With respect to the latter reference, for reasons of convenience it will always be cited as "Schlager 1997", even though the individual paragraphs were written by other people; they are simply too numerous to list separately.

[37] Schlager 1997, 47–54; Schlager 1999, 175; Schlager 2000, 182. Cf. Schlager 1997, 30–31. He envisages a timeless scenario: "When, in the first half of the 2nd millenium B.C., the expanding political power of Knossos went hand in hand with far reaching religious demands and an ever refined courtly life-style, in the far east of Crete a handful of stubborn, freedom-loving country people built a strong castle to defend themselves against attack from whereever [*sic!*] it may have come, and to oppose any attempt to suppress their long established independence" (Schlager 1999, 176 footnote 39). This seems to contradict somewhat his earlier ideas in Schlager 1997, 54.

[38] M. Tsipopoulou's conclusions concerning the lack of palatial control in eastern Crete contradict this idea (Tsipopoulou 1995, 191–192).

Old Palace Period, overlooking an arable karstic doline at ca. 650 m ASL; a burial ground may be associated. The toponym *'δάσος'* (forest) could point to the state or perception of vegetation in earlier times[39].

A rather enigmatic "tetragonal structure" on a rocky slope at Anemomylia, at the eastern edge of the Ziros polje, has been dated to LM I; a tomb of the same period under a rock at Plakospilios north-west of Ziros[40] may indicate a certain permanence of settlement, even though I am not entirely convinced by this argument.

No material from the Ziros tablelands has been assigned to LM II[41], but this need not imply abandonment of the region at this time (cf. for example Lasithi, p. 246). The presence of definite LM III material, for example in the Lamnoni burial ground or on the "acropolis" at Pentalitros at the eastern edge of the Ziros plain[42] could point to continuity in the settlement in these uplands. People may have lived in a hamlet to the west of modern Phonias; whether the settlement at Stalos, north of Agia Triada, also dates to this or to an earlier phase cannot be discerned[43]. According to the results of the Praisos survey, the uplands around the later polis show "increasing evidence for habitation" from LM IIIA onwards, whereas at later Praisos itself, there seems to have been "a small, defended or at least defensible, Late Minoan acropolis site, 50 by 100 m in extent"[44]. The 'Megalithic House' at Agios Konstantinos was inhabited for the second time in LM IIIA-B[45].

The Praisos area has produced very few signs of Neopalatial occupation; unfortunately, a comparison with the Ziros survey is difficult because of the broad pottery scheme used there[46].

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[39] Schlager 1997, 19–31; Schlager 2000, 179; but cf. Rackham's assessment of place-names, p. 97.
[40] Faure 1965, 28–29.
[41] Cf. however Tsipopoulou 1995, 192.
[42] Faure 1965, 28. He also reported LM III sherds from the Keramos/Latsida cave near Chametoulo and from the Tripiti cave near Katelionas, see Faure 1969, 194. 196. LM IIIA-B habitation and burials were found at Agios Georgios and Sklavi, at the narrowest part of the mountain range (Tsipopoulou 1995, 189–190).
[43] Faure 1965, 28.
[44] Whitley *et al.* 1995, 428; Whitley 2006, 600. For the upland 'habitation' he cites only tombs however. Cf. Whitley *et al.* 1999, 236–238.
[45] Whitley *et al.* 1999, 235.
[46] Whitley *et al.* 1999, 234; Whitley 2006, 611–612.

## 9.3 LM IIIC and Early Iron Age

The Bronze Age/Iron Age transition in the Ziros uplands is badly documented. Only few LM IIIC settlements are known so far in this area, but it has been suggested that most sites may still await discovery[47]. P. Faure reported LM III traces at Plakalona between Chandras and Nea Praisos (formerly Vaveli), above a spring[48], but the "primary defensible settlement of the Chandras-Armeni polje"[49] is conjectured to have been the one at Chandras Voila Kastri, a hilltop (absolute height 600 m ASL) also favoured by the Venetians for a little stronghold, even though evidence is rather sparse. A possible isolated grave was recorded nearby[50]. According to M. Tsipopoulou, tholos tombs are restricted to LM IIIC exclusively so that the two isolated ones found near Ziros and to the south-west of Katsoulianos can be assigned to this period despite seemingly inconclusive ceramic evidence[51]. Another tholos stood on a hill called Patela, on the southern side of a valley close to the modern village Sphakia. Remains of a substantial building were seen next to it, and both structures may be connected to the LM IIIC settlement on an oblong conical peak called Kastri (ca. 500 m ASL), to the north-east of the valley. A number of springs can be found in the vicinity[52].

A potentially bigger settlement was located on three rocky hills at Kypia (ca. 400 m ASL, see Fig. 9.2), about 700 m to the south of modern Kalamafki (nowadays a seasonal (winter) settlement), on which Neolithic activity has been detected. Walls built from *sideropetra* blocks are attributed to the Late Bronze Age and at least some of them belonged to buildings of substantial size (10 × 16 m),

[47] Nowicki 2000, 50. 61. He expects a defensible site in the Ziros polje, although Branigan's survey did not yield any LM IIIC sherds.

[48] Faure 1962, 39; Tsipopoulou 1995, 184; Nowicki 2000, 58.

[49] Nowicki 2000, 61. For a photo of the polje see Nowicki 2012, 144.

[50] Tsipopoulou 1995, 186; Nowicki 2000, 60–61. For 'refuge settlements' in this area see Tsipopoulou 1995, 187: "Two phenomena are distinguished, both in chronological and typological terms: the creation, in LM IIIC, of settlements on relatively accessible sites, caused by a fear of piracy; the abandonment of many of these in favour of more isolated mountain habitations during Protogeometric due to a menace arriving by land, that is, from people racially distinguished from the Eteocretans, namely the Dorians." This, she says, is K. Nowicki's view—and it "must be underlined that archaeological evidence necessary to support this reconstruction is lacking" (Tsipopoulou 1995, 190).

[51] Alexiou 1963, 406; Alexiou – Davaras 1964, 442; Faure 1965, 28; Tsipopoulou 1995, 191.

[52] Nowicki 2000, 55–56.

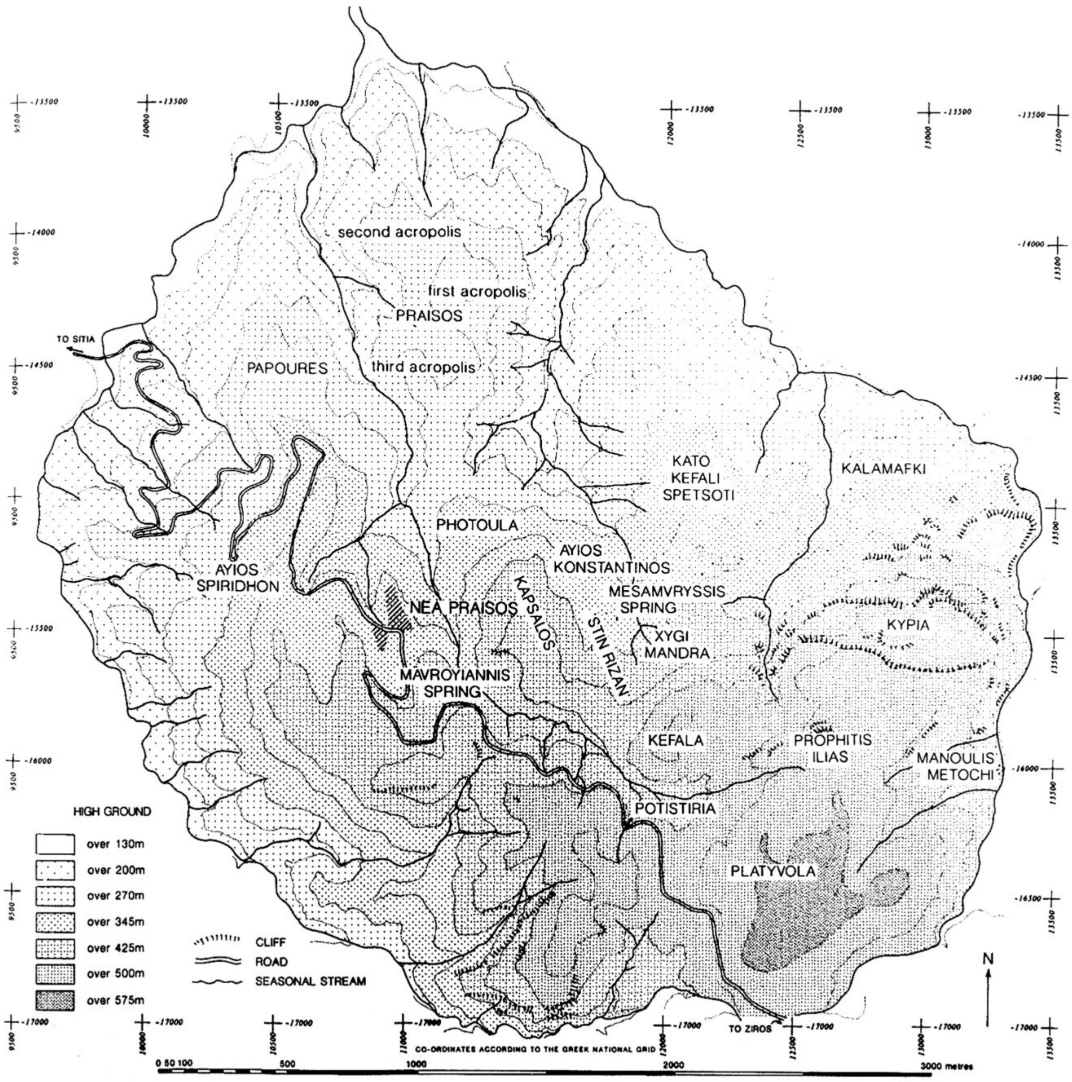


**Figure 9.2:** Map of the Praisos area (from Whitley *et al.* 1999, 219 Fig. 2)

the function of which is not clear[53]. Environmental conditions do not make this a particularly favourable location: "No-one who has stood here in the wind could think of this as a comfortable place to live"[54]. However, "[a]s with many other large refuge sites of the LM IIIC period certain features [of the settlement] stand out from afar"[55], casting some doubt on the 'refuge' idea, which one would expect to result in hidden, invisible settlements (though obviously this depends on from where the threat comes). There is a quick walking connection to well-watered arable land at Manoulis' Metochi (where LM IIIC sherds indicate human activity at this time), so that subsistence would have rested on a good basis[56]. The pottery from Kypia suggests LM IIIC and PG as the main phases of settlement; if all three hills were occupied at the same time, this would represent the biggest 'defensible settlement' known so far[57]. At any rate it was at the time probably a more important settlement than the 'First Acropolis' (450 m ASL; see Fig. 9.3) of what was to become Praisos[58]; later, the tables turned and Kypia was given up by 900 BC. Praisos only developed into an established settlement by the times of Geometric pottery, when there seems to have been a sanctuary on 'Altar Hill'[59].

## 9.4 Archaic and Classical

As for sites in this eastern part of Crete, uninterrupted settlement from LM IIIC into Protogeometric seems doubtful[60]. Protogeometric pottery seems to be something of a rarity in the assemblage. A settlement at Kato Stalos near the south entrance to the Ziros polje has been tentatively dated to PG; a number of circular tombs (of unknown date) are located nearby to the west[61]. The sanctuary on Mount Plagia is said to have continued (from Middle Minoan) into Subminoan

[53] Whitley *et al.* 1999, 239–240.
[54] Whitley 2006, 604.
[55] Whitley *et al.* 1999, 238.
[56] Whitley *et al.* 1999, 242. 246–247. See also Wallace 2010, 72.
[57] Whitley 1998, 33–35; Nowicki 2000, 56–58; Whitley 2006, 601. See Wallace 2010, 248 for a critical assessment of the reasons given for the choice of location.
[58] Whitley *et al.* 1999, 244–245; Nowicki 2000, 58–59.
[59] For the Protogeometric to Orientalizing finds see Whitley *et al.* 1999, 247–249.
[60] Tsipopoulou 1995, 190.
[61] Faure 1965, 28.

**Figure 9.3:** The First Acropolis at Praisos from north-west, with the so-called 'Almond Tree House' centre left (April 2009; photo courtesy of Torben Keßler)

or even Protogeometric times[62]. Traces of Archaic activity in the area do not abound—since "[n]o pottery from the survey can be firmly attributed to the period between the twelfth and fourth centuries BC"[63], the term 'Graeco-Roman' is applied by K. Branigan to material from the 3rd century BC to the 9th century AD. However, an Austrian team has located an Archaic hamlet at the north-western entrance to the Ziros polje not far from modern Chandras. A second one may be connected with a 7th century sanctuary in a locality named Moulas or *στου Μουλά*, on a limestone outcrop at the foot of a hill near the abandoned village of Stalos. Besides wall remains and pottery, a number of fragmented relief pinakes were found, some of which seem to represent a naked female figure, leading N. Schlager

[62]Faure 1965, 28.
[63]Branigan 1998, 87.

to suggest an "oriental" Aphrodite as the worshipped deity[64]. These findings certainly strengthen the case of human presence, and if economical use of the upland plains generated any surplus, there may have been a port at Xerokampos—often, but without any hard evidence, identified with ancient Ampelos—which could have aided the distribution of mountain produce to other parts of Crete[65]. S. Wallace however has connected the settlements in Ziros with the city of Praisos, the area around which has yielded much more Archaic material than the upland plains[66].

Although next to nothing is known about its emergence, Praisos became a flourishing polis, according to Strabon (10,4,6 (c475-c476); 10,4,12) the home of the Eteocretans, who were proud of their distinct collective identity[67]. It is surrounded by marly hills, offering comparatively good soil for grain and olive cultivation[68]. The existence of (modern) *alonia* show that these resources were exploited, although as elsewhere, cereal growing has now ceased and only olives are cultivated on a large scale; the land is otherwise used as pasture. Maybe the extremely rugged character of the terrain, which is stressed by Whitley, has contributed to this change[69]. Wool, if not sheep, was present in antiquity too: More than twenty loom weights have been found in the *asty*[70], which is not a large number until one takes into account that they come from a surface survey rather than an excavation. Recent excavation produced another 42 loom weights, mostly pyramidical, and a smaller number of spindle whorls, from Late Archaic to Roman contexts[71]. Although the location may have been attractive economically, water supply was rather laborious, since the two closest springs both required a walk of more than 700 metres over hilly terrain. A number of cisterns were constructed to ease this problem, though it is not clear whether they represent private initiatives or com-

[64] Faure 1965, 29; Schlager 1991, 20–23. I wonder whether Chandras could be the "fort" mentioned by Arthur Evans in his diary of 1898 (*non vidi*; see Pendlebury 1939, 300 under "Zyros").
[65] Faure 1965, 29. For a discussion of Ampelos see Schlager 1992, 12–14.
[66] Wallace 2010, 334; Erickson 2010, 246.
[67] The Eteocretans ('real Cretans') as such, but without mention of Praisos, make their first appearance in Homer (Od. 19,176). See Whitley 1998, 27; Sjögren 2008, 60.
[68] Lehmann 1939, 223.
[69] Whitley *et al.* 1999, 221–222. The exceptional quality of the wheat grown in this region was emphasized by T. A. B. Spratt, and he wondered whether it was down to the special properties of the soil or to a special type of grain (Spratt 1865a, 175).
[70] Whitley *et al.* 1999, 253.
[71] Whitley 2011, 19.

munal enterprises[72]. A hilltop shrine seems to have been located on Prophitis Ilias (ca. 600 m ASL), 2.5 km to the south-east of the city: there are indications for the presence of a temple; F. Halbherr found burnt animal bones and horns of oxen and rams, and cult activities are also said to be attested by two terracotta plaques and a large number of Archaic-Classical fragments of unparalleled shape, attributed to drinking vessels. In addition, two springs seem also to have had some cultic significance, which is said to be so unusual that it can be attributed to the 'Eteocretan' oddnesses of the Praisians[73]. Two more sanctuaries are known, one of them has been called "suburban" and is situated near a spring[74].

## 9.5 Hellenistic and Roman

Praisos reached its greatest extent (16 ha) in the 4$^{\text{th}}$ century BC[75] and some of its coins show a bee, others a (wild?) goat on the reverse[76] (see Fig. 9.4). Adjusting to the contours of the hill, foundations of houses were cut into the rock; the walls would have been built from stone and timber[77]. The so-called Tree House, a fine large building dating to the 4$^{\text{th}}$–2$^{\text{nd}}$ century BC, has been suggested to have been a public edifice rather than a private dwelling "of so remote and poor a city"[78] (see Fig. 9.3). It is an interesting observation that "the position of the largest room, 9, at the northern angle of the building, is significant of a desire to escape from the sun"[79]. A stone olive press was found in the building (and another one close to the summit of the First Acropolis[80]), but is (without giving any reasons) said to have been installed in a later phase, seemingly along with a kind of vat in the floor to

[72] Whitley *et al.* 1995, 427.
[73] Halbherr 1901, 378; Whitley *et al.* 1999, 249–251; Whitley 2006, 607–610; Pilz 2011, 110. The temple has been suggested to have been that of Dictaean Zeus, see Faure 1960, 194–195.
[74] Pilz 2011, 106–110.
[75] Whitley 2006, 612. No evidence has been dated earlier than 400 BC (Whitley *et al.* 1995, 428); Classical and Hellenistic pottery chronology is a problem in this area (Whitley *et al.* 1999, 253). For a discussion of the ports of Praisos see Brulé 1978, 150–152.
[76] Svoronos 1890, 289 no. 25–27. 290 no. 33. 36–37. 291 no. 43–45.
[77] Whitley *et al.* 1995, 409. 420.
[78] Bosanquet 1902, 260. The more recent explorers speak of "the Andreion" (Whitley *et al.* 1995, 406; Prent 2005, 303; Whitley 2011, 40).
[79] Bosanquet 1902, 261.
[80] Whitley *et al.* 1995, 412 Fig. 4.

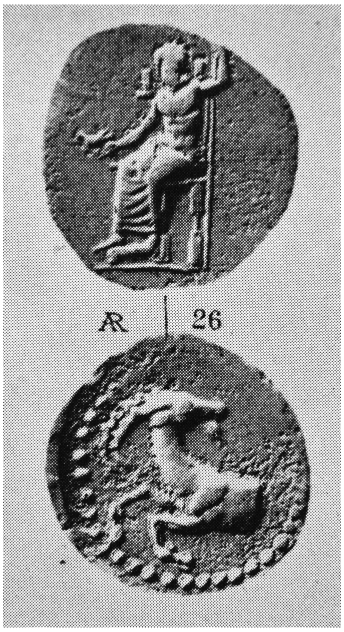


**Figure 9.4:** Hellenistic coin of Praisos showing (wild?) goat on reverse (from Svoronos 1890 Pl. 27 no. 26)

receive the oil; a ledge along the top indicates a lid. In another room, a separation jar and pithoi represent the next stages of the process. Holes in the walls show that strong wooden beams of 20 × 25 cm thickness were available[81]. Hellenistic interstate treaties testify to its polis status. One of these agreements with Hierapydna concerns mutual pasture rights for shepherds, which has been taken as direct proof of transhumant movements since the two cities do not have a common border (see chapter 10, p. 387)[82]. The city was razed to the ground by Hierapydna in 145 BC—it seems that the inhabitants were allowed to leave first[83]—and the former site and its surroundings seem to have been more or less completely abandoned. The remaining population has been suggested to have looked for a new home in the upland plain of Katelionas[84]: a settlement to the east of the Stavromenos hill is marked not only by pottery fragments, but also by six fragments of roof tiles

[81] Bosanquet 1902, 259–270.
[82] Chaniotis 1996, 115.
[83] Whitley 2011, 14–15. Although they might have saved their lives, their identity was probably severely damaged; cf. the thoughts of Middleton 2012, 273.
[84] Branigan 1998, 90; Alcock 2002, 107; Whitley 2006, 612.

and a broken triangular loom weight, which are taken as indicators of permanent occupation[85].

Having said that, surface survey evaluation is hamstrung by the very coarse chronological resolution of Hellenistic and Roman pottery in this part of Crete. In Lamnoni, a scatter of sherds ranging from Hellenistic to Late Roman, a span of 800 years, is thought to indicate the location of a continuously occupied small village[86].

Roman remains are very far and few between; the Praisos area seems to have been almost abandoned[87]. P. Faure saw a Roman tomb at Katelionas Papoura[88]. A Roman settlement was situated not far from the location of the modern village of Ziros, and it has been conjectured that Roman trade routes traversed the Ziros uplands[89].

## 9.6 Summary

The uplands in the very east of Crete, around the modern village of Ziros and extending north to the ancient city of Praisos, have received attention in the form of survey and, in the case of the latter site, of some early and limited unearthing. Although some patterns seem to emerge from the findings of the survey projects, it can be questioned how reliable these results are: "In fact it is clear today that the fragmentary nature of the research lends itself all too easily to rather daring and even worthless conclusions", as M. Tsipopoulou has put it[90]. The problems of all surveys—the question of visibility, the lack of archaeozoological and archaeobotanical results *et cetera*—are aggravated in this particular case by insufficient detail in pottery chronology, through which a great proportion of settlement dynamics is lost simply because sites are lumped together into one chronological unit when in reality they may well represent successive stages of land exploitation.

[85] Branigan 1998, 77.
[86] Branigan 1998, 75.
[87] Whitley *et al.* 1999, 256.
[88] Faure 1962, 39. It is not mentioned in K. Branigan's survey reports.
[89] Schachermeyr 1938, 478; Faure 1965, 29; Sanders 1982, 137.
[90] Tsipopoulou 1995, 177.

The available data suggest that the Praisos and Ziros uplands were first settled in the Final Neolithic, but either settlement in these elevations failed, or the reason that had caused the expansion had disappeared and people returned to the plains: in the Early Bronze Age, the mountain sites are abandoned. If anything, one would have expected the gradual aridization of the climate in the Early Bronze Age to cause movement into cooler, wetter heights. A connection to climate change is therefore difficult to establish.

In the Middle and Late Bronze Age, for the first time buildings seem to have been built in a sturdy enough way for them to remain, albeit ruined, visible on the surface. A number of them give the impression of fortified structures, perhaps implying some political tension. Peak sanctuaries appear even in the seemingly remote parts of the Ziros uplands, which hence must have been incorporated into the human landscape in some way or other. Because of their more specific chronological framework, they belong to the small number of sites that can—by analogy—be dated more closely than most other activity areas, some of which have received labels as broad as "MM-LM".

If the lack of LM II is really down to regional variation in style, differing from the sequence devised for Knossos, the uplands continued to be settled all through the Late Bronze Age; people seem to have found a way of making a living in these areas. In LM IIIC, however, this may have extended even to groups who had until then lived in the coastal plains, and who now found themselves having to adjust to life in greater, albeit still moderate, elevations, where water supply was more cumbersome. A number of these locations seem to have been emergency solutions, chosen for the relative protection they offered, but not appreciated in the long run. The prime example in the region, the large new foundation at Kalamafki Kypia, was abandoned in due course, and Praisos (whose water supply however was not much better) began its rise to the top of the settlement hierarchy, where it would stay until its unfortunate end in 145 BC. The *asty* of the Eteocretans incorporated three hills ('acropoleis') and a number of loom weights indicates textile production, though it must remain speculative on what scale. If the sheep from whose wool the garments were made were grazed in the Ziros tablelands, their herders did not leave substantial traces: there appears to be, with a few exceptions, not much activity in the uplands from the Archaic period onwards, although it has to be said that pottery chronology is rather crummy. It would seem that the arable and the pastures in the immediate hinterland of the polis were sufficient and did not warrant exploitation of the mountains proper. However, a Hellenistic treaty between Praisos and Hierapydna concerns the mutual right to some sort of agricultural exploitation of the land of the signing parties, which may or may not include grazing rights.

# Part III

# Thematic case studies

# Chapter 10

# Livestock, pastoralism and transhumance

The connection of uplands and herds of sheep and goats has always been intimate in Crete: legend had it that stock-rearing (and beekeeping) was invented by the Kouretes, who long ago lived in the rugged Cretan mountains (D. S. 5,65,1–2). Today, the importance of stockkeeping to the Cretan economy is evident to any visitor to the hinterland, where one cannot escape the sight of flocks of sheep on the slopes and of goats jumping carelessly from ledge to ledge on vertical cliffs. The animals are kept in the uplands, on pastures situated above the villages of their owners, in the summer. In the winter they are led to the coastal plains. This used to happen on foot; nowadays it is done with lorries. A highly gendered affair, the long, lonely sojourn of the men in the *mitata* was and still is the source of much folklore and more than one *mantinada*. The details of this practice, which can be found all around the Mediterranean (and in other parts of the world), vary from region to region even within Crete: the size of the flock, the distances travelled, the number of people moving with the animals or the degree of specialization to name but a few details. For example, the distance between winter and summer pastures is not necessarily very long[1], at least not in a mathematical sense—the hodological

[1] Nixon – Price 2001, 405. Cf. Skydsgaard 1988, 80; Chang 1992, 68–69. Forbes 1995, 331 footnote 53: “there is no reason to assume that distances of, say, 100 km and more were regularly travelled in Greek antiquity”. Cf. Beckmann 2012, 65. It seems that even the gender pattern described here was not necessarily set in stone in all regions, see Beckmann 2012, 57–59.

**Figure 10.1:** *Mitato* in the Psiloritis, south of the Nida plain (April 2009; photo courtesy of Torben Keßler)

distance may still be substantial. Motorized transportation has recently enabled the shepherds to travel to the pastures in the morning and return to their families in the evening: the animals are still part of the seasonal mobility scheme, but their human guards are not. The subsumption of all such practices under the term 'transhumance' has hence been criticized by some researchers who want to reserve it to a narrowly defined scheme[2]. Others have suggested that "[t]ranshumance is

[2] Chandezon 2003, 393–394; Prof. Dr Thomas Meier, *pers. comm.* 2012. Cf. however Skydsgaard 1988, 76: "how many sheep have to be involved and how far does the shepherd have to walk with his flocks from winter pasture to summer pasture before we can dare to use the word transhumance?" When the main, the winter settlement, is in the mountains and the flocks move to the coast in the summer, the system is called *transhumance inverse* (Skydsgaard 1988, 75). *Horizontal transhumance* denotes long-distance movement of animals, but without a change in ecological zone (Garnsey 1988, 172; Arnold – Greenfield 2004, 98.) On the question whether different ecological zones were exploited in ancient Greece see also Hodkinson 1988, 54.

so varied it sometimes seems hardly worth having it as a concept at all"[3]. In most treatments of Mediterranean animal husbandry, the term is used, often in a rather general sense[4]. Paul Halstead has tried to clear the confusion: According to him,

- **pastoralism** is a more or less specialized way of life depending on animals;
- **herding** is the management of livestock by mixed farmers or specialized pastoralists;
- and **seasonal mobility** is practised, on varying spatial scales, by both mixed farmers and pastoralists[5].

Transhumance is therefore not an economic model, but a strategy that can be employed by people with different specializations. As Hamish Forbes has pointed out, categorizations of economic strategies such as 'sedentary' or 'transhumant' fail because while a male member may tend the sheep on higher or, as it were, lower pastures, the rest of the household may be running a full-blown agricultural enterprise. Should such a strategy be classed as transhumant or as sedentary? Modern Lasithi or Sphakia in Crete can be cited as examples of such a system, although it has to be acknowledged that this pattern is a quite recent development and that the seasonal movement in Lasithi used to include the entire household[6]. What seems to me the most useful defining characteristic of transhumance as opposed, for example, to nomadism, is that the movement takes place between fixed locations[7].

> **Transhumance** is therefore defined here as the seasonal movement of animals and humans between fixed locations situated in zones with a different use regime, with the shepherd (possibly including his family) staying in the respective pasture with the animals.

[3] Evans 2003, 175.

[4] *E. g.* Georgoudi 1974, 155–160; Halstead 1987, 79–81; Garnsey 1998, 176–178; Chaniotis 1999b, 190–191. For the problem of definition see also Forbes 1995, 326–328.

[5] Halstead 1996b, 21; Halstead 2000, 122. Cf. Cherry 1988, 8; Nixon – Price 2001, 404–405; Arnold – Greenfield 2004, 97–98.

[6] Forbes 1995, 327–328. Sphakia: Nixon – Price 2001, 409–410. In the Psiloritis, it used to be only the men who went to the coastal plains; nowadays, motorization makes it possible for the whole family to go (Ivanovas 2000, 27). For sedentism and the problems of defining it see also Milner 2005, 33.

[7] Arnold – Greenfield 2004, 98.

Most if not all of the different strategies mentioned may have existed in the ancient world[8]. All of them would have had a determining influence on people's perception of their environment and hence brought about different landscapes, for example in terms of ideas about land use and ownership[9]. For the members of communities where the entire household moves between the seasonal pastures, few people know what the summer area looks like in the winter. In compliance with what has been said above about hodological space, rather than taking the shortest route from the summer to the winter pasture and vice versa, the location of springs for watering the flock may have determined the path chosen. Nonetheless, more than with any other practice the treatment of this question has caused scholars to caution against the projection of 'traditional' patterns onto the distant past[10]. One of the foremost critics is Paul Halstead, who grumbles: "*comparanda* acquired at first-hand enhance the credibility of archaeologists and ancient historians as fieldworkers, and chance summer encounters with Cretan shepherds or Cycladic fishermen are valuable currency in competitive displays at academic conferences." In reality, he claims, life and practices in rural areas are entangled with and dependent on environmental and social factors which are not the same now as they were a couple of millennia ago[11]. It is therefore not possible to simply take the existence of sheep and goat transhumance in the Bronze Age and in Greek times for granted on the grounds that it is practised *today* in Crete and other parts of the Mediterranean in what, despite all undeniable changes, still seems to be a 'traditional' way. The earliest certain recording of transhumance in Crete dates only to the Turkish period[12]. Direct hard data for earlier periods is difficult to come by, even more so since no one seems to be quite sure what such reliable evidence should look like[13]. H. Forbes has pointed out however that the herd-management strategy can change without any alteration in residence pattern, and he adds: "the relative *visibility* of different kinds of pastoralists must not be

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[8] Forbes 1995, 330.
[9] Halstead 2005, 39.
[10] As Watrous 1977, 2 has done. Criticized *e. g.* by Lewthwaite 1981, 62; Forbes 1995, 338; Nixon – Price 2001, 396. Cf.Wallace 2003, 602. See also Blitzer 1990, 41.
[11] Halstead 1987, 77.
[12] Rackham – Moody 1996, 160.
[13] See Chang – Koster 1986, 111–132 for suggestions. Cf. Cherry 1988, 18–19; Maggio – Nisbet 1990; Forbes 1995, 333–334. 336–337; Halstead 1996a, 21.

confused with *typicality*"[14]. Transhumance could only be *postulated* from the existence of seasonal settlements, and vice versa. Although seasonal occupation has been proposed for a whole bunch of sites in Crete, it has unfortunately never been proven from the material record—see the chapter on methods, p. 52, for how this could be achieved. No pair of settlements that could have formed an Ano-Kato couple has convincingly been argued yet (see chapter 12 footnote no. 23).

Treatments of the problem of transhumance in Crete, Greece and the Mediterranean normally refer to sheep and goats. It must not be forgotten however that in other parts of the world and indeed of the Mediterranean, cattle and even pigs[15] are kept in a (not necessarily seasonal) mobility scheme. Both species played a much more important role in the economy of ancient Crete than they do today[16]. Cattle bones found even at seemingly remote upland settlements from all periods testify to the presence of bovines at higher altitudes, too (MM I-II Askyphou, EM I/IIA and Late Roman Sentoni, Minoan Lasithi, Minoan Zominthos, Post-Minoan Kavousi Kastro). As the Alpine example proves, they can cope with steep pastures, and even the absence of meadows is not necessarily a problem: like other domestic animals, cattle can be led to the forest to feed on leaves and twigs[17]. Whether they featured in (potential) seasonal movements is impossible to say[18].

Because of the lack of material evidence, theories dominate the argumentative chains, which will be evaluated in the following. The question is of course why this particular way of herding developed. Political instability or a connection to the Secondary Products Revolution have been put forward[19]. Some writers have taken the geographical and climatic characteristics of the Mediterranean lands as sufficient evidence to assume that transhumance must have existed for millennia,

[14] Forbes 1994, 189.

[15] See the highly informative article by Albarella *et al.* 2011; cf. Halstead – Isaakidou 2011a, 164.

[16] For the former importance of cattle even in arid regions see Jameson 1988, 94.

[17] Halstead 1996b, 302; Haupt 2012, 102. For Alpine seasonal movement of animals see Netting 1981, 10–41; cf. however the definition of transhumance in Switzerland given by Frei-Stolba 1988, 149: "eine lose Kombination von Ackerbau und fester Siedlung einerseits mit Viehhaltung anderseits [sic!] dar, wobei der Besitzer der Herden mit seiner Familie im Dorf lebt, Acker und Rebberg bestellt, allenfalls einen nichtlandwirtschaftlichen Beruf ausübt, und die Obhut über die Herden, vor allem von den Schafherden, einem Hirten übergibt"—this is not possible in the Swiss Alps because in winter, the animals have to be stable-fed, in a system called 'Alpwirtschaft'.

[18] When it is mentioned, it seems almost accidental, see footnote no. 59 and p. 212 footnote no. 43.

[19] See Greenfield 1999, 17–18 for an overview and references.

since it is a necessary response to the prevailing environmental conditions[20]. The argument runs that mountain pastures are too cold and/or scarce in winter, forcing upland herders to escort their flocks to the warmer coastal plains, which in turn are too hot and/or scarce in the summer. Sheep must be taken to water once a day[21], which is facilitated by the relative abundance of springs in the uplands. However, it has been suggested that pasture would have been available year-round in the mountains in the (Late) Bronze Age, although doubts persist[22]. Moreover, P. Halstead ascertains that "[a]ll the common farmyard animals [...] can and do survive the heat and aridity of the lowland summers and a few even overwinter in the mountains"—this is expensive however, and therefore "transhumance is a necessary response to the Mediterranean environment *if livestock are kept on a sufficiently large scale*"[23]. Such a large scale would at most times not have been feasible for a single household: great numbers of animals can only be kept if a sufficiently large labour force is available. This can normally only be achieved through specialization on animal raising and necessitates great mobility if not nomadism of the herders[24]. The exclusive occupation with stock would mean that

[20]For example Churchill Semple 1922, 3–4; Braudel 1966, 76–77; Viviers 1999, 229; cf. Arnold – Greenfield 2004, 97. F. Braudel also knew however that "[l]a transhumance, même la plus tumulteuse, n'entraîne avec elle qu'un population de bergers. Elle implique une division du travail, une agriculture omniprésente, donc des labours à préserver, des maisons fixes, des villages" (Braudel 1966, 78). See also Chaniotis 1996a, 115. According to McNeill 1992, 91, in Arab times an additional incentive for transhumance was the reign of malaria in the plains; see also Lewthwaite 1981, 60; cf. however Rackham 1990, 36 footnote 6.

[21]Greger 1988, 39.

[22]See Siart 2011, 136. 145 and paragraph on Zominthos above, p. 209. J. Moody is not convinced (*pers. comm.* 2011). See also Wallace 2003, 603, who stresses that the two zones between which animals are moved need not be ecologically different but are under different *use*; cf. Hodkinson 1988, 54.

[23]Halstead 1987, 79; cf. Hodkinson 1988, 55–56; Nixon – Price 2001, 405; Evans 2003, 188. According to Netting 1981, 39, a sheep or goat in the Alps needs 280 kg of hay to get through the winter. In 1847, 660,000 sheep were counted in Crete, which would have been fewer than today (see above, chapter 3 footnote 223)—"but then they were taxed, now they are subsidised, and nobody but a shepherd really knows how many animals there are" (Rackham – Moody 1996, 163). See also Price 1981, 401–402; Tartaron 2004, 183–184.

[24]See Georgoudi 1974, 160; Chandezon 2003, 393 for the difference between transhumance and full-blown nomadism. Data as to the number of people actually needed for tending the animals varies. It can be surprisingly small: 300 sheep are said to be managed by one shepherd, 400 with a good dog (McNeill 1992, 114 with footnote 30), but cf. Koster 1977, 200. 290–291 (on dogs). 218. 223. 291–292 (on flock size). 255 (on flock size when grazing agricultural land). Cretan sheepdogs are praised by Oppian (Opp. *C.* 1,370; 3rd century AD), among others. Cf. also Vickery 1936, 65 with endnote 8; Calder 2011, 24. Cf. also Dodgshon – Olsson 2007, 92: before modern

other staples, most notably grain, would have to be bought from farmers, because "the pastoralist cannot live by wool alone, or even cheese and chops"[25]. According to P. Halstead, both sides of this system would require urban markets for selling their produce and acquiring the missing parts[26]. Since these preconditions would not always have been given, and since even then specialization still remains risky, Halstead has strongly argued (on the basis of an evaluation of faunal evidence from Neolithic and Bronze Age Greece) for the prevalence of a mixed economical strategy with small-scale, intensive land use as the prevalent strategy, offering a much better safeguard against food shortages[27]. In modern Greece, inheritance traditions mean that the plots owned by a family are often in some distance from each other. Although this may seem impractical in terms of labour and time expenditure, it can actually be shown to further diminish the risk of total crop failure: different geological and microclimatic conditions can be decisive[28]. A certain number of animals in a mixed farming context ensured the supply of protein—not so much through meat as through milk: cheese and other dairy products, although hard to detect in the archaeological record[29], are believed to have been a staple in antiquity and a valuable source of protein for those who could not afford meat very often (yoghurt seems to be a rather recent introduction[30]). Pulses served the same purpose. The advantages and likelihood of the mixed farming model have been shown for later periods too[31]; however, P. Halstead has also cautioned that

transport and communication, many areas would have been shut off in the winter and had to make sure they had all necessary provisions in stock: "The use of high ground pasture and the investment of vital labour to herding, milking and cheese making, therefore, had a strategic purpose. They combated winter scarcity by providing butter and cheese for the maintenance of humans and hay and other fodders for the maintenance of stock." See also Matter 1983.

[25] Price – Nixon 2001, 409. Cf. Halstead 1996b, 34; Wallace 2010, 40–41.

[26] Halstead 2000, 112. Cf. Forbes 1994, 188; Halstead 1996b, 34–35; Guizzi 1999, 239. This idea has been strongly criticized by Prof. Dr Thomas Meier, who cautions against projecting modern market economy ideas onto the past (*pers. comm.* 2012). Cf. Forbes 1995, 332: "Still less is there any hard evidence for the existence of shepherds who subsisted primarily on the products of their own flocks, despite occasional descriptions in ancient sources of geographically (and ideologically) distant peoples who are said to do just that."

[27] Halstead 1990c, 149–150; Halstead 1996b, 33; Halstead 2000, 112. Cf. Guillet 1983, 564–565.

[28] Netting 1981, 17.

[29] Milk residues were found in potsherds from the (lowland) site Chrysokamino near Kavousi (Beeston *et al.* 2006, 419–420. 422).

[30] Halstead – Isaakidou 2011b, 63

[31] See Koster 1977, 150–151. 163–165; Gallant 1991, 34–59; Forbes 1995, 331; Nowicki 1999a, 161; Evans 2003, 188.

the suggested connection between crop and livestock diversification, scale and intensity is to some extent derived from modern conceptions of economic benefits. Other factors play a role in such decisions however, which may or may not be known and intelligible to scholars today[32].

P. Halstead's model of mixed farming is not necessarily adverse to seasonal transhumance: he suggests that large flocks were formed through communal herding, *i. e.* grazing everybody's small number of sheep together[33]. Other scholars have opposed this on the grounds of a total absence of evidence[34]. Absence of evidence is not evidence of absence however, and the theory remains attractive in its reconciliation of mixed small-scale farming and transhumance, and neither modern nor ancient evidence support the notion of specialized pastoralism, *i. e.* without agriculture, either[35]. On a more general basis, mobile flocks of sheep and goats have a number of other disadvantages. As Cleary and Delano Smith have pointed out, moving herds around means expenses for loss of time and labour, loss of animal form, loss of animals, payments for wayleave and rights of watering and grazing[36]. They also mention loss of manure, and indeed this has been used as another argument against transhumance and grand-scale pastoralism: some scholars deem it unlikely that people would have kept sheep primarily for meat or wool or milk, since other animals (cows, pigs) are claimed to do the job more efficiently. The best use to which a sheep can be put, they say, is to produce manure (500 kg

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[32] Halstead 2000, 116; Dodgshon – Olsson 2007, 93. The benefits are not exclusively economic however: German organic farmers' associations insist on their members following a mixed regime, since only the conjunction of animals and agriculture enables a closed cycle and a sustainable system. L. Nixon and S. Price observe that even nomadic pastoralism does not rule out agricultural activities (Price – Nixon 2001, 409). Cf. also Vuidaskis 1977, 250: "Ein psychisches, physisches und damit auch wirtschaftliches Überleben während der Jahrhunderte der wechselnden Fremdherrschaften war nur möglich, wenn die Bevölkerung, die ja zum überwiegenden Teil in den abgelegenen Bergtälern und im Gebirge leben mußte, sich dort mit den dringendsten Nahrungsmitteln selbst versorgen konnte".

[33] As suggested by Klippel – Snyder 1999, 58, with reference to Halstead 1981; the idea is more explicit in Halstead 1987, 83 however. For another model see Nowicki 1999a, 161. See also Calder 2011, 25. Such a system is suggested or known for later periods including modern Crete, see Chaniotis 1999b, 195–196 with reference to Link 1991, 117 (*non vidi*); Greger 1988, 14; cf. Netting 1981, 12. 26; Halstead – Isaakidou 2011a, 164.

[34] Hodkinson 1988, 55–56; Chaniotis 1995, 45.

[35] Forbes 1994, 191–192.

[36] Cleary – Delano Smith 1990, 25. See also Price 1981, 405.

per animal per year[37]), and this must hence have been the main incentive. Moving flocks around however means, so the argument runs, that manure will not end up on the fields, hence transhumance is unlikely to have been the prevailing system[38]. I am not convinced by this, not only because in modern Crete and mainland Greece transhumant pastoralists keep their sheep in pens during the night and, at least in the Argolid, have been recorded collecting and selling the manure from the pens[39], but also because neither cows nor pigs can adjust to the Cretan climate, vegetation and terrain as easily as sheep and goats[40], and without attempting to doubt the other qualities of cows and pigs, neither of them will ever produce wool.

What actual evidence is there for transhumance in Cretan antiquity? P. Militello has evaluated Linear A records and archaeological material (cf. Fig. 10.2) and comes to the conclusion that in Minoan times, sheep-breeding and wool production were the concern of private households, with the palaces controlling the weaving and manufacture of fine valuable textiles, part of which would have been traded to Egypt and other parts of the Mediterranean[41]. Age profiles of ovicaprine remains from Agia Triada (a site in the plain) hint at wool rather than meat production, but the bones from nearby Kommos seem to suggest that this pattern is not universally applicable[42].

In contrast to this stands the Mycenaean system of palatial control (LM IIIA-B). The Linear B texts of Series D from Knossos record enormous flocks of sheep and a major concern with wool and textiles[43]. The records reflect a strict gender

[37]Number from Nixon – Price 2001, 410. For the difficulties of identifying dung in archaeological contexts and the various creative uses to which dung can be put see Moreno-García – Pimenta 2011.

[38]As argued by Lewthwaite 1981, 60–61; Cherry 1988, 21. Cf. Skydsgaard 1988, 82–83; Garnsey 1998, 177–178; Evans 2003, 188.

[39]Koster 1977, 240–241; Blitzer 1990; Forbes 1994, 190; Forbes 1995, 329.

[40]Cf. Georgoudi 1974, 165.

[41]Killen 1964, 14; Militello 2007, 43–44. Such a system of textile production can be reconciled with the scarcity of spindle whorls in Neopalatial houses, see Widmann 2007, 158 (with further references). Cf. also the evidence from Akrotiri as presented by Tzachili 2007, 190. 192.

[42]Wilkens 1991, 1515–1516; Militello 2007, 38 (who claims similar results from the Unexplored Mansion in Knossos which however cannot be sustained, see Bedwin 1984); Moody 2012, 239–240.

[43]More than 800 records mention a total of between 80,000 and 100,000 animals, mostly wethers (see Killen 1964, 3; Killen 2007, 51). Male sheep yield more wool than ewes (Halstead 1981, 328). The males are concluded to be castrated because of the ratio of males to females inferable from the records: uncastrated rams cannot be run in great numbers with ewes. Contrariwise, in

division: while men look after the animals, the processing of the wool was women's work[44].

**Figure 10.2:** MM I ceramic vessel with relief decoration on the inside, showing a shepherd and his flock. From Palaikastro (Museum Iraklio)

Milk and dairy products hardly feature at all in palatial records. Given the composition of the flocks, this is not surprising, since ewes are not numerous enough to allow large-scale dairying. This is a clear indication that the economic system was geared at trade and export: in contrast to textiles, perishable goods like milk could not be traded and therefore were of no interest to the palace, which was not primarily concerned with feeding the population, but with making profit[45]. Cheese, it has more than once been argued, was popular because it was a way of preserving milk—even in the modern age of refrigeration and sterile containers, fresh unpasteurised milk will go off after a couple of days; how much worse must

milk-orientated modern businesses, male lambs are normally killed, see Killen 1964, 2–3. 5–6 for references and Koster 1977, 262. 277 for modern ratios. The Mycenaean palace economy must be, in my opinion, (the) one instance where Halstead's statement that herding on a scale large enough to necessitate transhumance "cannot be assumed [for the past] and has rarely, if ever, been demonstrated" (Halstead 1987, 79) does not hold. According to A. Sarpaki, the concern with textiles is also apparent from the records of vegetable dyes such as safflower (Sarpaki 2001, 197–198). See also Halstead 1999.

[44] There is a 'biological' background to such social practices where they still exist nowadays: diseases transferred from animals can severely harm pregnant women (Nixon – Price 2001, 414–415; Nixon 2006, 89). Cf. Beckmann 2012, 10 footnote 18.

[45] Cf. Killen 1964, 1; Tzachili 2001, 168–169.

the situation have been in antiquity. However, cheese is so far attested only in mainland records, although the 'monogram' sign used is said to appear also on a tablet from Knossos[46].

P. Halstead argues that in many regions of the ancient Mediterranean, environmental conditions would not have allowed transhumance in the Bronze Age, since movements of large herds are not possible on forested mountains. In Crete however, so Halstead, vast stretches of pasture would have been available through forest clearance[47]. Although this view has been shown to be an inadmissible generalization of the environmental history of Crete, the outcome may have been the same: extensive upland landscapes suitable for grazing. The political situation in the palatial period can be argued to have been favourable to movements of herds over considerable distances[48]. Interestingly, the Knossos tablets record the greatest numbers of animals in the plain of Mesara. The Mesara is the largest portion of flat land in Crete and was certainly used for agriculture in the Bronze Age. Halstead therefore concludes that the records refer to winter grazing of fallow fields, whereas in the summer upland pastures would have been used[49]—which would effectively represent a system of transhumance.

I agree with P. Halstead that palatial control or even ownership of flocks for wool production certainly does not preclude privately owned smaller herds (exploited for wool, meat, milk and manure) outside of palatial control[50]—in contrast to earlier notions about the 'redistributive system' of the palaces, it seems highly unlikely that people would not have aimed at self-sufficiency; after all, the over-

[46] See Ventris – Chadwick 1973, 52–53. 132. 282–283. Objects in baskets on the Agia Triada sarcophagus have been suggested to be cheese offerings to the gods (Ventris – Chadwick 1973, 281), and in LM III skeletons from Armeni, brucellosis has been noted, said to be caused by infected milk or cheese (Rackham – Moody 1996, 162). See also Trantalidou 2001, 295–296 with footnote 202. R. I. Curtis thinks that Bronze Age cheese would generally have been soft (Curtis 2001, 274); however, soft cheese will not keep much longer than fresh milk and clashes with the preserving argument. The discovery that milk can be preserved as cheese however has been named by L.V.Watrous as one of the reasons for the population growth at the end of the Neolithic (Watrous 1974, 290). In the Alps, cheeses are still eaten after 20 years of storage (Netting 1981, 25).

[47] Halstead 1987, 79; Halstead 1990b, 72. Cf. however the views of Cherry 1988, 15; Hodkinson 1988, 54; Chaniotis 1995, 54–55 and Garnsey 1998, 176.

[48] Wallace 2003, 604.

[49] Halstead 1992, 112; Halstead 1996b, 32.

[50] Halstead 2000, 116.

whelming majority of people still were farmers, and a self-sufficient farm can only function if animal rearing and crops form a cycle of mutual benefaction. Moreover, it has been estimated that as little as 5% of the Cretan population could have been supported by pastoralism alone[51]. If more upland sites were investigated properly, with decent archaeozoological analyses, the mortality profiles of ovicaprines could help to get more definite answers on this issue[52]. From the evidence we have got at the moment, a mixed farming scheme emerges, and it seems not unlikely that large numbers of sheep would have been moved around pastures with the seasons at least in the Mycenaean Bronze Age.

Studies of pastoralism in post-Minoan Crete are almost completely lacking, even though in the context of the so-called refuge settlements of the Bronze Age/Iron Age transition, seasonal occupation has been suggested, a scenario that can be shown to be highly unlikely[53] (see below, chapter 12 and above, p. 255). For Greek times, one would think that written evidence might allow more definite statements, but there is no description of transhumance anywhere[54]. H. Forbes concluded that specialized animal husbandry in antiquity was a privilege of the well-to-do and directed at generating goods for exchange—not for subsistence[55]. A. Chaniotis spies a direct testimony in a contract between the cities of Hierapydna and Praisos in eastern Crete (late 3rd or early 2nd century BC): he emends and interprets the text to mean that the parties grant shepherds from either town the right to graze their flocks on each other's territory. A treaty of similar content between Hierapydna and Priansos (from around 210 BC) would be stronger evidence, since these two cities did not share a common border, implying longer distances of animal movement[56]. The verb used in the treaty between Hierapydna and Praisos is *αὐλοστατέω*, which Chaniotis without further comment translates as "to graze", and he hence insists that transhumance existed in Crete

[51] Halstead 1996b, 34.
[52] Mainland 2008, 547. See also the criticism of Wallace 2003, 602.
[53] Watrous 1974, 38. Cf. Nowicki 1999a, 158–162. See Wallace 2003, 602 for criticism.
[54] See Georgoudi 1974, *passim* and Skydsgaard 1988, 74 for possible literary references to transhumance.
[55] Forbes 1994, 191–192. This refers to the owners of the animals, not the shepherds, who seem to have held an inferior status in antiquity (in contrast to today, see Forbes 1995, 332–333). Cf. the statements of Chaniotis 1991, 95 (subsistence economy) and *passim* (transhumance).
[56] Chaniotis 1996a, 115–116. 185–190. 255–264. On the these treaties see also Chandezon 2003, 170–181.

at least at certain times, there being no evidence for Archaic or Classical times, but an abundance from the Hellenistic period[57]. A comment would have been desirable however[58], since Liddell and Scott give "to set up a farmstead", which clearly is something utterly different[59]. He thinks it possible that the comparative copiousness of documents referring to what he calls "specialized pastoralism and transhumance" could indicate a "change in economic patterns whose origins should be looked for in demographic and socioeconomic developments"[60]. If Chaniotis is right, the contracts only make sense if the territories of the cities differ and allow the necessary seasonal variation, *i.e.* if one city owns mountain pastures and the other coastal plains. Praisos probably controlled the upland areas of Lamnoni and Katelionas in Ziros (until 145 BC)[61]; Hierapydna was, at the time the treaty was made, the weaker of the two partners. Nothing at all is known about the terrain owned by Priansos, but the date of the treaty may imply that it helped out Hierapydna, which seems to have been overpopulated at the time, in terms of mountain pastures[62].

As has been shown, transhumance is only feasible if the number of animals is sufficiently large. Such large numbers of sheep would have produced a surplus of wool far beyond the needs of the owner and his family[63]. In evaluating the question of the existence of animal husbandry on such a scale it is interesting to note therefore that according to A. Chaniotis, it was not before the Roman period

[57] Chaniotis 1995, 52–53. 72; Chaniotis 1996a, 114; Chaniotis 1999b, 197–198.

[58] The comments and references given in Chaniotis 1995, 59 footnote 111 and Chaniotis 1999b are not sufficient.

[59] F. Guizzi sticks with Chaniotis' interpretation, translates "pascolare il bestiame" and declares that transhumance in eastern Crete has thereby been proven (Guizzi 1999, 238; Guizzi 2000, 522.525; Guizzi 2001, 341). However, he also refers to the meaning of this word as "attest[ing] the fencing of land for flocks" (Guizzi 1999, 239). Note that Guizzi 1999, 238 speaks of cattle in the context of east Cretan transhumance: cf. Chaniotis 1999b, 196. Cf. Tzedakis *et al.* 1989, 59 footnote 48. See also Forbes 1995, 330.

[60] Chaniotis 1999b, 197–198.

[61] Branigan 1998, 88.

[62] Population pressure in Hierapydna is mentioned by Chaniotis 1995, 74–75. Chaniotis 1996a, 259 offers the same thoughts on the differing territories of the two cities. For the extent of the territory of Hierapydna see also Guizzi 2001, 304–322.

[63] P. Halstead estimates that four to five sheep were enough to supply the 2–3 kg of wool per person per year needed for clothing in southern Greece (Halstead 1981, 327). Cf. Beckmann 2012, 292.

that textiles were exported from Crete[64]. Another useful product from stock-rearing was leather, from which not only shoes, but also armour and manifold other items were made; it goes without saying that this applies to the Bronze Age as much as to the Greek and Roman periods[65]. Dairy products were of great importance, even if they may not have been traded very widely. Not only in Crete they would have been made from sheep's and goat's milk rather than cow's milk, the latter being rare and regarded as a luxury[66]. A type of Cretan cheese used for sacrifice, characterized as *'λεπτοὺς'* (thin, fine, small) and *'πλατεις'* (flat), whose appellation as *'θήλειαι'* may hint to a soft texture, is mentioned by Seleucus (cited by Athenaeus; Seleuc. *ap. Ath.* 14,658d), but dairy production is hard to prove archaeologically, since the implements used during these processes are not distinct from those for other household tasks[67].

A growing number of scholars hence agrees that transhumance is not an ecologically determined system, but that historical-political circumstances are decisive

[64] Chaniotis 1991, 98–99; Chaniotis 1995, 50. Roman writer Varro describes how his flocks winter in Apulia and summer in the mountains around Raete and that public cattle trails exist between these two distant regions (Varr. *R.* 2,2,9–10) which indicates the popularity of the practice; for this passage see also Garnsey 1998, 169. 172.

[65] Chaniotis 1995, 51; Snodgrass 1999 *passim*; Trantalidou 2001, 272–287. See also the various contributions dealing with Minoan warfare in Laffineur 1999.

[66] This was because cows were also used for traction and would therefore have given only little milk (Auberger 2001, 132). The comparatively high rate of individuals with lactose intolerance in modern southern Italy and Greece has been attributed to traditional consumption of cheese (in which lactose is hardly present) rather than milk (Auberger 2001, 133; cf. Sherratt 1983, 94; Nixon – Price 2001, 419. See also Outram – Mulville 2005, 4). Homer mentions cheese several times (Il. 9,638–640; Od. 9,232. 9,246–249. 10,234; see Auberger 2000, 4). Milk and dairy products in ancient Greece are a rather under-researched topic; the most explicit studies are Auberger 2000 and Auberger 2001 (although the Heidelberg University Library electronic catalogue also suggested several works on Minoan archaeology by "Dairy Palyvou"). See also Nowicki 1999a, 159–160. Arist. *HA* 522b 2 mentions that fig sap can be used in place of rennet from calves' or lambs' stomachs to curdle milk (see Dalby 1996, 66; cf. Blitzer 1990, 39; Merk-Schäfer 1998, 210; Auberger 2000, 9–11; Curtis 2001, 315); since figs were eaten in Crete at least since the Bronze Age, this may well have been common practice. The work has to be read with caution though, as O. Rackham warns; it may not actually be Aristotle's work, and not all statements are actually right. This is not a unique feature of this book: "I hope the great man was not responsible for the Aristotelian treatise *On Plants*, a work full of inaccurate trivia (such as 'some plants live in wet places and others in dry, others in either, like the willow') which reads like a sleepy student's lecture notes" (Rackham 1996, 35).

[67] Forbes 1995, 333. Cf. Blitzer 1990, 39–40. In Venetian times, Cretan cheese was apparently exported to Egypt, Italy and even France (Nixon – Price 2001, 407). See also Jacoby 1998; Chaniotis 1999b, 193 with footnote 16.

for its establishment[68]: these circumstances include an economic system that allows individuals to spend extended periods of time with the flocks, border treaties and land use regulations as well as markets where the products can be sold.

[68] Georgoudi 1974, 155; Lewthwaite 1981, 61; Cherry 1988, 15; Hodkinson 1988, 55–56; Cleary – Delano Smith 1990, 22; Halstead 1990b, 65; Chaniotis 1995, 55; Garnsey 1998, 177; Nowicki 1999a, 160–161; Halstead 2000, 112; Nixon – Price 2001, 406–407; Tomkins 2009, 129. See also Price 1981, 404–406. Cf. Forbes 1995, 338.

# Chapter 11

# Cretan mountain cults

*Of course, one figurine on top of a mountain does not a peak sanctuary make.*

Peatfield 1990, 120

Worship in and possibly of the mountains was and is a widespread phenomenon across the globe (see above, section 4.4), and Crete is no different. The nature of the island with its great contrasts of soaring heights and sudden plunges is highly impressive to the modern visitor, and it is tempting to assume that people of the past would have felt the same—after all, at least elevations have certainly not changed over the past millennia. Sanctuaries have indeed been found in the mountains of Crete, most numerously from the Palatial Periods of the Bronze Age, but what was the relationship between cult and landscape?

## 11.1 Peak Sanctuaries

In the Old Palace Period, a new type of cult place suddenly sprung up in elevated places, the vast majority being situated in central and eastern Crete (see Fig. 11.1)[1]. The first ones that were discovered at the beginning of the 20$^{\text{th}}$ century were those at Petsophas in the very east of Crete and on Mount Iouchtas

[1] See also p. 194 footnote 141.

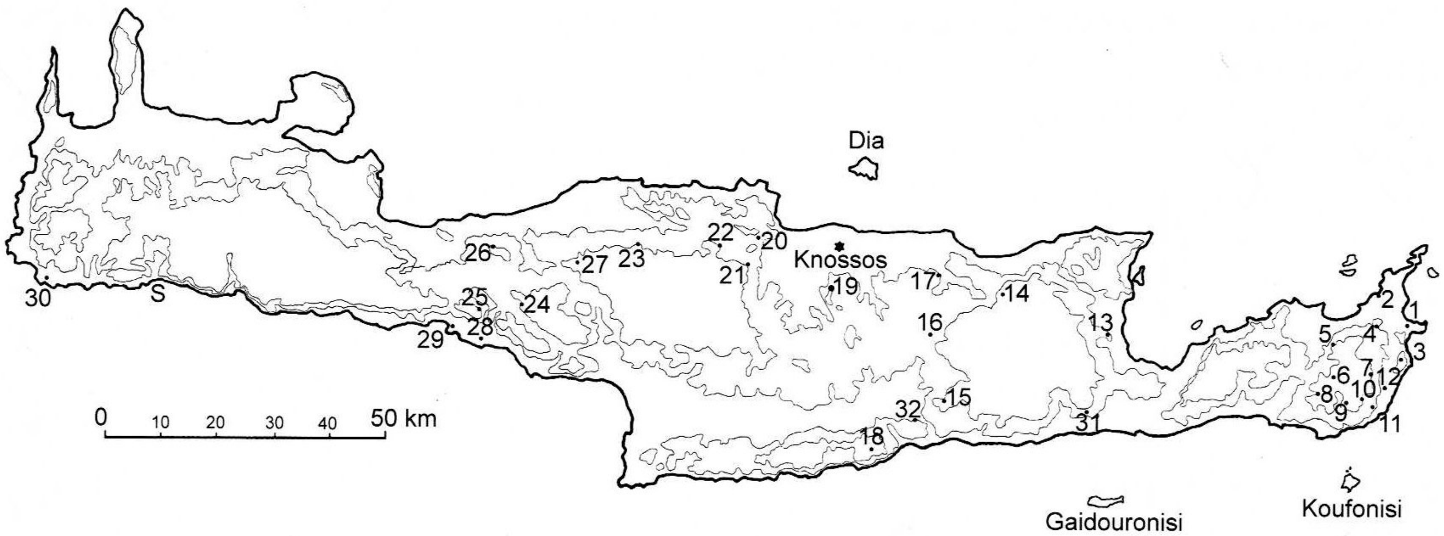


Fig. 1. Distribution of Minoan peak sanctuaries; sites with uncertain chronological and/or functional interpretation marked with (?)

1 Petsofas – 2 Kalamaki – 3 Traostalos – 4 Modi – 5 Prinias – 6 Xykefalo – 7 Zakros Vigla – 8 Etiani Kefala – 9 Ziros Plagia – 10 Korfi tou Mare – 11 Xerokampos Vigla – 12 Korakomouri – 13 Thylakas (?) – 14 Karfi – 15 Kastellos Koupa – 16 Liliano – 17 Maza (?) – 18 Kofinas – 19 Youkhtas – 20 Tylissos Pyrgos – 21 Keria – 22 Gonies Filiorimos – 23 Ag. Mamas Kopida – 24 Spili Vorizi – 25 Atsipades Korakias – 26 Vrysinas – 27 Mavrou Korifi – 28 Preveli Korifi – 29 Plakias Paligremnos – 30 Ag. Kyriaki Gremnakas – 31 Anatoli Pandotinou Korifi – 32 Demati (?) – An Archaic to Classical hilltop shrine at Sougia marked as S

**Figure 11.1:** Map showing distribution of Minoan peak sanctuaries (from Nowicki 2007, 2 Fig. 1)

near Iraklio, and they came to be described as 'peak sanctuaries'[2]. This term was quickly applied indiscriminately to any site outside a settlement context that did not sit on the bottom of a plain, which resulted in a very long list of alleged 'peak sanctuaries'. It was then felt necessary to establish which characteristics distinguish this special type of ritual site from others. The criteria defined by Alan Peatfield and therefore the number of sites to be classified as peak sanctuaries are now reasonably widely accepted[3]. They are:

- situation close to but not necessarily on a peak
- intervisibility (with each other and/or settlements)
- proximity to a settlement (*i. e.* within one to three hours walking distance)
- a specific artefact assemblage consisting of animal and human figurines, pottery and sometimes pebbles from a river or the sea.

About 25 sites are often cited as the number fulfilling these criteria, only nine of which bear architectural remains[4]. The ones with architectural remains are those that continued into the Neopalatial Period, after which this type of cult site disappeared again. The lack of architecture can be explained by the "diverse character and accessible scale of the Cretan landscape, and its long history of symbolic associations, [which] meant that high-investment monumentalisation was often not necessary to lend weight and significance to a cult", *i. e.* nature itself

[2]As far as I can see, the first usage of this term is in an article in Polish by Bogdan Rutkowski in 1967 (Rutkowski 1967). For the discovery of Petsophas see Myres 1903, for Iouchtas see Evans 1921, 153–159.

[3]Briault 2007, 124. Cf. Schlager 1995, 13.

[4]Soetens *et al.* 2006, 314; Lupack 2010, 252. Cf. Peatfield 1996, 23; Cromarty 2008, 32–46. The most recent publication gives 29 (Davaras 2010, 72). See also the (differing) catalogues in Rutkowski 1986, 96–98 and Rutkowski 1988, 78–98. This does not necessarily preclude that more are yet to be found: "one day the gaps in the distribution map will be filled, and all major Minoan settlements will have their own peak sanctuaries" (Peatfield 1983, 273). See however Peatfield 2009, 257 for a modification of this view. Soetens and colleagues name poor publication and erosion as possible factors preventing the identification of further peak sanctuaries in 'suspicious' locations (Soetens *et al.* 2006, 314). Cf. however the critical remarks of Soetens *et al.* 2008, 155. 159. Peatfield has also warned that "we need to move beyond the idea that their topography is a matter of fixed criteria and definitions; rather, it is a guide to [...] the creation, experience, and operation of the Minoan sacred landscape" (Peatfield 2009, 257–258).

seems to have been perceived as creating (a) sacred space[5]. Others think that architecture may have existed at more peak sanctuaries but disappeared because of erosion, army activities, antenna construction *et cetera*[6]. The area in which cult activities have been detected is quite small in some cases (100–250 $m^2$). It seems that not all of these cult places would have been suitable as the aim of an organized procession, but catered for more individual visits—"several tens of people would make Atsipades Korakias or Xerokampos Vigla very crowded"[7].

The definition given above has recently been challenged again by Camille Briault who asserts that the oft-stressed intervisibility may have been less important than usually thought. She argues that it is the assemblage of certain types of artefacts that makes a peak sanctuary, not its topographical situation. Her reasoning is based on the notion that "[w]hile spaces may be defined in terms of natural topography, *places* are defined by the activities conducted within them"[8]. However, in my view it would be just as wrong to base the definition exclusively on the artefacts as to base it only on topography[9], and the latter approach can be supported by GIS modelling of visibility patterns and viewshed analysis, given that possible changes in vegetation, which might have blocked the view, are taken into account. S. Soetens and his colleagues have found that virtually all peak sanctuaries offer a 360 °C degree view. This means that visibility links the peak sanctuary location to more than one other site, be it settlement or other peak sanctuary. They also plausibly suggested a hierarchy of these cult places: some, for example Iouchtas (see Fig. 11.6), are visible from all other peak sanctuaries in the region, which in turn are not all linked visually. With the decline in numbers in the Neopalatial Period, intervisibility is largely lost. It has also been pointed out that both the experience of looking up *to* and looking down *from* such a place should be taken into account[10]. The sadly under-researched cult place on top of Mount Kophinas

[5] Wallace 2010, 320; cf. Panagiotopoulos 2008.
[6] Soetens et al. 2006, 314–315.
[7] Nowicki 2007, 23–24. Cf. Nowicki 2012, 148. 150.
[8] Briault 2007, 137. Cf. Grötzbach 2004, 462.
[9] For criticism of Briault see also Nowicki 2007, 3, who denounces studies not based on first-hand experience: "good walking shoes plus willingness to climb cannot be easily replaced by a new methodology", and Nowicki 2012, 153.
[10] Peatfield 1983, 275; Soetens *et al.* 2006, 317–319; Soetens *et al.* 2009, 263; Peatfield 2009, 257–258. For the intervisibility of peak sanctuaries as visualized by GIS see Driessen – Frankel 2012,

(1,231 metres high) has a visibility link to Iouchtas[11] and indicates once more that the remarkable shape of a peak may well have played a role in the establishment of these sanctuaries. A certain landmark (if not beacon) function as suggested by viewshed analysis therefore seems very convincing, even more so when taking modern comparisons into account[12]. Alan Peatfield has united visibility and finds,

**Figure 11.2:** View of Vorizi, site of a Middle Minoan peak sanctuary, above modern Spili (April 2009)

claiming that in the case of Atsipades Korakias, objects are concentrated in an

73 Fig. 5.7. See Peatfield 1987, 89–93; Soetens *et al.* 2009, 264 for visual relations between peak sanctuaries and palaces.

[11] Soetens *et al.* 2002, 165; Soetens 2009.

[12] A landmark/beacon (or even military outlook) function, already suggested by Peatfield 1983, 276–277, were also put forward by Soetens*et al.* 2006 and Soetens *et al.* 2002; cf. Doxtater 2009. The beacon hypothesis is based on proximity to or visibility from the sea and evidence for fires (which, however, only in the case of Iouchtas and Traostalos rests on trustworthy description, see Peatfield 1992, 66; Peatfield 2009, 256. Cf. Burkert 2011, 51; Marinatos 1993, 116 with endnote 33. 119). For the (possibly unintended) landmark function of outlying churches, chapels and icon stands in modern Sphakia see Nixon 2006, 3–4. 23. 25. 88. 97. 100 and *passim*.

**Figure 11.3:** Terracotta figurines of sheep and cattle from the peak sanctuary at Petsophas (photograph courtesy of the British Museum)

area from which contemporary settlements can easily be seen[13]. A similar case has, for example, been made for Spili Vorizi (see Fig. 11.2), which also demonstrates the point that the absolute peak was shunned in favour of a terrace which offered greater visibility[14].

The assemblage of artefacts varies, and no analysis of the—mostly poorly published—assortments of figurines (see Fig. 11.3) and other objects has so far yielded conclusive explanations[15]. The nature of the deity or deities worshipped at the peak sanctuaries is therefore all but clear[16]; nonetheless many theories have been advanced. The most convincing one seems to me, as at least one aspect of the rituals carried out, a cult of weather and water. Seashells, including tritons, have

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[13] Peatfield 2009, 258 (cf. Nowicki 2012, 146. 148). He has further suggested that possible solar alignments should be taken into account (see Nowicki 2007, 25 with footnote 38 for criticism of another such hypothesis). See also Peatfield 2007.

[14] For Spili Vorizi see Nowicki 2007, 5–10.

[15] See Jones 1989, 34–36 and *passim*. Keith Branigan puts the diversity of assemblages down to the quick establishment of this type of sanctuary (Branigan 1970, 108). An enigmatic class of objects are human figures split lengthwise from Iouchtas and Petsophas; the lack of explanation was lamented by Dietrich 1971, 514 and was still not cured by Kyriakidis 2005, 157 (with Fig. 48). The statuettes are thought to be prayers for 'sacred healing' by Andreadaki-Vlasaki 2000, 179.

[16] Rutkowski has to be contradicted when he states: "The least difficult problem is to describe the type of gods that were worshipped. It is more difficult to establish their names" (Rutkowski 1971, 9).

been found in several peak sanctuaries[17]; these are known to be offered to water deities in other societies because all water, including the rain, springs and lakes from and in the mountains, is believed to originate and be connected to the sea. Spiral shaped strombus shells are used as trumpets to call the mountain gods or gather clouds[18]. What is more, Steven Soetens has recorded the number of springs in the vicinity of several Cretan peak sanctuaries and used this and the apparent dedication of water-worn pebbles to argue in favour of a water-related cult on the mountain tops[19]; a weather god as the focus of peak sanctuary cult has been suggested by a number of scholars[20]. The parallel with the later Greek tradition of worshipping Zeus on mountains, mainly (but not exclusively) in his function as the god of rain, lightning and thunderstorm may or may not be pure coincidence, since the association of mountains with water is frequently encountered in societies around the world[21]; obviously I am not aiming to suggest cult continuity between the pre-Greek phenomenon of ritual activity on Cretan mountain peaks and the Classical Greek worship of Zeus. Nonetheless it seems plausible to infer that in this geographical area too weather and mountains were connected terms. Even

[17] As always, exploration and publication are hardly satisfying in this respect, but see Jones 1999, 12. 57–58 (Table 9); Kyriakidis 2005, 132 (Table 8; classified as evidence for feasting; see also the evidence from Karphi p. 245). On other offerings to potential weather deities see Ventris – Chadwick 1973, 307.

[18] This is known from the Andes in Southern America (Reinhard 1985, 306–307). Cf. the depiction on a seal found in the Idaian Cave, see above, p. 209.

[19] Soetens 2009, 264–265. See also Davaras 2010, 83–84. For an alternative explanation of the pebbles see Peatfield 1992, 80.

[20] Burkert 2011, 52 and, even more tentatively, Marinatos 1993, 119 and supported (with reference to Zeus) by Watrous 1995, 400. 402. The existence of a Minoan sky-god was first suggested by A. B. Cook on the basis of iconographic evidence in the form of a gold ring from Knossos showing a 'sky-pillar' and a male figure descending from above (CMS VI 2 no. 281). He interpreted the aligned dots around its shoulders as rays of light (Cook 1925, 48–50), but windblown locks of hair seem more likely to me (as suggested by Marinatos 1993, 172; Cf. Cook 1925, 49 footnote 3. Her argument is supported by a comparison with pieces such as CMS VI 2 no. 278, where the dots are more clearly attached to the body. It is rather sobering to see the ring in the original and find that the figures are tiny and the dots barely visible.) Whether the upright poles were really supposed to attract lightning (as suggested by Rutkowski 1986, 91; Levi 1981, 40) is impossible to say. L. V. Watrous acknowledges, however, that not all votives can be so explained. A "Solar/Sky God" has also been postulated (along with a "Stellar God(dess)", a "Guardian of the Sun", a "Goddess of Renewal" and a number of others) by M. L. Moss, see Moss 2005, 114 and *passim*; no further comment is required.

[21] See Peatfield 1990, 126. The argument for a water- and rain cult in Minoan Crete is also presented in Widmann 2011, 175–177.

today, Cretans still venture in processions to upland churches in order to secure enough water for the following year[22].

N. Marinatos has strongly argued in favour of not just one deity for all sanctuaries and pointed out that the finds from the peaks do not even provide any evidence as to the sex of the worshipped deity[23]. Alan Peatfield has drawn attention to the fact that there is not even proof that the Minoans, like so many other peoples, believed that the gods took abode in the mountains, even though it seems likely that they did. Wherever the gods were thought to dwell, it can hardly be doubted that the 'peak sanctuaries' were sacred spaces. It is therefore legitimate to argue with Peatfield that the apparently deliberate proximity of peak sanctuaries to areas of human habitation and exploitation, their being "very much part of the 'human' landscape", indicates that the cult sites were not supposed to be places where the gods would dwell, but for interaction with them in the form of worship and possible encounter. He also suggested a special emphasis on pastoral concerns—because of their alleged location in pastoral landscapes and because of the presence of animal figurines[24]. The belief that mountain deities

[22] Faure 1972, 401; Peatfield 1992, 79; Peatfield 2007, 297. For modern-day Greek rain rituals and their possible ancient origins see also Håland 2007. In the face of "this notable lack of solid evidence" for the identity of the deity worshipped in Minoan times (Peatfield 2001, 53), B. Rutkowski has not done the case a favour with his overly confident statements such as "[The choice of cult places at high altitudes] shows that they attributed to the divinity the characteristics of the ruler of the heavens, who was lord of all atmospheric phenomena, and in particular brought strong, gusty winds, and—rain" (Rutkowski 1971, 9), and he does not even cite supporting evidence for his belief that rain magic was the most important element of peak sanctuary ceremonies. His hypothesis that people turned away from heavenly and towards chthonic divinities after the Thera eruption is indeed highly unconvincing. For criticism of Rutkowski's ideas see Dietrich 1971; Peatfield 1983, 278–279; Bloedow 1990, 64 footnote 38; Peatfield 2001, 53 (pointing out that Rutkowski is not even coherent in the number of deities he postulates). The abandonment of a large number of peak sanctuaries in early Neopalatial times is a fact however; D. Panagiotopoulos tentatively suggests a change in ritual practice that would have transferred the cult from the peak sanctuaries to inside cult chambers painted with nature motifs (Panagiotopoulos 2008, 139). As for Rutkowski, it is further not clear to me at all why the erection of built structures in peak sanctuaries from MM III onwards should be treated as first evidence of "a cult of the goddess's spouse, who, having taken over some of her functions, was worshipped because he could produce rain brought by lightning" (Rutkowski 1971, 18).

[23] Marinatos 1993, 119. 148 endnote 2. Cf. Watrous 1996, 27. 92.

[24] Peatfield 1990, 120; Peatfield 1996, 22–23. Cf. Grötzbach 2004, 460. The significance of accessibility and proximity is also stressed by Rutkowski 1971, 16 and Panagiotopoulos 2008, 127, but is denied by Watrous 1996, 91 with footnote 119. The connection of animal figurines and upland grazing was also suggested by Halstead 1996b, 27. See also Chaniotis 1999b, 192 footnote 15; Davaras 2010, 76.

protect lifestock is widespread in other communities and an association with both animal and human fertility very frequent[25]. (Of course it cannot be ruled out

[25]For example in the Andes (Reinhard 1985, 311). Cf. Price 1981, 10; Marcus 1992; Grötzbach 2004, 460. The dedication of figurines such as weasels and hedgehogs in some of the sanctuaries does not contradict this hypothesis: whether a votive accompanies a positive wish ("I am giving you a terracotta sheep to ask you to protect my sheep") or a negative one ("I am giving you a weasel to ask you to keep all weasels away from my beehives") is impossible to say. (This consideration of course casts a rather amusing doubt on representations of pregnant women or phalloi.) The idea that the weasel figurines represent pests which the worshipper asks to be spared from has also been put forward *e. g.* by Myres 1903, 381–382; Pilali-Papasteriou 1985, 155; Jones 1999, 33; Dietrich 1969, 267–269 ("This type of apotropaeic [*sic!*]ritual [...] was known well enough to the Mediterranean world and does not require any specific references."). Marinatos 1993, 117 does not seem to have a problem with this idea either, comparing it to modern Greek Orthodox practices (Cf. Peatfield 1992, 61). Watrous 1996, 27 however criticizes such notions as "strained and unconvincing" and reckons that the practice of dedicating apotropaic votives is "virtually unknown in later Greek or in Near Eastern cult". "Not in later Greece" is not a convincing argument, however, since peak sanctuaries are a phenomenon of the Minoan period and the Minoans are utterly different in many respects from the later Greeks. Moreover, the weasels, beetles *etc.* are hardly numerous enough to represent a very common practice; the majority of figurines represent sheep and cattle (and besides, a few exceptions are known from later Greece, too, which have aroused similar consternation, see *e. g.* the amusing comments on the 'sechsbeiniger Käfer' from Olympia by Rouse 1902, 299–300 with footnote 10). Of course it is also possible that such figurines were not apotropaic, but just unlikely dedications by wacky types, and Lance Watrous himself has pointed out that the same votive can be given for different reasons (Watrous 1996, 90). Others have suggested that weasels were, as in Classical Greece, kept as pets to keep mice away from the house (Rutkowski 1991, 36). The beetles have been interpreted as religious symbols, which in view of several known beetle-shaped rhyta seems not improbable, see Rutkowski 1986, 89–91; Davaras 1988; Watrous 1996, 83–84; Burkert 2011, 50. Cf. the remarks of Koster 1977, 364–365 about the importance of scarabs or dung beetles for the fields and mountainside in modern mainland Greece.

Clay phalloi are published from Atsipades only but may have been present at other peak sanctuaries, too. Such votives are, in accordance with later Greek practice but also for obvious reasons, normally interpreted as evidence for a fertility cult (Peatfield 1992, 79; Warren 1992, 81), but A. Peatfield also thought it possible that they represent the prayer for the cure of some medical condition. Moss 2005, 98, claims that the model penises from Atsipades "all appear to be circumcised or have the foreskin pulled back. Many have an exaggerated ring around the base of the *glans*. [...] Peatfield suggests that they may be a sign that the men in the area suffered from a particular, as yet unidentified, problem". It does not seem to me that this is precisely what A. Peatfield intended to say, and what is more, I do not think that the clay phalloi show abnormalities, and a pulled-back foreskin would hardly be surprising if they refer to sexuality and potency. However, for model limbs (arms and legs), for example from Petsophas, no other interpretation than a prayer for healing has so far been put forward (Peatfield 1992, 74). Cf. van Straten 1981, 103. 146. Eva Wacha, Institut für Klassische Archäologie Heidelberg, thinks that the oft-cited figurine of a woman allegedly suffering from elephantosis may be incorrectly restored and the two legs may actually have been of the same thickness (*pers. comm.* 2010). To my eyes, however, the spot where the leg gets thinner does not look like a point of breakage, but like a proper step in the clay—very odd indeed (although nobody has ever commented on the that the figurines represent 'substitutes' for more costly offerings in the form of sacrificial animals.) The question remains however why pastoral sanctuaries in upland locations emerged in EM III/MM IA and not earlier. In accordance with their presumed pastoral aspect, Alan Peatfield connected the development with a (hypothetical) increase in livestock husbandry during this period. This idea has been refuted on the grounds that the settlement pattern does not match such a scenario[26]. Donald Haggis has somewhat expanded this idea and argued in favour of a connection to palatial economy and a role of the peak sanctuaries as "the social and religious basis of the elite authority's control over regional production and mobilization"[27]. Jenny Moody on the other hand has suggested that the establishment of the cult was prompted by a change in climate towards the now common summer drought in lowland pastures, which caused sheepherders to move into the mountains. This would mean that an alteration in society and ultimately in religion was brought about by environmental change, although, as J. Moody herself points out, things may not be quite as straightforward, and it is likely that environmental and political developments were highly entangled. The evolution of a drier climate could however also reinforce the idea of a rain or water cult in Crete and would help to explain the establishment and popularity of sanctuaries in locations connected to the origin of water[28].

In addition to what has been said, Peatfield regards it as possible that other, more elevated parts of the mountains, where material evidence for worship is lacking so far, may well have been considered to be sacred or even inhabited by the gods, but, because of their remoteness, not fit for worship, or at least not for worship that leaves any trace[29]. Whether this argument could be taken so far as to suggest that these peaks were not *allowed* to be visited (cf. above, p. 4.4) I dare not say. At any rate, the fact that certain elevations may have been hardly or not at all accessible for parts of the year through snow and ice should also be taken into account.

complete lack of arms and potential medical implications); cf. the photograph in Davaras 1976, 246 Fig. 138.

[26] Peatfield 1990, 126; Peatfield 1992, 78–79; Watrous 1996, 73–74.

[27] Haggis 1999, 77.

[28] Moody 2009b, 248 with footnote 38.

[29] Peatfield 1990, 120; Peatfield 1996, 22–23.

The idea of 'pastoral' sanctuaries frequented primarily by sheepbreeders is somewhat difficult to reconcile with shrines on isolated hills such as Iouchtas and Petsophas which are unanimously identified as peak sanctuaries, but were hardly part of the pastoral landscape proper. Having said that, I do not necessarily think these cases should be treated as a separate category either[30]. This would only make sense if material evidence from a number of them indicated a distinctly different cult altogether. But even if their cult was different in character (which however does not preclude worship of the same deity), they are still elevated sanctuaries just as much as all the others. It may be unlikely that all elevated cult places all over Crete were dedicated to the same deity, but as long as there is hardly anything we know, we may well hold on to the universal aspect of elevation. It is also not clear why such a cult should cease so abruptly: only eight peak sanctuaries were still in use in the early Neopalatial period[31].

Other evidence for Minoan mountain cult is no less confusing. In the absence of written sources, the only hint from lowland sites to the existence and nature of mountain cults is the odd iconographic representation (interestingly, or rather worryingly, no comparable representations are known so far from artefact assemblages from the peak sanctuaries themselves[32]). Representations of goats, lilies and crocuses are often used to indicate a mountain environment[33]. One of the main pieces of evidence is a fragmentary LM IA ovoid rhyton from the palace at Kato Zakros showing a built structure with a spiral-adorned façade (see Fig. 11.4). The wings of the building are surmounted with Horns of Consecration and flagpole-like staffs. Four wild goats lie on the flat roof, and on the steps in front of the structure a table-like structure, unequivocally identified as an altar, is set. Two single *agrimia*

[30]Cf. Marinatos 1993, 117, "[...] it is [...] clear that it [the sanctuary on Iouchtas] was visited also by common men—shepherds, peasants, and the like".

[31]Soetens *et al.* 2000, 319.

[32]A terracotta model of a circular hut has been found in Gournos Krousonas (Psiloritis) in 2003 and is believed by the excavator to represent the structure that once adorned the peak (Rethemiotakis 2009, 198–199).

[33]Marinatos 1993, 193. Her claim that wild crocuses grow only on hilly terrain in Greece is true of many, but not all species native to Crete: *Crocus boryi* 150–550m, *C. cartwrightianus* 30–60m, *C. laevigatus* 0–2350m, *C. tournefortii* 0–200m (Turland *et al.* 1995, 177–178). On the subject of the Theran "Saffron Gatherers" fresco, O. Rackham observed: "whatever the plant is [...], the ladies are clearly dressed for a garden-party rather than for roughing it in the phrygana" (Rackham 1978, 757).

**Figure 11.4:** Rhyton from Kato Zakros, often said to show a peak sanctuary (from Schiering 1998, 10 Fig. 9a-b)

are depicted on the opposite side of the rhyton, one in ‘flying gallop’, the other standing up, possibly against the slope on which the building is set. Crocuses are shown growing on the rocks. Remains of gold leaf indicate that the vessel was formerly gilded[34]. Because of the character of the depicted environment, this is usually taken to be the most significant representation of a peak sanctuary that has come down to us[35]. One of the few critical voices in respect to this identification is E. F. Bloedow. He certainly has a point in observing that the fancy façade depicted on the rhyton does not go very well with the hypothesis of peak sanctuaries being mainly used by shepherds[36], and I would like to add that the find spot of the rhyton, the palace at Zakros, also contradicts this interpretation to some degree (even though a large proportion if not the majority of sheep seems to have been owned by the palace, see chapter 10). The visual links between palaces and peak sanctuaries have also often been cited as a sign of the influence of the former (or even the “manipulation of peak sanctuaries by the central authority”[37]), but it should be remembered that other sites shared these links (see above).

A group of fragmented seal impressions found at Knossos and originating from the same ring depict a scene which is commonly known as the ‘Mother of the Mountain’ (see Fig. 11.5)[38]. The scene involves a female figure holding a staff on top of or above a rippled conical structure, arguably a rugged mountain[39]. On either side of the alleged mound stands a feline animal with its front feet supported

[34] For a more detailed description and a bibliography see Koehl 2006, 103–104 (no. 204).

[35] A similar tripartite structure crowned with ‘Horns of Consecration’ in rocky terrain is represented on an MM III/LM I rhyton fragment from the Gypsades hill at Knossos. A male figure in or in front of the building seems to be bending down over a basket-like object standing on the ground. For a more detailed description and a bibliography see Koehl 2006, 180 (no. 764). Mention should also be made in this context of the so-called ‘meeting on the hill’ scene in the Miniature Frieze from Akrotiri, Thera, which has been interpreted as a procession to a peak sanctuary (Iakovidis 1981, 58). No architectural structures are depicted on the summit.

[36] Bloedow 1990, 62–63. 67. For another new interpretation of the motif, namely as the ‘Temple Tomb’ at Knossos, see Platon 2003. Burkert 2011, 50–51 first confirms the notion of shepherds as worshippers, then claims a connection between peak sanctuaries and palaces.

[37] Soetens *et al.* 2006, 319.

[38] CMS II 8 no. 256. The coining of the phrase ‘Mother of the Mountain’ is normally attributed to Arthur Evans, even though there are no allusions to this term in his writings about the sealing (not in Evans 1928b, 809, not in Evans 1964, 463 and not (the only entry in the index as “goddess associated with mountain”) in Evans 1935, 596).

[39] This ‘scale mountain’ has been claimed to originate in the Near East where it denotes ritual scenes (Crowley 1989, 131–133). The treatment of the subject by Crowley can hardly be called profound however.

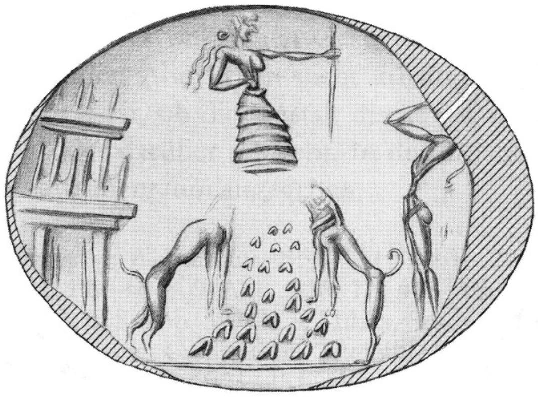

**Figure 11.5:** Seal impression from Knossos showing the so-called 'Mother of the Mountain' (drawing; from CMS II 8, 397)

on the slope. On the left side a building can be made out, whereas on the right a male figure is depicted in the so-called adoration gesture, with one hand raised to the head[40]. Representations such as this inevitably lead to the complex question of the possible existence of a Potnia Theron (Lady of the Animals), and the fact that she was at least once depicted holding *agrimia*[41] does make a certain connection to the mountains plausible—even if this may mean nothing more than that the mountains were not excluded from her realm. This is supported by several seals depicting a (seated) female figure, arguably a goddess, feeding a wild goat[42]. A mountain goddess has hence been postulated, sometimes even extended to a 'Great Mother' and the likes[43]. Although the notion of wild animals being owned by the mountain deity can be found in other societies[44], the iconographic evidence for such a designation in the Minoan context is hardly overwhelming, even less so since it

[40] For a discussion of Minoan gestures see Morris – Peatfield 2002.

[41] Namely on a gold diadem from Kato Zakros, found (with two other gold objects) in a field before the discovery of the palace (Platon 1967, 169. 171). See also Hiller 2001, 297.

[42] CMS V Suppl. 1A no. 175; CMS II, 8,1 no. 261; CMS II, 6 no. 30; CMS X no. 160. When the animals are being fed, it is always goats; a connection to a similar Near Eastern motif has been suggested (Schuhmann 2009, 42–43 with reference to Crowley 1989, 34). For a discussion of the role of goats in Aegean religion see Hiller 2001. I do not attempt to postulate the existence of a goddess which could be called 'Potnia Theron', let alone a 'Goddess of the Wild Goats' here, I am merely stressing the fact that what appears to be a divine figure is with a certain frequency depicted with wild goats, decidedly mountain animals (Cf. criticism in Thomas – Wedde 2001, 9; Hiller 2001, 297–298).

[43] Evans 1928b, 808. See also for example Levi 1981, 39.

[44] Reinhard 1985, 311.

has been shown that ‘Potnia Theron’ is “a pictorial motif, not a deity”[45]. We are hence no further in identifying the object of peak sanctuary worship, nor can the question of why the Minoans performed rituals on the mountains be answered with any certainty. Inconclusiveness notwithstanding, it has been suggested more than once that the Cretan landscape was to some extent responsible: “Crete is primarily a land of mountains. Its traditional economy is based on the Mediterranean staples of olive, vine, and pastoralism. These are the typical resources of a marginal landscape. Any culture that evolves in such a landscape is going to have an appropriate ritual response to it, and for the Minoans that response was the cult of the peak sanctuaries”[46].

Minoan cave cults may or may not have been of a slightly different character[47], but since some of them are located in great elevations[48], they must be mentioned here. The Idaian Cave, although not visible from afar (see Fig. 6.2), may have prompted the structuring of the Psiloritis landscape with a prominent route[49]. The great underground chamber at Psychro is similarly located in the foothills above an upland plain, as is the Trapeza cave (both in Lasithi, see Fig. 7.2 and Fig. 7.4). The most interesting example in this context however seems to me to be the Kamares Cave (see Fig. 6.1), whose visual links with the palace at

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[45] Thomas – Wedde 2001, 12; Schuhmann 2009, 120. D. Palermo’s reasoning that the association of Potnia and wild goats was deeply rooted in Minoan tradition fails to convince (Palermo 1992, 29). See also Marinatos 1993, 148 endnote 2.

[46] Peatfield 1996, 21. Cf. Panagiotopoulos 2008, 120–123; Wallace 2010, 320. Cf. also Dunn 2005, 117: “The emergence of the sanctuaries was a response to the physical environment, and its development can only be assessed in the context of the whole environmental picture.” Paul Faure expressed similar thoughts, stressing the life-sustaining wealth of resources which would have been available from the mountains, as well as their function as outlooks and shelters (Faure 1972, 425). For an extreme case of ecodeterminism in view of religion see Suzuki 1989. For a more moderate position, asserting that the influence of geography on religion is an indirect one, see Otto 1989; Gehlen 1995, 67–75.

[47] In opposition to other scholars (Marinatos 1993, 124; Peatfield 1990, 130; Peatfield 1992, 61), Watrous 1996, 92–96 claims they were indeed very similar and that they “share a similar concern but perhaps a different set of deities”. In the case of Kamares, P. Faure suggested that the water at the bottom of the cave may have been an important element (Faure 1964, 181; cf. Verbruggen 1981, 95–96; Rutkowski 1986, 52–53; Tomkins 2009, 145).

[48] For a concise list see Verbruggen 1981, 92 footnote 110.

[49] Panagiotopoulos 2007, 17. It has to be said though that evidence for Minoan rituals in the Idaian Cave is far less substantial than at Psychro (Cromarty 2008, 50).

Phaistos are supposed to have been of religious significance[50]. This does not mean it could easily be reached from there, at least not in a day-return procession[51]. It is a mystery to me how people could have made their way to the Kamares Cave (certainly not in winter) carrying dainty and fragile ceramics[52] and in Middle Bronze Age footwear—although T. A. B. Spratt noted the fitness and superiority of the traditional Cretan boot for the sharp-edged terrain of Sphakia[53]—, when even today, in 21st century state of the art hiking equipment, the almost vertical rocks are a trying climb (although I acknowledge that things may be different for people driven by religious beliefs).

## 11.2 Post-Minoan Crete

The number of known elevated sanctuaries of the Early Iron Age in Crete is not large, but the topographical situation of some of them, such as Vasiliki Kephala and Smari, has been described as "extreme"[54]. According to S. Wallace, such locations often had "historical associations"[55]: Mount Iouchtas and Kophinas (in the Asterousia range) were still frequented, and cult in the Idaian and Psychro Caves seems to have continued through the 'Dark Ages'[56]. The Patsos cave, at an absolute height of 450m in the Agios Vasilios valley, is linked to the cult of Hermes Kranaios, but was also used for cult purposes through the Iron Age[57]. A. Chaniotis has pointed out that continuity in usage of a cult location does

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[50] Faure 1964, 182. Driessen – Macdonald 1997, 200 have doubted the cultic character of the cave as such.

[51] As also pointed out by Tyree 2006, 336.

[52] Most of the pottery found in the cave was coarse ware though, see Faure 1964, 180; Tyree 1974, 39. Cf. Faure 1969, 184 (referring to the peak sanctuary of Keria in Psiloritis, at 1160 m): "Tout culte d'hiver est exclu: la région est abandonnée du début de décembre à la fin d'avril, tant la neige y est épaisse et le froid vif." However, it has to be borne in mind that Bronze Age climate may have been warmer, cf. p. 213.

[53] Spratt 1865b, 155. Rackham – Moody 1996, 154 provide references to ancient sources on this subject.

[54] Matthäus 2008, 239. For Vasiliki Kephala see Eliopoulos 1998 (who likens the setting, despite its moderate height of 210 m, to Karphi); cf. Perna 2004, 170. This was the site of a settlement in FN-EM I, too, see Nowicki 2002, 32.

[55] Wallace 2010, 321.

[56] See Prent 2005, 158–162. 165. 167–170. 314–320. 331. 339–348.

[57] See Hood – Warren 1966, 185–187; Sporn 2002, 251–252; Prent 2005, 156–158. 312–314.

not necessarily mean continuity of rituals[58]. This also applies to Kato Symi. This sanctuary, at a height of 1130m on the south flank of Dikti, has evidence for Bronze Age ritual activity within a 'sacred enclosure' but cannot be classified as a 'peak sanctuary'. It is today surrounded by a landscape of pine forest and beehives. The cult place seems to have been open to the sky; in Protogeometric times, a bothros altar was constructed, and bronze votives, among them cut-out plaques of men carrying wild goats, were dedicated. At least from the 6th century onwards, the recipients of worship can be identified as Hermes and Aphrodite, and the cult seems to have been connected to initiation rites. Cult continued, though on a seemingly reduced scale, into Late Roman times[59]. Because of the apparent importance of the sanctuary, it has been suggested that the *Ἱερὸν ὄρος* mentioned in Ptol. *Geog.* 3,17,4 refers to the part of the Cretan Dikti range on which Kato Symi is situated, but this may be just another case of what Paul Faure observed: "les monts sont si nombreux dans cette région et les options des archéologues dépendent tellement de leurs trouvailles ou de leurs sentiments"...[60]. He himself however deduced from the mentioning of a nymph called 'Dikte' by Servius (4th century AD) that the whole mountain range of this name was divine[61], which seems slightly over-enthusiastic. In Archaic to Hellenistic Crete, the best-attested mountain cult is that of Zeus. Zeus' connection with the Cretan mountains was established at least since the 8th century, when Hesiod described the birth of the divine baby and how his mother Rhea hid him in a cave in the Cretan mountains[62]. In view of her essential part in saving the life of the highest god, she certainly deserved to

[58]Chaniotis 1992, 88–96. Cf. Chaniotis 1988a, 22 with footnote 4. See also p. 149.

[59]This account relies heavily on Sporn 2002, 85–89. See also Prent 2005, 170–174; Lebessi 1985; Lebessi – Muhly 1990; Erickson 2010, 239.

[60]Faure 1958b, 512. The Kato Symi idea was put forward by Lebessi 1985, 18 and backed by Sporn 2002, 85. According to A. Chaniotis, the sanctuary was located on the border between Lyttos and Hierapydna (Chaniotis 1988a, 34; Chaniotis 1991, 101. 104; Chaniotis 1996a, 129). Chaniotis 2006b, 201 even suggests that the borders of Hierapydna, Lyttos, Biannos, Priansos and Arkades would have met here. See also Faure 1958b, 511–515; Langdon 2000, 466 footnote 22.

[61]Faure 1964, 182 with reference to Serv., *In Vergilii carmina commentarii* 3,175.

[62]Prof. Dr Jochen Althoff, Seminar für Klassische Philologie Mainz, has uttered his curiosity as to why exactly the Cretan mountains were chosen as the hideaway for the endangered babe (*pers. comm.* 2010); I suggested that it may have been the same reasons that until the present day make places like Zoniana and Sphakia uncontrollable for and perfect hideaways from the current authority—the Greek state today, the Germans during the Second World War, the Venetians in the 13th to the 17th century, Kronos in the days before man.

be worshipped with her son. Nonetheless, a joined cult of Rhea as the 'Mountain Mother' in the Cretan sanctuaries has often been postulated, but definite evidence is lacking so far[63]. Although ancient opinions as to its exact role in the myth of Zeus' birth vary, the most important cult place of this god in the mountains seems to have been the Idaian Cave, as not only the finds and their provenances, but also literary sources attest (see section 6.6). In Crete, the majority of Zeus' shrines were located in elevated positions[64]. One of these places may have been Mount Iouchtas (811m at its highest point), where locals lead visitors to 'the tomb of Zeus'. Although the tradition of the death and burial of the highest god is an ancient one (at least since Kallimachos in the 3rd century BC[65]), the association with Iouchtas is later, and may have been spurred by the appearance of the hill as the head of a reclining bearded male when seen from the sea (or the pier of Iraklio, see Fig. 11.6).

Indeed, it has been suggested that the name *Γιούχτας* is derived from a hypothetical *Διός-ὄχθος, 'Mountain of Zeus'[66]. However, a sanctuary or at least regular sacrifice to Poseidon is also attested on this mountain[67]. Weather-related epithets documented in Crete include *βρονταιος* (Thundering) and *ὑετίος* (Rain-bringing)[68].

With reference to Hesiod (Hes. *Th.* 969–974), Roman poets connected the goddess Ceres with the Cretan Ida, which is characterized as wild and remote[69]. An amazingly small number of Greek potsherds on the summit of Pyrgos near Tylissos has been taken as proof of worship of Apollon and Hyakinthos in this location; this is impossible to sustain[70].

A. Chaniotis has suggested that a number of sanctuaries owed their supraregional status to their geographical position in the mountains, *i. e.* in a liminal

[63] See Kern 1926, 217; Béquignon 1958, 177; Sporn 2002, 330; Collard – Cropp 2008, 539 footnote 5.
[64] Sporn 2002, 320.
[65] Call. *Jov.* 8–9. See Cook 1914, 157 footnote 4 for a complete list of ancient sources.
[66] Faure 1958a, 146. On Iouchtas and Zeus see Verbruggen 1981, 63–67.
[67] Chaniotis 1988a, 26. 33; Chaniotis 2001, 324; Sporn 2002, 136–137; Prent 2005, 320.
[68] Sporn 2002, 320. 378–380 Table 2a-d. Cf. the contrasting statement in Verbruggen 1981, 143–144.
[69] George 2006, 232.
[70] See Sporn 2002, 147 with footnote 992. Levi 1981, 40 states the hypothesis as if it were a fact and does not even give sources, and it has to be said here that the whole paper is shockingly unscientific.


**Figure 11.6:** Mount Iouchtas as seen from the pier at Iraklio (April 2009)

zone[71]. For some of the places given by him, such as Kato Symi and the Idaian Cave, this is quite plausible, whereas the sanctuary of Zeus Diktaios at Palaikastro is situated in the plain, in area X[72].

## 11.3 Conclusion

As in many parts of the world, mountains were part of the religious landscape of Crete, at least from the Bronze Age. The so-called peak sanctuaries of the Palatial Period were not necessarily all dedicated to the same distinct deity. It has here been argued that they were connected to the origin of weather and water, and a pastoral aspect seems not implausible. Water, being essential for the (mountain)

[71] Chaniotis 2009, 64–65. Cf. Rehak – Younger 2001, 434 for Bronze Age Kato Symi. See also p. 224.

[72] Hutchinson 1940, 40. H. Verbruggen claims that *δίκτη* means 'elevation' and derives, besides the epithet of Zeus, 'Diktynna' and 'diktamon' from it (Verbruggen 1981, 134–138). See also Chaniotis 2001, 325–326; Prent 2005, 350–353.

economy, may have led to a more general concern with fertility that was directed towards the land, the animals and human beings, as reflected in the votive figurines. Although, as has been shown above, cult places in the mountains and on peaks existed in Greece and Crete in other periods too and indeed until the present day, they are never as abundant as in the First Palatial Period, albeit seemingly mostly in the eastern half of the island. It must remain an unprovable hypothesis that climate change may have played a role in the emergence of a possibly water-related pastoral cult, but no better alternative has been offered as yet. Neither this nor any other explanation can elucidate why this specific type of ritual site was only ephemeral.

In the generally rather underresearched later periods, Cretan mountain cults sometimes focus on age-old cult places, although this may not mean continuity in the strict sense of the word. As elsewhere in Greece, Zeus was the deity most frequently worshipped in elevated places, which were sometimes not out in the open, but in caves. Mountain sanctuaries may have played political role as border markers or meeting places.

# Chapter 12

# LM IIIC ‘defensible settlements’

Upland locations in Crete rise to unrivalled prominence at the very end of the Bronze Age: in the pottery phase labelled LM IIIC, virtually all communities move from the plain to more elevated locations. Only three large coastal settlements and a number of rural farmsteads remained in use in the plain[1]. The debate about the motivation for this choice still goes on after a century of more or less thorough research and will be discussed here in some detail.

The pattern of abandonment of long-established lowland settlements and the foundation of new habitation sites on relatively accessible, but in all cases elevated locations is an almost island-wide one and can hardly be denied. From early on, even when far fewer LM IIIC sites were known, it was suggested that the pattern reflects a concern for defensibility, and consequently, the term ‘refuge settlements’ was introduced. However, this appellation does not seem to fit all topographies in question. For example, Metaxia Tsipopoulou criticizes the fact that very few such sites are as markedly inaccessible and naturally fortified as to justify their use as refuge settlements[2]. This is no doubt true—even the more ‘remote’ settlements like Karphi and Kastro (as opposed to places like Azoria,

[1] Nowicki 2000, 14.

[2] Tsipopoulou 1995, 190; Tsipopulou 2008, xviii–xix. As examples of such sites she names Monastiraki Katalimata, Elliniki Koriphi and Adrianos Fortetsa. For the latter two sites see Wallace 2010, 62–63. Cf. Haggis’ 2001, 52 criticism that “the ‘refuge settlement’ paradigm has become an interpretive tool leading to overly broad or coarse interpretations that tend to obscure or to ignore local systems of settlement, local social contexts, and indeed local causal factors of culture change”.

which are not remote at all) are accessible on two feet without ropes, but maybe more consistent use of appellations could help to calm such worries. K. Nowicki therefore now differentiates between 'defensible sites' and 'refuge sites': settlements in elevated positions can be classified as the former, whereas the latter are "situated above or close to defensible settlements". At least some of them are indeed located in such extreme settings that it is easy to believe that only desperate conditions could have tempted anyone to inhabit a place like that. By far not all sites adhere to the suggested two-partite system, but the most spectacular example are two settlements on the northern Ierapetra isthmus: Chalasmenos on a sort of foothill, Monastiraki Katalimata perched on terraces on one of the almost perpendicular sides of the Cha gorge, a giant crack in the west flank of the Thriphti range, with walls rising up to 300 m (see Fig. 12.1)[3].

The number of known LM IIIC sites in the areas analyzed in the present study is comparatively large, although numbers vary greatly between regions: there are far more in the east of the island than in the west, which, seeing as K. Nowicki has scrutinized the whole of Crete and only one has been found in intensively surveyed Sphakia, is unlikely to be entirely due to problems of visibility or lack of research. It should be noted that most debates on the subject of LM IIIC sites is based on topographic characteristics and models, since the number of those actually dug up is minuscule compared to the number known from survey. Moreover, two of the 'excavated' ones, which have become some sort of role models for this type of settlement, namely Karphi and Kavousi Kastro, were unearthed in a fashion which can easily be argued to have done more harm than good. Of the ones more thoroughly researched and actually deserving the predicate 'excavated', only one has been published to an extent that could begin to satisfy the thorough archaeologist: Kavousi Vronda (see p. 305). The neighbouring Kastro (see p. 313) has also been researched in the course of the same project, but no final report has been produced. These two are the only defensible sites from which faunal remains are published at all, albeit in a preliminary fashion and not strictly differentiating between the two sites and phases (see p. 317). The basis for an analysis of man-

[3]For the suggested terminology of sites see Nowicki 2000, 14–15; Nowicki 2008a, 3. 71. He later classified LM IIIC settlements even further (Nowicki 2004, 279). Obviously these differentiating terms are not always used consistently by other scholars, leading to more confusion. Traunmüller 2005, 138 thinks even the term 'defensible settlement' is too broad.


**Figure 12.1:** Situation of Monastiraki Katalimata (marked by letters A–K) above the Cha gorge (from Nowicki 2000, 93 Fig. 41)

environment interactions at the Bronze Age/Iron Age transition is therefore not plentiful[4].

The first question to ask is what caused the profound change in settlement pattern. A threat arriving from the sea has often been suggested and does indeed fit the pattern of total abandonment of the coastal plains that is observable in the regions studied here, as well as everywhere else in Crete. The formerly oft-cited Sea Peoples have somewhat gone out of fashion as the ones to blame, and piracy has been favoured recently[5]. However, this does not explain the manifold

[4]For an attempt at reconstructing the economy of those days see Nowicki 1999a.
[5]Prof. Dr D.Panagiotopoulos *pers. comm.* 2010; cf. Tsipopoulou 1995, 190.

instances not only of sites within short walking distance from the sea but even less so of those actually on the coast (though in elevated positions). If they were just small sites, one could argue that they could represent look-out posts like the ones that existed in Crete in the 19th century, a pirate warning system, if you will[6], but the excavations at Palaikastro Kastri, on a hill 70m above the shore, show clearly that this was a proper (if small) settlement[7]. K. Nowicki has suggested as a solution that "the LM IIIC Cretans were not only the victims, but also the authors, of disturbances within the Aegean at the turn of the 13th century B.C."[8]. At least in the case of Palaikastro Kastri, the fact that the settlement was destroyed and abandoned within 100 years could also indicate that the attempt at defence on the promontory from sea-borne attacks eventually failed. Other LM IIIC settlements, such as Vronda, do not show any signs of destruction and were seemingly abandoned in an orderly fashion. For a long time this argument also applied to Karphi, but new exploration has produced evidence for destruction by fire and the 'success' of the settlement may have to be reassessed[9].

Although the drastic climate change at the BA/IA transition with very dry conditions has been suggested to have contributed significantly to the disruptions that led to the end of the Mycenaean palaces on the mainland, this hypothesis has very rarely been transferred to Crete, despite the probable Mycenaean domination there at the time in question. However, when the idea has been put forward, it has been criticized that an explanation of how this relates to the distinct topographical choices underlying the new pattern has not been provided[10].

The pattern has even been suggested to be the result of "well-joined-up decision making" to form a true network of defence across large parts of the island[11]. Why

[6] Spratt 1865b, 3: "Similar guards or look-outs are perched upon the most conspicuous eminences along the whole coast of Crete, at distances of eight or ten miles apart, whose beacon-fires blaze up at dusk, if a vessel comes in sight, in order to warn the neighbouring villages and authorities that a strange sail is off the coast. It is doubtless a custom handed down from the earliest times, especially when piracy was frequent; but it is kept up now mainly to prevent smuggling." Cf. Hayden 2004, 385.

[7] See map in Nowicki 2000, 51 Fig.10.

[8] Nowicki 2004, 279. Cf. Nowicki 2008a, 85. See also Wallace 2010, 60.

[9] Wallace 2012, 34.

[10] Climate as a factor was suggested by Andreadaki Vlazaki 1991, 421; Moody 2005, 465; Tsonis *et al.* 2010. Criticism comes from Wallace 2010, 59. See also Rohling *et al.* 2009, 5.

[11] Wallace 2010, 66.

there are as yet hardly any 'defensible' settlements in the western part of Crete cannot really be explained—it seems unlikely that the west would for some reason have been less dangerous, and there is no reason to suppose it was significantly less densely populated either[12].

Despite the criticism that the hypothesis of defensibility concerns is not always entirely coherent, no convincing alternative model of explaining the peculiar siting of these settlements has been brought forward. Whereas S. Wallace and K. Nowicki are therefore looking for "a single all-embracing political cause"[13] to explain the topographic characteristics, others have stressed the differences between locations and environments and refute the idea of a "once-for-all" explanation[14]. D. Haggis is certainly right in calling for individual rather than general analysis and in asking: "Are these Dark Age settlement data more than the (circular) argument that conditions in the Mediterranean around 1200 B. C. were unstable, characterized by lack of organization, structure, and typically the movement of populations (invasions, piracy, itinerant mercenary activity, migrations)?" Nonetheless, the suggestion that the economic value of the hinterland could have been the incentive that lured people to the upland sites[15] is not convincing at all. For example, the choice of the Kastro for settlement has sometimes been explained with the fertility of the arable land in its vicinity; W. D. E. Coulson has also stressed the nearness of springs and the importance of such resources in LM IIIC because marine trade routes were disrupted[16]. However, the nearest springs are Mylora, situated higher up the mountain, above the terraces to the south-east, and Xerambela (near Vronda), at 300m below the Kastro[17], so neither is very close. As for the 'sudden' need for fertile land to ensure self-sufficiency, this is a highly unconvincing argument, since it is unlikely that people would really have relied on

[12]Cf.Nowicki 2008a, 84.
[13]Wallace 2010, 58.
[14]Snodgrass 1987, 187.
[15]Haggis 1993a; Haggis 2001, 51; Haggis 2005, 19; Traunmüller 2005, 46. 130–134. 138.
[16]Coulson 1998, 40.
[17]Gesell *et al.* 1992, 120; Haggis 2001, 57. For a map showing the location of the spring see Haggis 2005 Fig. 22. Boyd's report that the eastern slope had been terraced and planted with barley when she came there (Boyd 1901, 137) reinforces the value attributed to the upland fields before the introduction of large-scale irrigation in the plain: it is hard to imagine people would have climbed up to plant grain unless they really needed to.

*trade* for a living in LMIIIA and earlier[18]. The basis of subsistence would always have been agriculture and stock-keeping.

This applies to Kavousi Kastro as much as to all other defensible settlements: people *lived* in these places for at least several decades if not longer, and living requires food and water, so it is hardly surprising that in times of a seemingly more or less continuous threat, people were keen to have some sort of agricultural potential close to their new home. Having said this, even though such resources had to be accessible, this does not mean they were better than those in the vicinity of earlier settlements. Saro Wallace has analyzed the agricultural potential of the hinterland of LM IIIC sites and found that in most cases, access to suitable areas was actually more difficult than before and that the idea of an increased reliance on shepherding cannot be justified topographically either, even less so given the political instability of the period[19]. K. Nowicki has also denied the claim that the water supply in the mountains was the sole rationale for the move to the uplands, although according to him it is true that most refuge settlements have a water source within 10–20 minutes walking distance (something that does not apply to Kavousi Kastro though)[20]. Most and foremost, it seems to me, the economic explanation is invalidated by the fact that the majority of settlements newly founded in LM IIIC were abandoned after about two centuries[21], so the advantages cannot have been convincing enough to tempt people to exploit these locations earlier nor later. It seems rather that people only stayed in the cumbersome location as long as absolutely necessary, which reinforces the notion of some kind of threat of attack. The suggestion that these settlements may be seasonally occupied herding sites—which, it has to be said, has really only ever been advanced for Karphi and Kavousi Kastro[22] and which of course could only apply to a number of sites

[18] Cf. Bintliff 1977, 114. Cf. however also Rackham 1990c, 106: "Nature has intended Greece to be a land of trade rather than self-sufficiency."

[19] Wallace 2003, 613; Wallace 2006, 161; Wallace 2010, 73. Cf. however Moody 2012, 242, who states that although economic concerns were probably not the prime trigger, the move to the uplands bore consequences for agriculture and stock-keeping: the former would have become more seasonal, and the latter seems to have experienced an increase in sheep/goat-rearing.

[20] Nowicki 2000, 25. For distance to other resources and overlapping territories/exploitation zones see Wallace 2000, 65.

[21] Wallace 2010, 234. Pausanias offers a different explanation why people moved to the coast (Paus. 3,2,7).

[22] Karphi: Watrous 1977, 2–3. Kastro: Day 1990, 173.

situated in the uplands proper—can be refuted. There is no observable settlement system of 'Ano' and 'Kato' habitations, and the cemeteries around the settlement and storage facilities inside the houses also indicate permanent residence[23]. H. Forbes's argument for the identification of isolated upland farmsteads as 'pastoralist' sites (the term being used in a sense that does not imply exclusive concentration on animals, and according to Paul Halstead[24] it should therefore be called 'herding'), convincing as it is, cannot be applied here: the sites analyzed by him are single buildings, not settlements. What may be of more significance is the strange absence of sites in the plain, which, even if they do not belong to the same people as the upland ones, are part of the system described by him[25]. Another argument for summer occupation only brought forward by some was rebutted by K. Nowicki who wrote: "It is not a good argument that during winter months the place was unpleasant, because at that period other factors ruled the settlement pattern. The life of refugees was in general "unpleasant" in comparison with that of the earlier period, but for most of them there was no way out; it was not a question of pleasure but a matter of survival"[26]. In other respects too the locations were unfavourable: space was limited in general and architectural options even more restricted by having to incorporate the protruding rocks[27]. For this reason, Jennifer Moody's climatic explanation of the change in architecture from Neo- to Postpalatial times may not be the whole truth[28]. This may also, according to S. Wallace, ultimately have been the reason why the settlements were given up: there was no room for expansion, neither topographically nor economically[29].

The 'economic' hypothesis, where it strives to be universally applicable, also completely fails to acknowledge the existence of LM IIIC hilltop settlements on

[23]Wallace 2003, 602. 613; Wallace 2010, 74. The fact that seasonal occupation of Karphi would require a corresponding settlement at a lower elevation was noted by Watrous 1977, 3, but he did not pursue this idea any further.

[24]Halstead 2000, 122. See also p. 378.

[25]Forbes 1995, 337.

[26]Nowicki 1987a, 230.

[27]Cf. Wallace 2010, 107–108.

[28]Moody 2009a, 19. Cf. Hayden 1995, 128. Moreover, at the present stage of research it is difficult to tell what Palatial period upland architecture was like because there hardly is any, and with the same applying to LM IIIC lowland architecture, it can hence not be determined if, as is possible, architecture in the mountains was always different from that in the lowlands. Cf. Olshausen 1996, 8.

[29]Wallace 2010, 263. Cf. Wallace 2010, 67.

the coast, which are difficult to reconcile with the postulated growing importance of pastoralism and fertile mountain fields. These sites make more sense as (attempted) defensible settlements within reach of the old fields in the plain.

Continuity of the large lowland settlements at Knossos, Phaistos and Chania (although data are not detailed enough to ascertain its extent) does not necessarily contradict the hypothesis of there being a threat of attacks: big flourishing communities would have had the means and resources (both human and material) to protect themselves, and maybe also too favourable a location to give up[30]. A small rural farming community however would not have had much choice but to flee to a safer spot. Although Vrokastro is often cited as a model defensible settlement, the survey of the area has shown that no move inland is discernible[31], making a threat of attack from the sea less plausible. It is probably too bold to argue that the reason why the three large settlements persisted was that *they* were the actual source of the threat, chasing rural communities off their land and forcing them to exploit more remote areas. At any rate, it is not totally implausible I think that the breakdown of palatial control and the severe climate change with frequent droughts may have added up and resulted in a sort of civil war and a constant threat of attack by another Cretan community[32].

In spite of (or indeed maybe reinforced by) the threat which the inhabitants of these sites seem to have felt, they were not necessarily isolated from the rest of the world. In the Kavousi area, so-called clusters of settlements have been detected and argued to have promoted a kind of group identity (see above, p. 318). A similar case can perhaps be made for Karphi, which shows a similar agglomeration of sites in its neighbourhood (see above, p. 258). It is not unfeasible that social hierarchies existed both on an intra- and on an inter-site level. There are clear differences in size *e.g.* between Karphi and the other settlements on this side of Dikti, and also between the sites in the Kavousi area. Singular buildings at Vronda or at Kastro are also bigger than others within the same settlements. Beyond these very broad observations however, evidence is not plentiful enough to allow more

[30] As also argued by Traunmüller 2005, 138 and Wallace 2007, 253; Wallace 2010, 68. 70. Cf. the Hellenistic decision of the people of the island of Anaphe to move inland because of the small number of men (Ruschenbusch 1996, 198).

[31] Hayden 2004, 137. 146. 153.

[32] Cf. the ideas of Traunmüller 2005, 138.

precise reconstructions[33]. Although Saro Wallace stresses the landmark character of a site like Karphi, the implied social meaning of this feature does not seem to have translated into success for the settlement, which was abandoned after about two centuries (but before the soils around it destabilized in the 9th century BC). Some other LM IIIC settlements continued in their peculiar setting into the early Archaic period, among them Kavousi Kastro and Vrokastro. Wallace has argued that this may have been those sites, which, although being "highly defensible", had been founded in more favourable environments than others and which only eventually succumbed to the nucleation process of the Archaic polis-emergence in places with more space for growth, in advantageous rather than defensive locations[34]. A prime example of this is Azoria, which continued into the Archaic period but was given up at the beginning of the 5th century, possibly in favour of Hierapydna. In Lasithi, population numbers may have dwindled due to migration to Lyttos. Other LM IIIC sites with continuity into the Archaic period went on to become influential poleis in later centuries, for example Eleutherna, Prinias or Sybrita (none of which is located in a particularly dramatic position).

All in all, although K. Nowicki has suggested a concern for defensibility in other chronological phases too (see p. 427), the case that can be made for it is never as strong as in LM IIIC. The strategy chosen need not have been the same in all cases. A characteristic shared by most of them is that they have a view to the sea, and many are not actually located inland. Only some communities re-enforced the natural defence properties of their new homes with walls on the most assailable side[35]. However, hardly any LM IIIC settlement had direct access to a source of freshwater. Moreover, at least in some cases, it seems that the houses, although probably blending in with their surroundings by virtue of their building materials, must have been visible or at least not deliberately hidden (cf. Fig. 12.2 and for example p. 366 (Kalamafki Kypia)). These facts bear implications for the interpretation of these settlements. During the Second World War, people

[33] Traunmüller 2005, 137 acknowledges the lack of data but nonetheless makes confident statements about the existence of elites and their taking part in trade and gift exchange.
[34] Wallace 2003, 605; Wallace 2010, 163. 238–239. 263.
[35] See Wallace 2010, 66. 69. The explanation given by her, namely that these sites served as refuges for the inhabitants of the large lowland sites, fails to convince—it seems unlikely to me that people would have run to these elevated sites when the enemy appeared on the horizon.

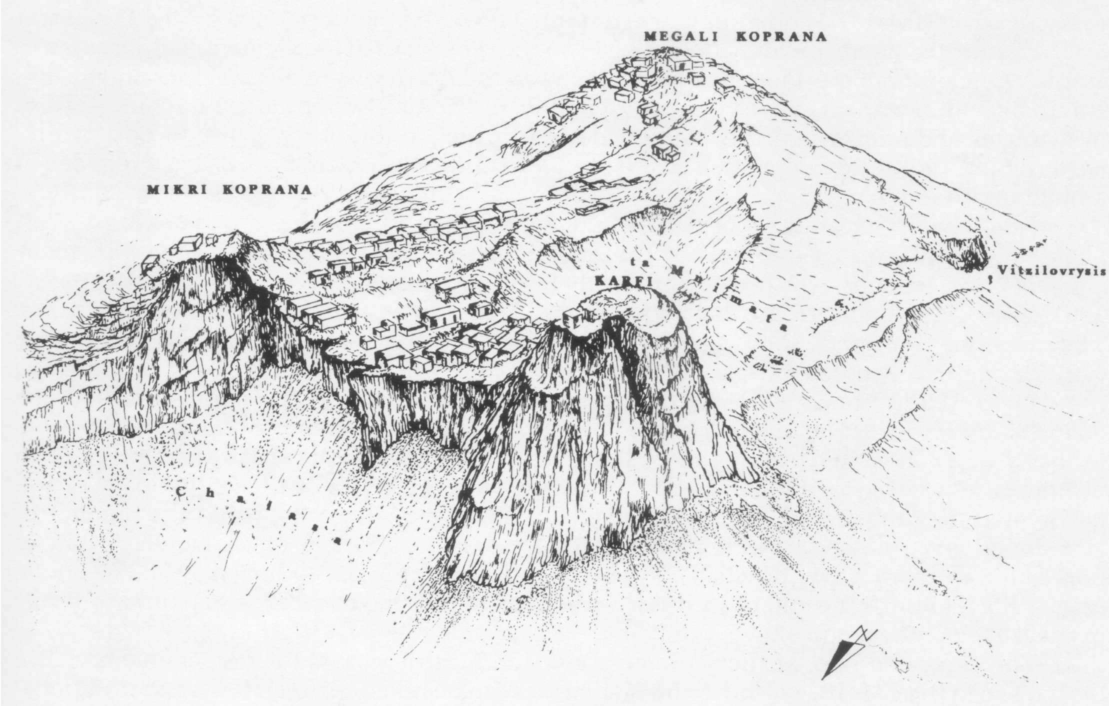


**Figure 12.2:** Reconstruction of the settlement at Karphi from north-west (from Nowicki 2000, 161 Fig. 92)

remained in their normal settlements, whereas those fighting the invaders hid in the most inaccessible parts of the mountains, in caves and places known only to locals and their trusted equals such as John Pendlebury or Patrick Leigh Fermor. The LM IIIC defensible settlements therefore clearly respond to a different situation. They were not chosen as hiding places, nor would they have had the capacities to withstand a siege (if such a concept existed at the time). They seem to me most useful as lookouts in a fairly safe place, which might also have enabled at least the more vulnerable parts of society to retreat into less dangerous areas. Places like Monastiraki Katalimata on the other hand appear like a last resort option in the truest sense of the word. The only way out, if an attack succeeded to ascend the gravel slope (which seems unlikely enough) and enter the settlement, was over the edge. Even if similar locations were chosen earlier in the Bronze Age, the phenomenon remains ephemeral, and the settlement pattern changes as soon as the situation allows.

# Part IV

# Synthesis

# Chapter 13

# Synthesis: A history of man and the environment in the uplands of Crete

> *Don't be afraid to say you don't know. Pseudo-history is started by scholars clutching at straws.*
>
> Rackham – Moody 1996, 10

Every evening from spring to autumn in the Askyphou mountain plain in Sphakia, 700 metres above the sea, the visitor beholds a fascinating spectacle: a Cretan in a typical super-suspension pick-up truck crawls along the unpaved road behind a bunch of self-willed sheep, ceaselessly honking his horn in an effort to encourage the animals to make their way to the communal milking hall, in which they finally disappear. Shortly afterwards, an old man in a woollen cloak, carrying a shepherd's crook, comes striding along the same road, whistling every now and again in a special way, and a flock of sheep and lambs follow him in a surprisingly orderly fashion (see Fig. 13.1). As so often in Crete, it seems as if several layers of history became suddenly present at the same time in the same place, and as if some of the roads in Crete—especially those in remote areas like Askyphou—were leading directly back into the past[1].

[1]"The love-affair of northern Europeans with the Mediterranean has always contained an element of wonder at a quality of timelessness: many commentators have reached for phrases like 'time stands still' and 'just as it must have been when [Odysseus; St Paul; Petrarch; Jackie Onassis] stood here'" (Simmons 1993, 100).

**Figure 13.1:** Shepherd and his flock, Askyphou plain, Sphakia (April 2011)

The idea of this project was to write a history of man-environment interactions in the Cretan mountains in antiquity. In the course of study it has become clear that human impact on the environment is even more difficult to prove than vice versa. Exceptions are obvious modifications such as terracing or the introduction of certain animal and plant species, although even here in many cases it can be debated whether a wild ancestor did not exist on the island. The difficulties are not limited to the lack of adequate palaeoenvironmental data, a lack that is largely due to neglect during the (early) exploration of many sites: even where data are accumulated, they are often not easy to connect to human activities. For example, in the case of Karphi, soil loss can be proven, but it took place in the $9^{th}$ century, 100 years after the abandonment of the settlement. Similarly, the presence of botanical remains at a site does not, if one is absolutely correct, prove that a certain plant was grown in the vicinity and hence does not offer conclusive data for landscape reconstruction. This has become clear in the case of the olive stones from Karphi or the exotic spices at Chrysokamino. The reasoning is stronger where faunal remains are concerned, since it seems unlikely that carcasses were transported over long distances; however, it cannot be ruled out that live animals were driven to a site from far away before slaughter.

With two regions that include the plain and elevations of 700 metres and beyond (Kavousi, Sphakia), two areas of flat uplands (Lasithi, Ziros) and one with a bit of everything which can serve as an example for the problems of studying a region where no survey has been undertaken (Psiloritis), I think the wide range of different yet similar landscapes (and the different states of exploration) is an advantage more than a drawback[2]. Only the inclusion of both uplands and coastal plains in some regions allows a potential distinctness of the mountains to emerge by providing comparative data. Nonetheless, the different composition of the regions chosen must be borne at the back of one's mind, since obviously drawing comparisons and discovering patterns is somewhat hampered by this approach. Matters are further complicated not only by the different chronological resolutions achieved in individual surveys (high in the Kavousi area and Lasithi, very broad in Ziros and Sphakia), but also by the different subdivisions: for example, in the Kavousi area, one phase is EM III-MM IA and the next MM IB-II, whereas in Lasithi, EM II-III is succeeded by MM I-II. Therefore, just as geographical generalizations like 'Crete' or even 'eastern Crete' are difficult because of the diversity of environmental conditions, it is impossible to speak of 'developments in Early Minoan' and the likes.

## 13.1 Man and the environment through time

### 13.1.1 Neolithic

The first noticeable human impact on the Cretan environment was the extinction of the Holocene fauna of dwarf hippos, miniature elephants and giant deer

[2]This opinion seems to be shared by others: "My view is that interpretations are often more convincingly supported by identification of strong, widespread patterns of lower-resolution data than reliance on one-off cases of high resolution" (Wallace 2010, 7), although of course the implications of this assessment are worth thinking about.

which seems to have taken place—whether through a *Blitz-* or a *Sitzkrieg*—before the Neolithic. Until very recently, it was assumed that this must have happened through hunting expeditions to Crete from elsewhere, since there was no evidence for pre-Neolithic human presence in Crete. Only in 2010 have artefacts from the south coast of the island proven the more or less permanent presence of humans in the Palaeolithic[3]. Parts of Cretan environmental history may have to be rewritten with further research. Nonetheless, the coming of the Neolithic presented an arguably even more fundamental change than the extinction of the Pleistocene fauna: the introduction of domesticated species of plants and animals. Exactly *why* people chose to colonize Crete will maybe never be known. Though certainly not the trigger of colonization, climate may have played a role[4]. The climate which the first settlers on the island experienced was up to 5 °C cooler and much wetter than today, with rain all through the year and accordingly a vegetation that included elements which are nowadays restricted to more temperate regions. Even if the Cretan vegetation can plausibly be argued to have already been adapted to browsing through the habits of the Pleistocene fauna, it is certain that agriculture required the clearing of areas for planting crops. It has often been suggested that open spaces had to be created as pastures for sheep and cattle. However, since ovicaprids and cattle, like pigs, can be left to roam bosky areas, it is not clear how much of a role this aspect would have played in the modification of the landscape[5]. The vegetation that was thus removed was, as has been shown, certainly not always forest, but either way these activities represent a serious modification of the 'natural' environment. It is not clear yet whether this impact started on an island-wide scale straightaway. The earliest Neolithic settlers, who most likely migrated to the island with the full Neolithic package in tow[6], seem to have stuck to their settlement in Knossos for several millennia. The only other ENL sites

[3]See Broodbank – Strasser 1991, 236 for some thoughts.

[4]Broodbank – Strasser 1991, 238.

[5]This is true even if cows were not as big as 455 kg and requiring 68 kg of grass every day as stated by Strasser 1992, 172—they may have been more in the region of 250 kg. See also p. 328 footnote 296. Cf. the numbers given by Netting 1981, 25. 31 for Alpine cows: weighing, on average, 440 kg rather than the usual 700-800 kg, every single one of them needs 2800 kg hay to get through the winter. For roaming pigs see Meyer *et al.* 2004, 87–98. 109–111; Albarella *et al.* 2011; Halstead – Isaakidou 2011.

[6]Broodbank – Strasser 1991, 239–240 (with an estimation of the cargo required for settling the island). Cf. Perlès 2001, 61; Kotsakis 2001, 58.

known so far are the Gerani cave west of Rethymno and the Lera cave on the Akrotiri peninsula (a site near Malia has been postulated on the grounds of cereal pollen from the second half of the 7$^{\text{th}}$ millennium BC found there, but it seems dangerous to presuppose the presence of humans from one piece of environmental evidence)[7].

The introduction of new species affected not only the areas controlled by humans: some animals seem to have escaped and over time bred into independent 'wild', or rather feral varieties, as for example the *agrimi*. The same is true for many plants; besides agricultural crops, lots of other neophytes have come to the island over the millennia (most infamously Arthur Evans' tree-of-heaven (*Ailanthus altissima*) which has so far resisted all attempts at controlling its spread), and some of them have naturalized[8].

The earliest NL farmers in Crete cultivated bread wheat (*Triticum aestivum*), which is otherwise typical for (Central) Anatolia—another indication that the settlers may have migrated to Crete from there, since the Greek mainland at the time knew only *T. dicoccum* and *T. monococcum*[9]. They kept sheep, goats, pigs and cows, which were used for traction but could still contribute to the milk and meat supply. Hunting and fishing on the other hand did not figure prominently in the diet and economy of the early Neolithic in Crete. This does not seem to have changed much when settlement expanded into mountainous parts. Although arrowheads for example from Katharo may indicate hunting activities, they can of course be used to shoot humans too. At the present state of research, this expansion of human activities outside Knossos cannot be detected before the Final Neolithic. Remarkably, it then took in all available ecozones, from coast to high mountain areas such as the Katharo plain, at 1150 m ASL in the Dikti range, or the Madares in Sphakia (1778 m), although the latter site probably represents only a very short-term stay. This exploitation of all ecozones did not necessarily happen all at once: it is dated to the 'Final Neolithic', a period of about 1000 years, and may have been a more gradual process than appears at first sight. Because of the poor state of research, "a settlement study in the form of a presence-absence

[7]Watrous 2001, 162; Tomkins 2008, 28–29. Cf. the chapter on methods, p. 15.
[8]See Rackham – Moody 1996, 57.
[9]Perlès 2001, 62 with footnote 12. See Evans 1971, 98 for what the Knossos settlers brought to the island.

experiment, in which site presence is represented by dots on a map, is the only way to approach Cretan Neolithic settlement on an island-wide scale"[10]. This however makes settlements look contemporary that might not be. Nor can the function of sites be determined when these are known only from survey—it can hence only be *assumed* that they are connected to the *assumed* farming practices of the period[11]. In the case of the Idaian Cave, at 1538 m another high-elevation site, it is well imaginable that the Nida plain was used for agriculture, but research is lacking completely.

In contrast to caves such as the Idaian and the Kamares Cave in the Psiloritis or Trapeza and Psychro in Lasithi, which were used for habitation in the FNL, open-air settlements are never, it has been argued, placed randomly, but reflect the "decision-making processes" of people. It has been shown that Cretan Neolithic settlers deliberately chose certain soils, namely Holocene alluvia and late Miocene to early Pliocene limestones and marls (rendzinas), maybe because of the ease with which they can be worked[12]. This implies that prospectors or people in general must have been able to recognize these soils (though it should be noted that tried and failed locations may be difficult to identify). However, as T. Strasser has pointed out, "[o]ne should not confuse efficient land-use with a balanced ecosystem. An awareness of an environmental potential does not signify some sort of conservation ethic on the part of these societies"[13]. The surveys included in the present study also refute Paul Halstead's theory that both eastern and western Crete were colonized belatedly[14]. Among the favoured locations in all parts of the island were the characteristic Cretan mountain plains: Lasithi, Katharo, Lamnoni, Katelionas, Anopoli, Asphendou and Askyphou all have FNL material.

Other locations have led to the characterization of the FNL in Crete as a 'flight to the hills', possibly as a response to immigration from outside the is-

[10] Strasser 1992, 135.
[11] Strasser 1992, 136.
[12] Strasser 1992, 143. 149. Kavousi and some other important sites were not included in the analysis. Note also Strasser's shortcomings in the gazetteer, where, in stark opposition to the title of his study, he does not even note the type of soil or the topographical situation of the sites.
[13] Strasser 1992, 151. For the question of 'ecological' thinking in antiquity see also Hughes 1980; Hughes 1983; Rackham 1996, 33; Shipley 1996, 4. 12–13; Sonnabend 1996, 151 footnote 1 (with references); Dillon 1997, 113–114; Ettrich 1999b; Desideri 2001, 17.
[14] Halstead 2008, 248. Cf. also Strasser 2008, 161.

land, or population pressure in the plain, or in search for protection from raids or floods[15]. A case in point is the FNL occupation of Monastiraki Katalimata, easily the most extreme position for a settlement imaginable (see also above, chapter 12 and Fig. 12.1). Although it is impossible to disprove the scenario of an outside threat and it may contain an element of truth, describing the phase in this way is, to say the least, misleading: the settlement pattern, as reconstructible from the available data, is not confined to 'defensible' hills but includes coastal plains as well, as in both Sphakia and the Kavousi area and in Vrokastro[16], and with the large timespan included in the term 'FNL', it is impossible to tell which settlements were occupied simultaneously[17]. Moreover, it is not clear to me where all those people now fleeing to the hills are supposed to have lived before, seeing as apart from Knossos, hardly any earlier settlements are known[18]. Krzysztof Nowicki attributes the defensible settlements to "both groups of people, namely Cretan refugees and foreign intruders"[19]. He does not pay the slightest attention however to evidence for activities in the coastal plains or, to name but one example, to the fact that besides the indeed rather inaccessible Tzermiado Kastello, there were also traces of human activities on the lowest slopes around the Lasithi plain. In fact, other archaeologists have actually detected a coastal preference for this period[20]. P. D. Tomkins has suggested that "the greater concern for security seen in some areas may reflect intensifying local competition within and/or between sites, manifest in a developing sense of territoriality and resource circumscription, perhaps caused or exacerbated by a major shift towards greater climatic uncertainty that may occur around this time", *i. e.* the mid-4$^{\text{th}}$ millennium[21]. A similar idea, namely that climate change caused floods in the plain, was put forward by L. Vagnetti[22]. Tomkins argues that this would have compelled people to move into agriculturally

[15] Population pressure: Branigan 1998, 81. Immigration: Hood *et al.* 1964, 51 (who do not suggest any explanation for the phenomenon for which they found "some evidence" however). Raids and floods: Faure 1965, 29. Attacks: Nowicki 2008a, 72–76; Nowicki 2008b.

[16] For Vrokastro see Hayden 2004, 35. 45–46. More lowland sites may await discovery, not having been located yet because of inferior visibility (Tomkins 2008, 38–40).

[17] See Tomkins 2008, 36 for some thoughts on the supposed immigration.

[18] Cf. Tomkins 2008, 38.

[19] Nowicki 1999b, 579.

[20] Hayden 2004, 45 with endnote 95.

[21] Tomkins 2008, 38.

[22] Vagnetti 1972, 133.

less favourable areas. He concludes that it "may be more than simple irony that marginal colonization in Crete appears to coincide with a shift towards increased aridity and interannual variation in precipitation, a change which may have made farming such landscapes more unpredictable than at any point in the previous three millennia"[23]. This hypothesis too does not explain where people lived before the expansion, as Tomkins himself admits: the large number of FNL sites as opposed to those of earlier phases could reflect a population increase or simply be the result of settlement in more visible places, with riverine locations just not found and recorded yet. The enforced rather than deliberate move into marginal lands could explain however why many FNL sites did not continue into the Early Bronze Age, a phenomenon also observable in the Ziros uplands: Cyprian Broodbank has contended that these soils would have suffered from overuse under increasingly arid conditions and eventually become too unproductive to support the population. However, again it should not be forgotten that the pottery of FNL styles equal a timespan of circa 1000 years, and since nobody knows for how long within this span a particular site was occupied, it may not be appropriate to speak of 'failure', a term which seems to me to imply a short time. Besides, not all sites ceased to exist; Eleftherna is an example of a site that persisted. In some cases in the Kavousi area the pottery is also datable closely enough to make it clear that a site continued from NL into EM I-II. I am wondering whether the seemingly large discrepancy between settlement locations could also be resolved through the argument of imprecise dating and chronological difference: there is enough time in a millennium to accomodate periods of relative safety and one or more of instability or fear of raids. Expansion to the uplands in general could also have appeared favourable during the short-term cool and dry events in the Aegean, when temperatures dropped by about 2 °C and rainfall diminished.

The only two Neolithic faunal assemblages published so far are from Magasa (problematic because of the early date of its exploration) and Azoria, which can hardly count as the highlands proper. At Magasa, sheep, goats and marine fauna were identified. At Azoria, the evidence is not substantial either, consisting of the

[23] Tomkins 2008, 39.

bones of a single pig. The first evidence for donkeys in Crete is also from the FNL, and at any rate they were probably on the island long before horses[24].

### 13.1.2 EBA

The first problem in researching EBA man-environment interactions is the difficulty—especially in survey—of distinguishing between FNL and EM I pottery. (This, however, is a wonderful illustration of the pitfalls of dividing 'culture' into 'phases': people did not stop using 'NL pottery' because somewhere on their island someone used bronze for the first time and someone else had a new idea for decorating pots.) The transition from NL to EM pottery coincides with an arid phase, but it is not clear how this influenced settlement patterns or economic strategies.

An orientation to the coast has been detected in the Vrokastro area, paralleling the pattern around modern Kavousi: here, the EM IIA material from Tholos testifies to port activities, and the main settlements of the period are Agios Antonios Alykomouri (a hill of just 120 m height) and a site in the location of the modern village. In Sphakia, too, pottery dated to EM II-MM is found on the coast (in the Frangokastello plain or at the mouth of the Trypiti gorge, at later Poikilasion), but upland localities such as Aradena and the Anopolis plain (ca. 580 m) and the mountain plains (Asphendou, Askyphou) are used, too, a phenomenon also observed around Vrokastro[25]. The findings from Debla on the north slope of the Lefka Ori, at 540 m ASL, also show that the uplands were not neglected *per se*, despite the fact that at the present state of research it seems that some other mountain regions are rather void of EM material. Scarcity or even absence of evidence applies to the Ziros uplands and to some extent to Lasithi, where the only five settlements known are arranged around the edge of the plain. In the Psiloritis, very few EM sites are known, but the area is too poorly surveyed to make this a reliable result.

Some caves began to be used for burial, while others seem to have been inhabited for the first time, like Sentoni (630 m ASL) in the Psiloritis. This cave and the open-air settlement at Debla are the only sources for upland economy in

[24] Jarman 1996, 212–214; Moody 2012, 241.
[25] Hayden 2004, 69–71.

the Early Bronze Age. They show that at Sentoni the full range of domesticated animals—sheep, goats, pigs and cattle—was kept or at least consumed and possibly that deer, which must also have been brought to Crete from elsewhere, were hunted. Debla seems to have been more of a (seasonal?) herder's site, although this does not preclude that the emmer (*Triticum dicoccum*), barley (*Hordeum* sp.) and oat (*Avena* sp.) found here were grown by the same people in the vicinity.

Overall, there is now evidence for more settlement at higher elevations than before, but this interest does not seem to go beyond medium heights (up to 800 m). The phenomenon is also recognizable in central and west Crete. The Vrokastro area again provides a parallel however: in EM II-III, the number of sites between 300 and 700 m height increases (although overall numbers remain small)[26].

A very dry spell hit Crete between about 2200 and 2000 BC, at the EM III-MM IA transition. Although upland areas near Kavousi began to be exploited in this period, the focus of settlement is in the coastal plain, and the 'Metallurgical Site' at Chrysokamino, in an utterly barren place, experienced its main phase of use. Lasithi remained settled, with a predominance of locations on low hills around the edges of the plain, maybe to avoid flooding.

### 13.1.3 MBA / Protopalatial Period

In the time corresponding to ceramic phases MM I to LM III, climatic conditions resembled in some ways the Little Ice Age of the Middle Ages, with low temperatures and increased precipitation which, however, would have been unevenly distributed and may thereby frequently have interrupted crop cycles. Despite these problematic conditions, settlement and exploitation of the countryside flourished. In western Crete, settlement numbers are bigger in the Proto- and Neopalatial periods than in any other prehistoric phase[27]. Within this broad date range, all elevations and ecological zones were exploited, from the coastal plain of Frangokastello to the mountain plain of Askyphou, the Agia Aikaterini ridge (later the site of the city of Anopolis), where two houses may have been more or less continually inhabited since the FNL, and up to the Madares and a stunning height of 1826 m.

[26] The explanation given for the emergence of 'open settlements on high ground' by Warren – Tzedhakis 1974, 339 fails to convince.

[27] Moody 2004, 253.

The Dikti range (where dating seems to be less of a problem) was all but depopulated: the Lasithi plain had at least two substantial settlements, and they and also the smaller ones were situated, as in later EM, on hills around the edge of the mountain plain. Defensive concerns may have played a role[28], though alternative explanations such as the problem of floods on the bottom of the plain or the avoidance of building over arable should also be considered. MM II material has been found in the surrounding mountains.

In the Kavousi area, MM IB-II is the most populous phase. It seems that the need was felt to go looking for new locations offering access to everything required for subsistence economy: a reliable water source, agricultural land and pasturage. Newly founded dispersed hamlets or farmsteads with MM I-II material like Vronda or Chondrovolakes (265 m) are examples of this development. The Vrokastro area can serve as a comparison: here, pottery of MM I-II is found in many sites at elevations between 450–700 m, and overall site numbers indicate a population explosion in the Middle Bronze Age[29]. Maybe this can be connected to the dry conditions prevailing in Crete, especially its eastern half, in those centuries. The Agios Vasilios valley offers a parallel in that at the end of the Protopalatial period, the settlement pattern changed towards dispersal. In MM III-LM I Kavousi, it seems that people were forced to make use even of marginal soils in order to meet their needs.

In Ziros, a large number of settlements belong to MM-LM, but it is impossible to judge how many existed at the same time. Two settlements and two farmsteads with MM I-LM material as well as a number of Protopalatial peak sanctuaries are known.

Big and small grottoes were now used for burial and/or cult, for example the Kamares and maybe also the Idaian Cave in the Psiloritis, where nearly all sites known from this period are ritual sites. Besides the caves, these are 'peak sanctuaries', a type which emerged in the First Palatial Period in many areas of Crete. Situated on peaks (though rarely on the highest summit) or slopes in three to five hours walking distance from human settlement and arguably close to land used as pasture, these were, in all but a few cases, open air sanctuaries

[28]As suggested by Nowicki 1999c; Nowicki 2000, 32–33.
[29]Hayden 2004, 82. 93.

seemingly unmarked by any architecture. People deposited terracotta figurines in the shape of (domestic) animals and of humans or their limbs (legs, phalloi), but also seashells and pebbles as gifts for an unknown deity. Peak cults around the world and through all times as well as in Crete today are frequently connected to rain and water, the most essential basis of (not only) rural life. These may have gained even greater importance in times of unstable climate as described above. I have argued that both the topography and the finds from Minoan peak sanctuaries support the idea that the cult at these sites related to water and, in logical consequence, fertility issues. Of the areas analyzed in the present study, the Ziros-Praisos region and the Psiloritis each have several and Lasithi has one whereas, remarkably, none is known from Kavousi area—Sphakia has none either, but this is less surprising since the whole west of Crete is, with one exception, void of this type of cult site.

### 13.1.4 Neopalatial Period

During the Neopalatial period (MM III-LM IIIA 1), outstanding individual buildings appear in the countryside. There are two types, which should not be confused, although both kinds of structure have been suggested to belong to a kind of rural elite: 'megalithic farmsteads' are isolated and stand out through their building technique[30]. As for the case studies presented here, this type can be found only in the areas of Ziros-Praisos and of Kavousi. In the former, there is the 'Megalithic House' at Agios Konstantinos near Praisos with a rock-cut wine press, and another site near Ziros, at 650 m ASL between Kalo Chorio and Chametoulo. In the Kavousi region, examples are rather numerous: Chondrovolakes, Chrysokamino Habitation Site (LM IB), Katsoprinos, Agios Antonios and Panagia Avgo (LM I) have all been identified as megalithic farmsteads. D. Haggis has assigned them a function as centres of palace-directed specialized production of flax, vines, olives, fruits, nuts and wheat. P. Betancourt on the other hand has explicitly denied a palatial connection and describes such sites as self-sufficient mixed economy farms. Only detailed excavation with thorough recovery techniques of all botanical remains could throw more light on this issue. The other type of special building in

[30] See also Hayden 2004, 381.

the landscape are the so-called 'villas', for which it seems more certain that they really were some sort of palatial sub-unit with administrative functions, although far from all of them have yielded Linear A records or even seals. There are not many in the regions studied here: in the Katelionas upland plain, a villa has been surmised from survey results; much better evidence comes from the north-eastern slopes of Psiloritis, where building complexes have been unearthed at Tylissos and Sklavokampos. Much higher up on the mountain than any of these or any other villa in Crete lies the extraordinarily large building of Zominthos, whose position has been connected to the route from Knossos to the Idaian Cave, but also with natural advantages such as the (still flowing) spring, agricultural land (degraded since), ample pasturage and good visibility. Its abandonment after less than a century seems to have followed the demise of some of these favourable conditions through earthquakes, climate change and anthropogenic impact on vegetation and soils. New results however also show that the site was nonetheless occupied time and again in later periods.

LM II pottery has not been found in any of the regions reviewed here, and it can plausibly be argued that in 'remote' upland areas or at any rate outside Knossos, LM IIIA followed straight on from LM I, so that the missing letter in the ceramic sequence does not imply abandonment in this phase[31]. It should also be noted that at least in some regions, LM IIIA material is very scarce too. In Kavousi, sites are far fewer and also smaller, so much so that the region appears to have been almost empty. Moreover, all sites are at some distance from the coast. The whole area seems to have experienced a serious population drop: similar indications come from Gournia, Pseira and Mochlos. Lasithi has only very little evidence too, but it is difficult to speak of a slump because the preceding period is, apart from continuing cult activities in the Psychro Cave, poorly documented. One settlement however thrives, and a couple of tombs also testify to ongoing occupation.

From Ziros, LM III evidence is not quite so absent, and around later Praisos there is even an increase in settlement from LM IIIA onwards. In the Psiloritis, some parts of the settlement around the 'villa' of Zominthos were reoccupied. Tylissos and Eleftherna were inhabited too.

[31] Cf. Moody 2004, 257 for another explanation. LM II is missing from the Vrokastro survey too (Hayden 2004, 133).

The only LM faunal assemblage published in some detail comes from Eleftherna and comprises cattle, sheep/goat, pig, donkey, wild boar, badger and hare. The vague information from Zominthos includes little cattle and pig, whereas (fallow) deer and *agrimi* seems comparatively frequent. From layers dated to MM III-LM I in the Psychro Cave, bones of oxen, pigs, deer, goats and *agrimia* are reported, but since this is a cult context, the sample will probably be biased.

Some evidence for the economy during the Mycenaean rule of Crete (Knossos ceramic phases LM II – LM III A2) can be gained from the palatial Linear B records, which indicate that wool and textile production were a major concern and hence the scale of sheepbreeding on the island would have been considerable. Paul Halstead has argued for the existence of mixed herds of animals issued to shepherds by the palace and privately owned sheep, which would have been used to make up numbers in case of losses of palatial sheep. The herders themselves would not have specialized in pastoralism—nor in one of the commodities meat, wool or milk—, but practised mixed farming regimes like everyone else on the island[32]. The Knossos Fp and Fs series also mention oil, barley, figs, wine, and honey (some of them as offerings to the gods).

### 13.1.5 LM IIIC and the transition to the Early Iron Age

At the end of the Bronze Age, the settlement pattern experienced a more profound and obvious change than ever before. With the exception of the three large towns of Chania, Knossos and Phaistos, all communities abandoned the coastal plains and moved to elevated places. The most likely reason for this move is a threat of attack from which these more defensible locations offered some protection—not necessarily in all cases in the form of direct resistance, but possibly also by being set back from the sea, making attacks from there difficult, and/or by providing excellent outlook opportunities, which may have enabled early detection of and flight from the threat. An analysis of the exploitation territory of such sites has shown that, not surprisingly, the surrounding environment offered the requirements necessary for subsistence, but that in many cases these were less advantageous than the areas used before the shift. Because only very few LM IIIC settlements have

[32] Halstead 1999, 158–160; Moody 2012, 237. 239.

been explored, the data base for a reconstruction of the economy of this period is not large. At LM IIIC-Early Iron Age Kavousi, ovicaprids dominate (70–80%), but pig and cattle also played some role in the economy, much more so than wild animals and marine resources. The age profiles suggest that animals were managed to gain a maximum of bone marrow fat rather than meat, milk or wool, an idea supported by the large number of cracked bones. Dogs and badgers also featured in the diet, though overall probably only rarely. The percentage of sheep/goat exceeds those of all other published LM IIIC assemblages[33]. The high ratio of cattle bones at Kastro is noteworthy since the terrain is—although probably not impossible—much less suitable for these animals than around, say, Chania, which has even more cattle bones[34].

At Karphi, the comparatively large number of spindle whorls may imply the importance of sheep and wool in the economy of this community, and the preliminary analysis of the faunal material, albeit limited, confirms this. Horns of oxen, deer and goat were also found. Archaeobotanical remains include olive, grape, grain and pulses, and evidence for the presence of emmer, einkorn, olive, grape, almond and fig remains and various legumes is known from Kavousi Kastro.

The clustering of a number of settlements, usually of different sizes, in some regions such as Kavousi or the northern slope of Dikti around Karphi may be connected to some sort of hierarchy. Differential building sizes evolving in the course of settlement existence could also indicate social inequalities. I do not view this as irreconcilable with a situation of socio-political unrest. Attention has been drawn to the fact that despite the seemingly severe disruptions of the LM IIIC period, cult at some major sites continued—"[i]ndeed, the disruptions may even have enhanced the status of these sanctuaries, as secure points of social reference in a changing world"[35].

A large number of LM IIIC settlements did not persist beyond the Early Iron Age. The three best-explored ones, Karphi, Kastro and Vronda and many others such as Kalamafki Kypia in the Praisos uplands were all given up before 700 BC. In Sphakia, dating is not precise enough to allow a reconstruction of developments

[33]In contrast to the statements by Wallace 2003, 607. In fact, Kavousi seems to differ from every other site except Chalasmeno. This is actually noted by Wallace 2003, 605 footnote 37.
[34]A "mass of cattle bones" is also reported from Vrokastro (Hayden 2004, 152).
[35]Wallace 2010, 136. 316–318.

in the times of PG-G pottery styles. The defensible Kolokasia Kastro above the coastal plain was apparently given up after LM IIIC-Geometric, potentially in favour of Patsianos Kephala on a hill below, which seems to have survived into Hellenistic times. The site at Potamous Kitrogianni at 1586 m in the Madares with LM IIIC evidence continued into Archaic or even Classical times—this was certainly not a place of refuge, rather (seasonal?) life at such heights may have continued fairly undisturbed. Eleutherna, one of the very few known LM IIIC 'defensible sites' in the Psiloritis, is an interesting example: it is surprising how successful this settlement proved over the millennia, when today it is situated in an utterly remote area. Brice Erickson has argued that the location was actually favourable to international trade, although he "suspects that overseas imports on Crete tell us more about the trade relations of foreign states and less about what the islanders themselves were doing"[36].

### 13.1.6 Archaic

Although the long-standing notion of the existence of an 'Archaic gap' in archaeological remains from Crete in general has been disposed of lately[37], B. Erickson's review of the evidence produced the conclusion that "[i]f the demographic implications of the 6$^{th}$-century lacuna are taken at face value, the island suffered an environmental, economic, or military catastrophe on a scale almost unprecedented in ancient Greek history"[38]. A severe drop in population is more likely than the complete abandonment of sites: Knossos, on which the notion of the gap was first based and which indeed may have been completely deserted in the 6$^{th}$ century,

[36] Erickson 2010, 287–289.

[37] Wallace 2010, 330. See however Erickson 2010 *passim* for an update on ceramic evidence. See also Haggis *et al.* 2004, 344. The Sphakia survey has produced pottery whose chronological range includes the 6$^{th}$ century (Nixon *et al.* 2000, site no. 8.30).

[38] Erickson 2010, 13. He feels the need to explain that Crete is too diverse to suffer severely and on an island-wide scale from climate change: "Climatic change might account for the temporary abandonment of a single Cretan polis, region, or environmental zone, but it cannot account for a hypothesized abandonment of the entire island." His amendment that "[s]till, climate change may have been one of several interrelated causes of the apparent Knossian recession. For example, localized droughts may have exacerbating [*sic!*] interpolis hostilities" (Erickson 2010, 238) is invalidated by the fact that a climate crash occurred around 800 BC, *i. e.* at least 100 years too early to cause abandonment in the 6$^{th}$ century. See also Whitley 2001, 243–252.

may actually represent an exception rather than the norm[39]. Although more material is now being brought to the fore from the 7$^{th}$ to 4$^{th}$ centuries, data from this period which are usable for the present study are rather scarce (this problem is not even restricted to the uplands: there is still no properly excavated Archaic-Classical site in Crete[40]). There should be no shortage of potential, even though there has been some debate about the reality of the 100 Cretan poleis mentioned by Homer[41]. Saro Wallace has, I think, come up with a sensible thought: the term 'polis' "need not reflect permanent political independence: the frequent changes in territorial boundaries occurring in Archaic to Hellenistic Crete make any application of the term in this way across the period meaningless"; hence, what is more important is the independent *identity* of the collective unit. The formation of these 'polis'-collectives took place before the late 7$^{th}$ century[42]. From the case study regions, the clearest example for this development is Azoria, which had been the biggest settlement in the region already in LM IIIC. Praisos may represent the same process. It is interesting that despite the favourable soil conditions, no polis emerged in Lasithi. Not all of the new nucleated settlements persisted into Classical times: Azoria, Agios Georgios Papoura and others were abandoned[43].

From the 7$^{th}$ century on, the countryside appears to have been dotted with small sites consisting of a single or a couple of houses. These, and most other forms of rural settlement, are believed to have been occupied by "the least prosperous (indebted or conquered) and thereby least politically powerful classes of

[39] Erickson 2010, 235. 237–238. Cf. however his argument for the abandonment of Prinias ("Unless something is seriously wrong with the pottery chronologies, and barring a drastic shift in settlement location, it is hard to avoid the conclusion that Prinias was abandoned. [...] If Prinias was destroyed by enemy action, the source of contemporary Knossian troubles may have lain on a direct line farther south, in the direction of the Mesara plain" [*i. e.* in Knossos' rival Gortyn] (Erickson 2010, 241)) and cf. Erickson 2010, 11, where he speaks of a "a catastrophic decline in population, substantial cultural discontinuity, or some other phenomenon".

[40] As lamented by Wallace 2010, 4.

[41] See Erickson 2010, 5 for some references. B. Erickson has also argued that the inter-city rivalries and wars of the Hellenistic period may have their roots in "an unusually crowded and competitive environment too small and environmentally poor to sustain its many poleis and their compact territories" (Erickson 2010, 307).

[42] Wallace 2010, 340–341. Cf. Rackham – Moody 1996, 94; Erickson 2010, 248 (on the polis-status of Azoria).

[43] Wallace 2010, 331.

society"[44]. This changed, as seemingly quite a number of things, in the 6th century, for which "survey has yet to detect a significant rural presence. The tentative picture emerging from the preliminary reports of the various island surveys suggest the almost complete desertion of the countryside in the 6th century"[45]. If D. Haggis is right, Azoria again presents an exception to this: to judge from the findings published from this site, primary processing of agricultural produce did not take place within the *asty*[46]. Rather, the wheat and barley must have been threshed on dependent landholdings which supplied the city with foodstuffs. Besides the grain these included grapes, figs, chickpeas, broad beans, almonds and pistachios. Olives, however, apparently *were* pressed within the settlement. Sheep and goats are attested, as are pigs, cows and rabbits. Dogs were still eaten on occasion. *Agrimia* were hunted and some marine resources also featured in the diet[47]. Faunal remains from Eleutherna, though problematic, stress the importance of pigs in Crete in antiquity.

Although the beginnings of the poleis in Sphakia are harder to determine, the settlements seem to have persisted for a longer time than the short-lived Azoria: Araden, Anopolis, Tarrha, Lissos, and Poikilasion all have, as far as it is possible to tell from the coarse chronological framework of the survey, evidence for A-H occupation. They show differing strategies of positioning and subsistence: whereas Anopolis commanded a fertile upland plain from its ridge high above the coast, Tarrha is situated at the mouth of the Samaria gorge which offers no hinterland for agriculture and also makes all communication except by sea difficult. All of these cities seem to have got by without the use of the Madares, which are largely void of activity throughout the Greek and Roman period.

### 13.1.7 Classical

In the Classical period, the available data suggest a strong tendency towards nucleation in city states, with few or no signs of settlement in the rural landscape.

[44] Wallace 2010, 332–333. 336 with reference to Sjögren 2004. S. Wallace also cautions that "[i]n Crete, it is important not to confuse this with the tail end of the EIA citadel-site phenomenon".
[45] Erickson 2010, 11–12. According to him, cult at rural sanctuaries such as Psychro, Kato Syme and the Idaian Cave also declined in this period.
[46] See Kotsonas 2002, 52–53 for a cautionary view of this idea of a 'consumer city'.
[47] For marine resources in the ancient Cretan diet see Moody 2012, 255–258.

This pattern can be observed for example in the Psiloritis, where settlement is not well attested outside the cities of Eleutherna and Axos. The Kavousi area was largely abandoned, as was Lasithi. In Ziros, dating is too coarse to allow a settlement pattern to emerge, but Praisos was the main nucleated settlement in the region and marked one of its cult places with a temple on a hilltop at 600 m height.

The same picture emerges in Sphakia: except for the poleis of Anopolis, Araden and Tarrha, there are very few signs for human presence in the countryside. The position of Tarrha notwithstanding, there is a clear, albeit not exclusive, tendency away from the coast to heights above 300 m, which is not restricted to this part of Crete[48]. None of these fascinating sites has ever been explored to any reasonable extent, and in general, as noted above, the Classical period is one of a dearth of published evidence from Crete, and even more so as regards the uplands. Interestingly, however, the Idaian Cave, at 1538 m ASL, continued to be one of the most important cult places in Crete, where cattle, ovicaprids and hares seemingly were sacrificed to Zeus.

### 13.1.8 Hellenistic

The change in settlement pattern is best exemplified by Sphakia. Here, the Hellenistic-Roman period is the one with the greatest abundance of evidence. The city-states to the west of the area (Tarrha, Elyros, Hyrtakina, Lissos, Kantanos) formed an alliance which they called '*Orioi*', *i. e.* 'mountain-people'. Anopolis was given up in Late Hellenistic times, allegedly in favour of the coastal town of Phoinix (Loutro), although it is surprising that its favourable location and hinterland were not big enough incentives to stay. This may be an example for the general trend of a "descente vers la mer" that has been postulated for the 4$^{\text{th}}$ century[49]. Anopolis' neighbour Araden however remained settled and even held city status under the Roman rule, and agricultural use of the mountain plain of Anopolis also seems to have continued into Roman times. Although it is a tempting suggestion that the almost complete lack of evidence from the Madares and other areas above 800 m

[48] Cf. Brulé 1978, 145. 148.

[49] Brulé 1978, 148–149. N.B. however that Brulé bases his claim on the number of coastal settlements striking coins.

indicates the shift of the upper limit of land use with the settlements towards the coast, it is contradicted by the fact that abandonment of the high mountains had begun centuries earlier. As in Sphakia, other upland regions of Crete were not entirely deserted either, despite the—sometimes sudden—emergence of large settlements on the coast (*e. g.* Hierapydna): in Hellenistic Lasithi, although there are still only a few village-sized settlements, there is evidence for large-scale textile production, probably from local wool, in a specialized manufacture.

The settlement pattern in the Psiloritis is very badly known; besides the city of Eleutherna on its northern foothills, the other main source of evidence is the Idaian Cave, *i. e.* a cult site. The faunal assemblage from Eleutherna, if contradictory, testifies to the contribution of pigs and, though to a lesser degree, of cattle to the ancient Cretan economy, diet and cult. Horses, which were the size of ponies, were eaten too.

The most important export good, apart from cypress wood, may have been humans: Cretans were, from the 5$^{\text{th}}$ century onwards, sought-after mercenaries, despite their notorious uselessness at phalanx fighting[50].

### 13.1.9 Roman

Crete became part of the Roman empire in 69 BC through a campaign led by Caecilius Metellus (though one should always remain doubtful about actual *control* of its inhabitants and their activities), but does not seem to have been an important colony at first[51]. Nonetheless, the administrative system and pressure may have presented a significant change to the Cretans themselves[52]. This is also reflected in the exploitation pattern: rural settlement increases everywhere in Crete after the conquest, but especially in the 2$^{\text{nd}}$ to 4$^{\text{th}}$ century AD. In Kavousi, the probable farmsteads and some warehouses reflect the economical concerns of the era. In La-

[50] Brulé 1978, 157. 161–162; Erickson 2010, 14 with footnote 63. Cf. also Spratt 1865b, 256. Their deficits at phalanx fighting are mentioned by Platon (*Lg.* 625C-D) and Polybius (4,8); I would like to thank Prof. Dr Stefan Link (University of Paderborn) for providing these references. On trade and exports in (Hellenistic) Crete see also Viviers 1999, 229.

[51] Harrison 1988, 125: "One must marvel at the very limited role Crete and Cretans played in the first two-and-a-half centuries of the Roman Empire." Cf. also Chaniotis' 2008, 87 remark that in Roman times, the "administration of Crete was not a very challenging job".

[52] Harrison 1991, 115.

sithi, the attempted drainage of the plain and the siting of a number of farmsteads on the basin bottom confirms the pattern.

However, there is very little evidence from the Ziros-Praisos area after the destruction of the city by Hierapydna in 145 BC, and hardly anything is known from the Psiloritis in Roman times, but in the latter case, this may be due to lack of research more than to actual absence. There is evidence that locals were driven off their land by the Romans and forced to use marginal soils[53]. The goods produced by these people may nonetheless have been part of the export cargo including timber, wine (mostly *passum*, made from raisins and considered an all-purpose medicine), which seems to have become important for international trade at least in Roman times, and medicinal herbs[54].

The faunal assemblage from Eleutherna testifies to pig- and cattle-breeding; pigs may actually have been more important than ovicaprids. Unfortunately, the data are not clear enough to ascertain this strategy, which would be very unusual in Crete and and hence of great interest. If the animals could indeed be attributed to the free-roaming rather than the sty-fed type, this would hold important implications about the character and use of the surrounding landscape and potentially testify to a way of putting oak woods to the best economical use[55].

Cult activities took place in an elevated place at the 'Tomb of Zeus' on Iouchtas. Both Psychro and the Idaian Cave were popular cult places into early Christian times, when elsewhere, for example in Sphakia, churches were founded to cater for the inhabitants of farmsteads which had moved from the foothills into the coastal plain of Frangokastello.

[53] Raab 2001, 33; Hayden 2004, 213–214. This is somewhat in contrast to another claim about Roman economical administration, which holds that "the Romans recognised the existence of micro-climates within Crete and therefore promoted, whether actively or passively, the introduction or intensive practice of selective types of non-exhaustive agriculture" (Harrison 1991, 115). See also Sanders 1982, 32–35.

[54] Timber: Sanders 1982, 33. See however Chaniotis 1999, 209. Wine: Chaniotis 1988 (to be read with caution); Marangou-Lerat 1995; Marangou 1999; Vogeikoff-Brogan – Apostolakou 2004; Chaniotis 2008, 89–90; Erickson 2010, 281. Herbs: see section 4.3. Cf. the maps in Sanders 1982, 11. 12.

[55] The absence of suitable woodland habitats is often cited as a barrier to successful pig rearing (Mainland 2008, 547; cf. Waelkens et al. 1999, 702).

## 13.2 Aspects of man-environment interaction

### 13.2.1 Climate

It is only comparatively recently that human activities have reached such an enormous scale of harmfulness that they have a lasting impact on global climate. Until the 20$^{th}$ century AD, the relationship between humans and climate was strictly one way: climate changes occurred frequently, depending on sunspot activity and other natural phenomena that cannot be influenced by man. Just as with other environmental factors, people would have had to adapt to the prevailing conditions in their choice of settlement location, their way of life and their economy.

Although palaeoclimatic data such as pollen do not abound for Crete and some potential sources like speleothems have not been tapped at all, the influence of climate on diverse aspects of life can be asserted. To fill the gaps, deep-sea cores reflecting general trends have been used. However, it is debatable how reliably global developments can be related to such microenvironments, and the chronological problems in Aegean prehistory further impede correlation of climatic and archaeological data. Nonetheless, it is fairly certain that it was climate change that extinguished tree species which only prospered in the cooler and wetter climate of the Neolithic. Milder temperatures in the Bronze Age may have made highland locations such as Zominthos inhabitable year-round, while at the same time, the unpredictable conditions resembling a Little Ice Age may have spurred large-scale storage. An extremely warm and dry spell may have been one of the triggers or even the final straw leading to the political and social upheavals that seem to have shaken the Mediterranean at the end of the Bronze Age. A drop in temperatures in the 4$^{th}$ century BC is said to have put a (temporary) end to grain growing in the mountain plains of the island.

### 13.2.2 Settlement type and pattern

The case studies demonstrate how essential regional survey is for the reconstruction of settlement patterns; it is the only way to record alternating phases of nucleation and dispersal. (Finding reasons for these developments is a different matter: it is not always easy and sometimes impossible.) One of the most distinct characteristics of upland settlement is the popularity of upland plains, often of karstic origin, which is explained by the ruggedness of the majority of Cretan landscape. Besides Lasithi and its smaller neighbour Katharo, there are Askyphou, Asphendou and Niato in Sphakia and Katelionas and Lamnoni in the Ziros uplands, all of which were, though not continuously, exploited or inhabited by humans since the earliest times. (The Nida plain stands in the shadow of the Idaian Cave and is sadly underresearched.) The geological formation in the area of Zominthos is a plateau, not a polje, but has comparable qualities. The value of flat land in a place like Crete is further illustrated by the placement of settlements on rocky outcrops or surrounding hills to avoid the fertile plain, *e. g.* in the Ziros uplands in the Neolithic, in FNL-EM I in Askyphou, or in MM IB-MM II Kavousi[56].

Another clear pattern emerges in one chronological phase, namely LM IIIC; the influence of topography is never as obvious as here, when almost all settlements move to locations evidently chosen for their 'defensible' properties. T. Strasser has claimed that although "humans exploit the resources in the environment, and the choice of resources may be strictly cultural, they cannot predetermine where the resources are located. [...] Social and economic factors in settlement locations are, thus, secondary to environmental ones"[57]. This seems true only to a certain extent however, since in Crete—at least in theory and in the present climate—elevations between 500–800 m represent the ecologically and climatically favourable zone[58]. Maybe it was these advantages that led to the emergence of quite a number of Cretan poleis at such heights: Rhaukos (410 m), Eleutherna (410 m), Kantanos (450 m), Krousonas (460 m), Aphrati (480 m), Elyros (500 m), Axos (510 m), Lyttos (510 m), Araden (520 m), Sybrita (540 m), Biannos (560 m), Malla (588 m), Anopolis (600 m), Prinias (610 m), Anavlochos (625 m), Hyrtakina (680 m)[59]. Some elevated locations proved rather popular and were occupied, if not continuously, then at least time and again throughout antiquity, for example Eleftherna, Anopolis, Araden, Lasithi or Gonies/Tylissos, although it is not always clear what

[56] See also Beckmann 2012, 170. A modern-day parallel is the Anopoli plain in Sphakia (Nixon 2006, 33).
[57] Strasser 1992, 135.
[58] Hempel 1996, 31. Cf. Moody 2012, 263.
[59] List taken from Chaniotis 1991, 96. See correction and criticism by Beckmann 2012, 30 footnote 48.

distinguishes such places from other less popular ones. With the Roman rule, the pattern changed and ever since, the most successful and important settlements were situated right on the coast, and 500–800 metres is really the upper limit of settlement. However, it is an interesting observation not limited to many upland sites that very few of the sometimes long-lived ancient settlements are more than villages today; some are not settled at all. Eleftherna, occupied since the Neolithic and said to have commanded a position favourable to overseas trade, is today situated, frankly speaking, in the middle of nowhere[60]. The Agia Aikaterini ridge, which has evidence for Neolithic occupation and where the walled city of Anopolis was set, seems to have been abandoned since the Early Hellenistic period, and the hamlets in the fertile mountain plain behind it are known at best as the home of the great heroes of resistance against the Turks. Neighbouring Araden, also occupied at least since the Early Bronze Age, continued into the Late Roman period; a village from Venetian times into the 20$^{\text{th}}$ century, it has recently become virtually completely abandoned. Other former poleis in western Crete have fared even worse: Lissos is just a couple of ancient ruins in an unsettled valley, Tarrha (Agia Roumeli) serves as a resting place for tired gorge hikers for a couple of summer months and is accessible only by private boat at all other times. Less extreme but similar is the situation at Lyttos, a sleepy village at the bottom rather than the top of the hill that the powerful city once occupied. Lato, whose incredibly thick walls show it had reason to protect itself, is nowadays not even a hamlet. Praisos, the city of three acropoleis, was, admittedly, destroyed by Hierapydna, but there is no obvious reason why it should not have been rebuilt later. Gortyn, once the capital of the province, is now literally on the road to nowhere. The list could no doubt be continued for some time. An extreme example is Knossos: it was a settlement since the Early Neolithic and, save for the possible blip of the 6$^{\text{th}}$ century BC, inhabited without interruption to become a polis and later a Roman city. Today it is situated in the unspectacular hinterland of the sprawling city of Iraklio, remote if it were not for the constant flow of tourist buses and cars.

[60] I do like L. Nixon's remark however: "In other words, there is no such thing as a monument in the middle of nowhere; all parts of any human landscape are always in the middle of somewhere (even if that somewhere turns out to be liminal) [...]. Indeed, some particularly important monuments are in the middle of everywhere" (Nixon 2006, 7).

As has been said above, it is often not obvious today why a certain location was favoured over another, but one of the most fundamental concerns in choosing a site for settlement is water supply. Crete is known for its abundance of springs. It now has only a few perennial rivers, but before the beginning of electricity-powered irrigation which has also lowered the groundwater table considerably, there were at least 28 flowing all year[61]. Water supply may have been easier in the mountains, where springs are especially numerous and precipitation is higher, an advantage for agricultural concerns. In the Neolithic and Bronze Age, climate in general was wetter than in historical and modern times. This may explain why other ways of sourcing water were seemingly not applied much in those days: the only cisterns known so far from Bronze Age Crete are one or two Protopalatial specimens at Myrtos-Pyrgos, and they fell into disuse in LM I[62]. Other cisterns, like at Lyttos and Phoinix, date to much later, arguably to balance the lower levels and more seasonal character of precipitation, although the giant ones at Eleutherna must have been filled with water from a spring and, given their location near the top of the hill, would probably not have served agricultural purposes. Aqueducts, as at Lyttos and Knossos, were a Roman innovation (22 are known so far)[63].

Especially with regard to prehistoric settlement patterns, it must always be remembered that the conventional chronological phases span, at best, more than one century and there is no telling whether settlements are actually contemporaneous. The fact that the chronology of decorated pottery in some periods of Cretan history is rather coarse is not helped by the fact that the fabrics typically found in surveys, namely coarse wares, are not very chronologically sensitive in themselves. There is no way of getting over this shortcoming except for to bear in mind that maps with dots for sites with a certain pottery style do not necessarily represent settlements occupied at the same time. Useful and irreplaceable as survey is, it cannot answer all questions. For example, it is not always clear whether a 'site' denotes a settlement or some other type of activity location, as illustrated by some

[61] Rackham – Moody 1996, 41. Cf. however the diverging opinion of Lucia Nixon (Grove – Rackham 2001, 141). See also Fielding 1953, 150.

[62] Cadogan 2007. Cf. Rackham 2003, 57: "Mediterranean peoples in general insist on living near water sources and refuse to spend time carrying water. If there are no springs or wells they store rainwater in cisterns."

[63] The 'aqueducts' described by Angelakis *et al.* 2007 fail to convince. On Roman aqueducts see Kelly 2006; Bechert 2011, 36–37.

sites in Sphakia (beekeeping installations *etc.*). Settlement size is also only rarely known, even in cases where excavation has taken place; Karphi for example is now estimated to have been much bigger than previously assumed.

Too few settlements have been excavated to analyze on an island-wide scale whether the local wind and weather patterns played a role in the orientation of houses and doors, as they seem to have done at Kavousi Kastro and Hellenistic Praisos. Architecture often incorporated bedrock; building material was usually locally sourced. Mudbrick is so far rarely found. In Azoria, where beams supporting the roof or a second storey have been retrieved, they were made from olive wood. Roofs were flat, and this can plausibly be argued to be a rather un-European feature and indeed one not well suited to the climate of the Bronze Age[64].

### 13.2.3 Vegetation

The oft-surmised existence of a continuous forest cover of Crete before the Neolithic or Bronze Age can be refuted with great certainty. Geological, botanical and ecological studies have shown not only that the Cretan landscape is too diverse to allow generalized statements, but also that in many of the researched areas, slope denudation happened before the Neolithic (which, however, is no longer the absolute *terminus post quem* for human settlement on the island). In other areas, a case can be made for human-induced erosion, but the mosaic pattern of forests or woods, maquis, phrygana and steppe can plausibly be argued not to represent successive states of degradation, but rather to depend on the availability of water. Although the impact of grazing and browsing is undeniable, most of the flora must have adapted to this already in response to the Palaeolithic fauna, and the impact is not necessarily long-lasting.

The demands for timber for Minoan palatial buildings could have been met with cypress and oak where especially long and straight beams were required, or with olive trunks for shorter spans, as has been the practice for centuries in all areas of Crete. Firewood, which would have been needed in great amounts for

[64] Rackham – Moody 1996, 167: "The mind boggles at the thought of getting rid of a downpour on the acres of flat roofs of the Palace of Knossos. [. . . ] Flat roofs seem to have originated in a desert area, been taken to an unsuitable climate, and continued there, in defiance of practicality, for 6,000 years."

metallurgical processes, plaster making and, maybe on the greatest scale of all, for everyday household cooking and heating, could almost certainly be obtained from coppicing and pollarding of wild trees and orchards, but also from shrubs. Anthracological analyses from several Cretan sites support these ideas, and olive press cakes could also have been used as fuel. Lime, hazel and hornbeam have been identified from Neolithic to MBA layers in the Tersana pollen core, but have so far not been recovered in any other form[65].

### 13.2.4 Subsistence and economy

Where 'archaeology' concerns itself with objects of art or their former context, it is mostly forgotten that these objects and their contexts were of interest only to a minuscule number of people in antiquity, because in Crete as elsewhere, the vast majority of people were farmers[66]. It is one of the aims of this study to draw attention to the less conspicuous parts of society, fully occupied with producing food for their household and surplus for trade or exchange. The bulk of population did not have marble statues in their living rooms and no nymphaeum in their front garden and never even got to see the provincial capital, but were stuck to their village and their plot and their flocks and pasturage. Theirs was no easy life of leisure and enjoyment of the beauty of the landscape around them, but a daily struggle to produce enough to get not only through the winter, but potentially even through another year in case it would be a bad one. The evidence for these activities must come from agricultural implements and remains of plants and animals, from terrace walls and written records about taxes and tithes.

The most advantageous system of subsistence seems to be a 'mixed farming' regime, in which each household plants cereals and tends (or owns) a small number of animals and possibly a vegetable plot. By not relying on one source of nutrients only, this minimizes the risk of hunger resulting from crop failure. Different types of grain and pulses, grown on non-adjacent fields, are combined with olives to form the basis of the diet. They can be stored in pithoi or underground over the year. Animals back up and supplement this system; they are 'walking larders' full of

[65]But see Moody 2012, 253.
[66]Cf. Cartledge 2002, 20.

meat and also supply milk, manure, wool, hides and other secondary products. Risk is not only minimized by not putting, in an almost literal sense, all one's eggs in one basket in terms of species. It is further reduced by the small scale of such undertakings, which means that mischief may only affect some farmers but not others. Redistribution systems can then help to bring a household through the winter[67]. The available archaeobotanical analyses[68] confirm that the basis of Cretan subsistence were grain, olives, wine and pulses, the latter an addition to the normally postulated 'Mediterranean Triad' that has only fairly recently been argued by A. Sarpaki (see Tables 13.1 and 13.2). Their neglect in academic communications may be due to the fact that they do not seem to feature in the Linear B records, neither in Crete nor mainland Greece[69]. However, written sources are always very eclectic, and even if they did not star in palace economy, they certainly did in the households of the common people. An irreplaceable source of comparatively cheap protein for humans, they may have been grown as one part of a crop rotation system, replenishing the soil with nitrogen and, if the plants were ploughed under after the harvest, humus[70]. Pulses, for example chickpeas, vetch and broad beans, are attested from all sites where botanical remains have been found, but conditions are as unfavourable to their preservation as for other botanical remains, and their pollen are undistinguishable from wild legumes. They require threshing which would have used the same floors and implements as grain processing, so that indirect evidence is hard to come by. Nowadays, climatic conditions do not permit the (risk-free) cultivation of olives beyond 800 m ASL. This may have been different in the past, although even when olive remains are found at higher elevations, it will always be difficult to ascertain where they originate. If olive crushings are found, one might argue that it is unlikely that great quantities of harvested olives were conveyed up the mountain just in order to make them into oil, but in the case of intact kernels, as in Karphi or in Zominthos—at 1100 m and almost 1200 m respectively, it is unthinkable today in both instances that

[67] The importance of diversification, storage and redistribution is also argued in Horden – Purcell 2000, 175–297.

[68] They are not numerous: "Archaeobotanical remains are the most under-collected, under-studied and under-published type of archaeological material on Crete" (Moody 2012, 251).

[69] Ventris – Chadwick 1973, 131.

[70] Sarpaki 1992. See also Nowicki 1999a, 155–156; Horden – Purcell 2000, 203. Cf. Allbaugh 1953, 273. On broad beans (*Vicia faba*) see Garnsey 1998, 214–225 with footnote 1.

the olive stones are the seeds of fruit grown nearby—they probably stem from olives eaten as such rather than as oil. The latter was more than just a household staple; it was valuable enough to be offered to the gods in Mycenaean times[71]. Note that olive oil production requires access to abundant freshwater and leaves behind masses of waste: 100 kg of olives yield about 20 litres of oil, 35 kg of press cake and 45 litres of wastewater which not only stinks but also pollutes both the land and the water[72]. Vines can be grown in heights of up to 1200 m, but it will often have to be argued *ex silentio* that they were: if sites were explored early, grape pips, being less conspicuous than olive kernels, may often have been lost in 'excavation'. In the case study areas, grape remains were retrieved solely, and in great quantities, at Azoria, and it seems that the wine produced there would have been served on occasion in the public buildings[73]. Wine is mentioned in the Linear B lists as offerings to the gods, and at least in Roman times, Cretan *passum* was widely traded and valued[74]. The grain grown by the earliest farmers in Crete was bread wheat (*Triticum aestivum*), a free-threshing grain, *i. e.* threshing results in naked kernels, which signifies an advanced stage of breeding[75]. Cultivation of this demanding species was given up almost completely after initial trials—this may have been not entirely unrelated to the change in climate towards drier conditions, since wheat ideally requires higher rainfall levels and better soils than Crete has to offer nowadays. Barley therefore gained in importance over time[76]. Einkorn, emmer and macaroni wheat (*T. durum* Desf.) also cope better with unfavourable climates and soils[77] and could have been the preferred species for upland agriculture, although the available evidence is hardly conclusive. Wheat and barley are believed to be the cereals recorded in the Linear B tablets from Knossos[78].

[71] Ventris – Chadwick 1973, 306–307.

[72] Niaounakis 2011, 414. 416. 419 (with references to ancient sources).

[73] Written sources from Gortyn may indicate that citizens had to contribute sweet new wine (*γλεῦκος*) to public meals (Paula Perlman, Department of Classics, University of Texas at Austin, *pers. comm.* May 2011). See also Ventris – Chadwick 1973, 495.

[74] Wine has probably always retained a large share of the Cretan diet, though opinions vary as to how large exactly: "Allbaugh's amount for wine [...] seems excessively underestimated, when compared with any rural standard I have ever heard of" (Nowicki 1999a, 156).

[75] Zohary – Hopf 1993, 25.

[76] Cf. the findings from Debla, Pseira (Betancourt 1995, 164) or Eleutherna. See also Allbaugh 1953, 268. 277.

[77] Sarpaki 1992, 69; Halstead 1992, 108; Wallace 2010, 35.

[78] Ventris – Chadwick 1973, 130.

In Venetian times (1210–1650), Crete was the only colony from which wheat was exported—at what cost for the well-being of the local population cannot be assessed here—, although yields were highly unpredictable. Wheat continued to be grown until the Second World War, after which cereal cultivation ceased almost entirely[79]. An inscription recording the import of large amounts of grain (of uncertain type) to Knossos, Gortyn, Kydonia, Hyrtakina and possibly also Elyros dates to 330 BC, when Crete and the rest of Greece suffered from famine, normally attributed to drought. The import of grain seems to have been an unusual event meriting recording. If both Hyrtakina and Elyros were concerned, it seems that in this case, their position not only in the mountains, but also in the west of Crete, which receives more rainfall than the east, was not enough to save them. Whereas in more recent centuries with a climate similar to today's, the dry summers would have meant that the crop, once it was ripe, would not spoil, this would have been a different affair in the less seasonal and often unstable climate of the Bronze Age, when crop failure may have been a common phenomenon. Of course such short-term shortages are not detectable in the archaeological record, since they would have required equally short-term adaptations which probably not even a very high chronological resolution could trace. It is conceivable that drought would have affected upland agriculture less because of naturally higher rainfall in the mountains.

Transhumance, often mainly regarded as a system of animal management, has far-reaching social and also other economic consequences; for example, it allows people to grow grain in both ecozones, though at different times of the year[80]. Whether seasonal movement of animals was a practice common in Crete in the past, before the Turkish period, is not certain: at the present time it is impossible to prove the existence of a transhumant system at any time of antiquity. A strong case can be made for some periods and some places such as remote singular sites in the Sphakian Madares[81], but proving seasonal occupation would require detailed faunal and botanical analysis and/or written sources. The important point is that

[79] Stallsmith 2007, 157. 167. For grain production under the Turkish rule see Abulafia 2011, 483.
[80] Rackham – Moody 1996, 160.
[81] I do very much subscribe to S. Wallace's warning however: "Assumptions of herding-based site functions on the ground of topography or of ethnography alone can never be justified, although they are still being made, for example, for Bronze Age Crete" (Wallace 2003, 602).

**Table 13.1:** Plant remains from sites below 400 m ASL[a]. xx denotes more than 10 specimens published, x denotes fewer than 10 or unknown numbers. * denotes ritual context. ? denotes uncertain identification. # denotes impression

| | | | cereal | | | | | | pulse | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | olive | grape | wheat | emmer | einkorn | barley | oat | unidentified | lentil | chickpea | bitter vetch | broad bean | grass pea | dwarf chickling | unidentified | almond | pistachio | pine nut | poppy | fig | pear | hackberry | elderberry | wild greens/weeds |
| Knossos ENL | | x | xx | x | x | xx | | | xx | | | x | | | | x | | | | x | | | | xx |
| Knossos MNL | | | x | | | | | | x | | | | | | x | xx | | | | xx | | | | |
| Knossos LNL | | | | | | | | x | | | | | | | x | xx | | | | xx | | | | x |
| Chrysokamino EM III-MM IA | | | | | | x# | | | | | | | | | | | | | | | | | | |
| Kommos MM | xx | | | | | | | x | | | | | | | | x | | | | | | | | |
| Mochlos LM IB | x | x | | x | | x | | | x | | | x | | x | x | x | | | x | x | | | | x? |
| Kommos LM | xx | x | | | | | | x | | | | | | | x | x | | | | | | | | |
| Chalinomouri LM IB | x | x | | | | | | | | | | | | | x | x | | | | x | | | | |
| Azoria A | xx | xx | xx | | | xx | | | x | xx | x | x | | | | x | x | x | x | x | x? | x | x | |
| Eleutherna A | x | x | | | | x | | | | | | | | x | | | | | | x | | x? | | x |
| Tarrha C* | | | | | | | | | | | | | | | | x | | | | | | | | |

[a] References (where not given in case studies): Knossos: Sarpaki 2009. Kommos: Shay – Shay 1995, 123. Mochlos and Chalinomouri: Sarpaki – Bending 2004.

**Table 13.2:** Plant remains from sites above 400 m ASL. xx denotes more than 10 specimens published, x denotes fewer than 10 or unknown numbers. * denotes ritual context. ? denotes uncertain identification. # denotes impression.

| | | | cereal | | | | | | pulse | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | olive | grape | wheat | emmer | einkorn | barley | oat | unidentified | lentil | chickpea | bitter vetch | broad bean | grass pea | dwarf chickling | unidentified | almond | pistachio | pine | poppy | fig | pear | hackberry | elderberry | wild greens/weeds |
| Debla EM I-II | x? | | | x# | | x# | x# | | | | | | | | | | | | | | | | | |
| Karphi MM* | | x | | | | | | | | | | | | | | | | | | | | | | |
| Kamares MM* | | | | | | | | x | | | | | | | | | | | | | | | | |
| Zominthos LM I | x | | | | | | | x | | | x | | x | | x | | | | | | | | | |
| Sklavokampos LM I | x | | | | | | | | | | | | | | | | | | | | | | | |
| Karphi LM IIIC | x | x | x? | | | x? | | x | x | | | x | | | x | | | | | | | | | |
| Kastro LM IIIC-PG | x | x | | x | x | | | | | | | | | | x | x | | | | x | | | | |

transhumance is not a direct response to environmental conditions—even less so when until the end of the Bronze Age, climate would have been different from today—, and is dependent upon a certain degree of social and political stability since in most cases it involves crossing or even using the territory of other communities. Such conditions are most likely to have prevailed during the Mycenaean rule in the Late Bronze Age, when Linear B texts testify to the large numbers of sheep administered by the palace in Knossos. In the Hellenistic period, inter-polis treaties govern rights to land use, but it is far from clear whether they actually concern grazing. Be that as it may, it is highly unlikely that at any time any movement of flocks and people represented a form of specialized pastoralism—virtually all households would also have engaged in agriculture to grow grain and perhaps also tend garden plots for vegetables, as has been postulated for example as a result of the Kavousi survey project. That these two components were used in conjunction, *i. e.* animals led to graze on fallow or stubble fields and/or their manure collected to fertilize the fields, is a suggestion worth considering but cannot be proven[82].

Wild animals are not attested from the earliest Neolithic layers at Knossos, but are present at all Neopalatial sites from which bones have been published (see Table 13.3 and 13.4). A popular quarry through all times was the *agrimi*, probably a feral descendent of the domestic goat introduced by the first settlers. *Agrimi* bones are found in all parts of Crete, proving that Thomas Spratt was wrong in supposing, from the situation in his days, that the wild goat ("ibex") only lived in Lefka Ori in antiquity[83]. Their horns may have had some cultic significance, as their deposition at Kavousi Vronda and a record in Linear B suggest[84]; they were also popular as votive figurines. Wild pigs' remains are not infrequently found

[82] Cf. Hodkinson 1988, 54: "On all these grounds many of the vertical seasonal movements discussed above take on the aspect of an infield-outfield shift to uncultivable locations with unused grazing at a time of year when the animals were not wanted near the growing crops (with the verticality of movement dictated by conditions of highly accidented topography) rather than a search for a different vegetational zone." Cf. also Allbaugh 1953, 275–276. The value of fallowing in areas with less than 500 mm annual precipitation has been questioned (Sarpaki 1992, 63), and ethnographic research indicates that rotation with pulses may be preferred over fallowing (Halstead 1996b, 302.)

[83] Spratt 1865b, 182. For wild goats as hunting prey see also Od. 9,155.

[84] Ventris – Chadwick 1973, 302. Moody 2012, 243 points out that 'trophy-like' parts of animals need not necessarily imply the presence of the species in question.

and indicate a wooded (not necessarily forested) landscape; the 4th century coins of Lyttos show a boar's head which may be wild[85]. Remains of deer have been reported from a surprisingly large number of sites, given that all post-Pleistocene animals must stem from introduced individuals. Whether these bones are enough to indicate a stable population is doubtful, but they do crop up in all sorts of places in all sorts of chronological phases[86]. Their influence on the ecosystem would have been limited, but they are useful indicators of wooded environments. It is not completely unfeasible that they were kept in deer-parks, where they would have lived as wild animals but in a restricted territory, thereby greatly increasing the efficiency with which they could be hunted[87]. A comparison of the evidence from sites below and above 400 m ASL shows that remains of wild animals are not actually more numerous in upland sites[88]. Marine fauna (both molluscs and fish) on the other hand are much more frequent in sites closer to the sea.

As for domestic animals, sheep and goats clearly dominate the assemblages from most sites. The sheep:goat ratio decreased in the Bronze Age as compared to the Neolithic but reached an unprecedented high in the Early Iron Age. It is also interesting to see how misleading written records, in this case Linear B, can be: sheep feature much more prominently than goats in these documents, but the bones found indicate that the two species were kept in equal numbers[89].

Both pigs and cattle were clearly much more important throughout antiquity than today[90]. It is often assumed that cattle were raised as draught animals rather than for meat or milk; they can also be used for threshing[91]. The rareness of cow's milk in ancient diets has been argued to be the reason for the higher numbers

[85] Svoronos 1890, 230–238. See also Moody 2012, 247, who suggests the 'wild' pigs may have been feral. See also Grove – Rackham 2001, 167.

[86] See Jarman 1996, 219. In the LM IIIC settlement at Chamalevri, on a low hill close to the sea (!), deer constitutes almost 12% of the total assemblage (Wallace 2003, 607–608); cf. Nowicki 1999a, 157.

[87] See Clutton-Brock 1987, 182–183 and cf. the interesting comments by Moody 2012, 245–246.

[88] As also pointed out by Moody 2012, 249.

[89] Moody 2012, 237. Note that goats on average give four times more milk than sheep (Calder 2011, 20).

[90] See Fillios 2007, 73. 130 for a hypothesis about the relationship between pig and cattle breeding. See also Zeimbekis 2006, 29–31 for why cattle were introduced to Crete.

[91] Reese *et al.* 1995, 188–189; Rackham – Moody 1996, 74–75; Isaakidou 2008, 99. 105; Clutton-Brock 1987, 62–63 with Fig. 6.1. Cf. Allbaugh 1953, 245. 279; Calder 2011, 37–44; Johannsen 2011.

**Table 13.3:** Animal remains from sites below 400 m ASL[a]. xx denotes more than 10 bones published, x denotes fewer than 10 or unknown numbers. * denotes ritual context. ? denotes uncertain identification

| | | | | | | | | | | | | deer | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ovicaprid | sheep | goat | pig | cattle | equid | dog | cat | chicken | agrimi | wild boar | fallow deer | roe deer | red deer | unidentified | hare | rabbit | badger | marine |
| Knossos ENL | xx | xx | xx | xx | xx | | x | | | | | | | x | | x | | x | |
| Azoria NL | | | | x | | | | | | | | | | | | | | | |
| Knossos FNL | xx | xx | xx | xx | xx | x | | | | | | | | x | | | | | |
| Chrysokamino EM III-MM IA | | | | | | | | | | | | | | | | | | | x |
| Kommos MM | xx | | | xx | xx | | xx | | x | | | x | | | x | | | | xx |
| Mochlos LM IB | xx | | | xx | x | | x | | | | | | | | | x | | | xx |
| Chalinomouri LM IB | xx | | | xx | | | x? | | | | | | | | xx | x? | | | xx |
| Kommos LM I-IIIB | xx | | | xx | xx | x | x | | | | | | | | | x | | | xx |
| Eleftherna LM? | x | | | x | x | x | | | x | | | | | | | | | | |
| Eleftherna LM-Geo | x | | | x | x | x | x | | x | x | x | | | | | x | | | x |
| Chrysokamino LM IIIA2 | x | x | x | x | x | | | | | | | | | | x? | x | | | xx |
| Azoria A | | x | x | x | x | | | | | x | | | | | | | x | | x |
| Eleutherna A | x | | | x | x | x | x | | x | | x | | | | | x | | x | |
| Eleutherna H-R | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | x | x |
| Azoria H* | x | | | | | | | | | | | | | | | | | | |
| Agiasmatsi H/ER* | | | | x | x | | | | | | | | | | | | | | |

[a] References (where not given in case studies): Knossos: Jarman – Jarman 1968; Moody 2012, 246. Kommos: Reese *et al.* 1995. Mochlos and Chalinomouri: Reese 2004 (NB that Moody 2012, 244 lists "greater presence" of deer at Mochlos, whereas Reese 2004, 118 states clearly that there are no deer remains).

**Table 13.4:** Animal remains from sites above 400 m ASL. xx denotes more than 10 bones published, x denotes fewer than 10 or unknown numbers. * denotes ritual context. ? denotes uncertain identification

| | oviacaprid | sheep | goat | pig | cattle | equid | dog | cat | chicken | agrimi | wild boar | deer | | | | hare | rabbit | badger | marine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | fallow deer | roe deer | red deer | unidentified | | | | |
| Magasa NL | | x | x | | | | | | | | | | | | | | | | x |
| Debla EM I-II | x | | x | | | | | | | | | | | | | | | | |
| Trapeza EM I-III? | | x | | | x | | | | | | | | | | | | | | |
| Sentoni EM I/II | | x | | x | x | | | | | | | | x? | x? | | | | | |
| Birmani MM I-II | x | x | | | x | | | | | | | | | | | | | | |
| Kamares MM* | | x | x | | x | | | | | | | | | | | | | | |
| Karphi MM* | | | | x | | x? | | | | | | | | | | | | | |
| Agios Charalambos MM IIB | x | | | x | x | | x | x | | | | | | | | x | | | |
| Vronda MM | x | | | x | x | | | | | | | | | | | | | x | x |
| Psychro MM III-LM IB* | | | x | x | x | | | | | x | | | | | x | | | | |
| Zominthos LM I | | x | x | x | x | x | | | | x | | x | | | x | x | | | |
| Karphi LM IIIC | x | x | | x | x | x? | x | | | x | x | x | | x | | | | | x |
| Vronda LM IIIC | | x | x | x | x | x | x | | | x | | | | | | x | x? | | |
| Kastro LGeo | | x | | x | x | x | | x | | x | | x | | | | x | | x | x |
| Vronda LGeo* | x | | x | | | | | | | | | | | | | | x? | | |
| Idaian Cave C?* | x | | | | x | | | | | | | | | | | x | | | |
| Sentoni LR | x | | | x | x | | | | | | | | x? | | | | | | |

of people with lactose intolerance in modern Greece and Italy[92]. This does not contradict the fact that cattle were the most valued animals for sacrifice in many periods[93]. The earliest bovines at Knossos were large, but their size, as happens with domestication, diminished over time before Roman breeds were developed[94]. Nonetheless, the bull played a special role in Minoan imagery and cult. Since the debate about the presence of the aurochs (wild cattle) is still ongoing, it has been suggested that the representations and bones may be connected with more or less feral specimens—domesticated animals which had escaped (or were let loose on purpose). The importance of cattle in Crete is also reflected by the Gortynian self-appellation as *'Καϱτεμνίδες'*, which A. Chaniotis translates as 'cow-men'[95]. But cattle were not confined to the obvious locations like the Mesara plain: the bones from Kavousi Kastro show that animals were kept in areas today deemed unsuitable for this purpose. Having said that, the high number of cattle bones at Kastro remains an exception at elevations like this: J. Moody has analyzed the pooled faunal data from all periods in Crete and concluded that with altitude (above 400 m), the importance of sheep/goats increases while cattle and pigs diminish[96].

The early domestic pigs were physiognomically like wild pigs, *i. e.* leggy and long-snouted, because they were sent to roam in the woods (oaks would have been a favourite) and are hence difficult to distinguish also in faunal assemblages. Only later—the exact point in time is difficult to determine and may have varied—were they kept in sties and fed from agricultural surplus rather than from what they found, which made them fatter and short-legged from lack of exercise[97]. Although pigs do not need much space, they require lots of water and protection from the sun[98]. M. Fillios has shown that the skeletal parts found at a site can give clues

[92] Auberger 2001, 133; cf. Nixon – Price 2001, 419. For recent lactose research in archaeology see Curry 2013.
[93] See for example Reese 2000, 450.
[94] Nobis 1993, 113; Nobis 1999, 56; Nobis 2003, 95–96. Cf. MacKinnon 2004, 84.
[95] Chaniotis 1995, 57. The term is documented in the lexikon of Hesychios.
[96] Moody 2012, 243. It must be borne in mind that very few assemblages from above 400 m are actually published.
[97] Clutton-Brock 1987, 74–75; Meyer *et al.* 2004, 87–98. 109–110. See also Fillios 2007, 70; Moody 2012, 237. 239. Stalling also increases the risk of diseases, see Halstead – Isaakidou 2011, 165.
[98] Fillios 2007, 68. 72–73.

as to the type of site (self-sustained or consumer site)[99], but unfortunately published data from Crete are not precise enough to allow such analyses. Differential slaughter ages can relate to the desired end-product[100]. The frequency with which pigs crop up in faunal assemblages stands in stark contrast to the Linear B testimonies, indicating that they were raised for the interest of private households, not for palatial quota[101]. Pigs are especially prevalent in ancient Eleutherna, where in some periods they may have been more numerous than ovicaprids. Jennifer Moody has suggested that the proportion of pigs may have been bigger when (or where) sheep were raised for wool rather than for meat, although far too few faunal assemblages have been published to make this more than postulation[102].

Chickens are normally believed to have been introduced to Europe in the 8th–7th century. Two bones have been reported from an MM III layer at Kommos, which despite some doubts about the date have been attributed to "one of the earliest chickens in Greece and the Mediterranean Basin"[103]. As for the presently studied regions, the only specimens are from Eleutherna. The earliest ones are dated to LM to Geometric and they are then present in all layers up to Roman, which at least leaves open the possibility that they were popular from an early stage. Unfortunately it is impossible to say whether this was an island-wide phenomenon or whether this particular site benefited from its trade links.

The faunal assemblage from Kommos provides a useful comparison from a lowland site. All through the Bronze Age, ovicaprids represent about 50% of the MNI, pigs about 30% (they decrease ever so slightly after MM III-LM I[104]) and cattle between 11 and 18% (the highest value being the LM III assemblage). The age profile shows that ovicaprids were exploited for meat. Most pigs were killed at 2 years and older[105]. The Iron Age assemblage comes from a sanctuary and is therefore less valuable for the present study.

Beekeeping is generally assumed to have been a widespread practice—honey being the only available sweetener other than fruit, and beeswax a substance of

[99] Fillios 2007, 50.
[100] Moody 2012, 239.
[101] Moody 2012, 239. Cf. Halstead – Isaakidou 2011, 171.
[102] Moody 2012, 243.
[103] Reese *et al.* 1995, 200–201. On this issue see also Moody 2012, 241.
[104] According to M. Fillios, the MBA would have been the ideal climate for pigs (Fillios 2007, 69).
[105] Reese *et al.* 1995, 167 Table 5.3. 170. 179.

many a use—, and both products are mentioned in written sources throughout antiquity, beginning at least in Linear B. Nonetheless, actual evidence for the localities in which this activity took place (in the form of sherds of the distinct scored ware) are much less frequently encountered than one would expect. Of course, the bee-paradise of the phrygana-covered mountains has seldom been surveyed, but where it has, as in Sphakia, scored ware was found only at low elevations. The Ziros survey, which concentrated on a region at 600–700 m ASL, has not produced any evidence of beekeeping at all. Today however beekeeping is practised extensively for example around Kato Symi, at an elevation of circa 1000 m, and also in the Madares, *i. e.* even higher, and the ancient data are not sufficient to rule out that honey was a mountain product in antiquity too.

Quarrying or the exploitation of minerals does not seem to have played any role in settling the mountains; it seems that producing perishable goods was a more worthwhile pursuit. These included the products of herding (wool, cheese, hides), herbs, honey and maybe even snow.

### 13.2.5 Catastrophes

"Katastrophen kennt allein der Mensch, sofern er sie überlebt; die Natur kennt keine Katastrophen", Max Frisch once wrote[106]: disaster is disaster only by human definition and from a human perspective. Recently, it is also being felt that catastrophes such as earthquakes, floods, tsunamis or droughts are not so much 'natural' but social, in that inequality, governmental and international negligence and resulting human tragedies are what make such events so disastrous[107]. To what extent this already applied to antiquity remains to be debated, but it is clear that Crete, with its precarious position on the edge of a tectonic plate, was time and again subjected to severe earthquakes, possibly tsunamis and certainly to drought. The uncertainties regarding a causal relation to social upheaval notwithstanding, there is evidence for a prolonged phase of hot and dry climate at the Bronze Age/Iron Age transition, which may well have led to situations that would today be classed as catastrophic for at least part of society. Loss of soil,

[106]Frisch 1998, 271. See also Meier 2005, 253. 268. 272.
[107]Cf. Waldherr 1998, 57.

where it happened, can also have been ruinous for the people who depended on this stretch of land[108]. A theory regarding the causal connection of earthquakes and/or (associated) giant waves and the widespread destruction of settlements in Crete at the end of LM IB was first formulated by Marinatos in the 1930s and has since been haunting archaeological literature[109]. However, a critical assessment of such natural phenomena as triggers of social change casts severe doubts on the validity of the general idea[110]. Single sites could of course suffer nonetheless: it has been suggested that the abandonment of the Minoan 'villa' at Zominthos, at roughly 1200 m ASL, was at least partly prompted either by earthquake destruction or by tephra fallout from the Santorini eruption. No doubts exist in the case of Eleutherna, where traces of earthquake destruction in 365 AD include skeletons of people struck dead by the collapsing building; note however that the city was rebuilt and life continued as before[111]. The so-called Early Byzantine Paroxysm was traditionally associated with this earthquake described in literary sources: the west coast of the island was lifted up by up to nine metres, which deprived a number of cities of their harbours (see above, p. 183. 191). The date of the uplift has recently been confirmed by radiocarbon dating[112].

[108]See Horden – Purcell 2000, 298–341.

[109]Marinatos 1939. The literature on the Thera/Santorini eruption and its possible impact on Crete is vast; see Driessen – Macdonald 1997, Lohmann 1998 and Middleton 2012, 281–283 as a starting point. For the postulated tsunami see also Minoura *et al.* 2000; Cita Sironi – Rimoldi 2005.

[110]Zangger 1998. He does acknowledge the possible *catalytic* function for social developments.

[111]Themelis 2009, 69. For how to distinguish earthquake damage in the archaeological record see Helly 1998, Zangger 1998, 230–232 and Furger 2011, especially 77–118. 295. A. Nur suggested an 'earthquake storm' as a cause of at least some of the destructions at the end of the Bronze Age (Nur 2000). Zangger points out that contrary to common opinion, an earthquake happens without warning and people would therefore have no time to remove valuables and that traces of conflagration are clear evidence *against* an earthquake, for it "scheint [...] äußerst unwahrscheinlich zu sein, daß die angeblich vorgewarnte Bevölkerung zwar ihre Häuser verlassen und wertvolle Güter mitnehmen konnte, aber die Öllampen brennen ließ" (Zangger 1998, 230).

[112]An earlier re-dating to the 5$^{th}$ or 6$^{th}$ century (1550 BP; proposed by Price *et al.* 2002, 171. 187; Higgins – Higgins 1996, 199 give sometime between 430 and 580 AD) is now thought by others to have been caused by calibration problems (Shaw *et al.* 2008, 269), although not everyone believes them (Jennifer Moody, *pers. comm.* September 2013). See also Kelletat 1998; Stiros 2001.

### 13.2.6 Traffic and routes

Connectivity, it has been argued, is one of the mainstays of microregions in Crete and elsewhere in the Mediterranean[113]. In spite of the ability of Cretan mountaineers to traverse the landscape at speed even in the absence of paths, it seems that at some point the need was felt to build routes that can be used by everyone to facilitate contact and exchange. The Cretan landscape is full of cobbled tracks connecting major settlements (see Fig. 13.2); they are called *kalderimia* by a Turkish name and often dated to that period. These tracks—and the landscape that they girdle—are made for mules or donkeys, not for carts, which must have severely restricted the availability of certain things in certain areas[114]. It is possible that at least some *kalderimia* follow routes that have been used from time immemorial[115], but the attempt to identify ancient roads has so far concentrated on a very limited area and period. Early connecting routes can also be traced through GIS simulations of least-cost analyses. However, this method, though certainly valuable, does not factor in non-topographical aspects governing human choices for routes, *i. e.*, the hodological concept discussed in section 2.10[116].

### 13.2.7 Attitudes towards mountains

The Minoans seem to have attributed cultic significance to certain aspects of nature (if not nature as such), and natural hills and mountains were one such feature. Whether the mountains were considered to be 'sacred' is impossible to say, but quite some of their summits were, in the Middle Bronze Age, cult places—in the truest sense of the word, since most of them were not equipped with architecture: it seems that nature was sacred space which did not need to be marked out as such. Rather than worshipping inside temples, the Minoans seem to have worshipped underneath the open skies.

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[113] Horden – Purcell 2000, 123–172.

[114] Cf. Tzedakis *et al.* 1989, 59 and see Rackham – Moody 1996, 156: "A land of *kalderímia* had to make locally, or to do without, any object too long or heavy for a mule—or rather, too heavy for half a mule, since a pack-saddle carries two loads which must balance." See also Olshausen 1996, 9. According to Netting 1981, 30, a mule (in the Alps) can carry 200 kg.

[115] The Minoan road network in the far east of Crete is reported to have included fords and bridges across streams, see Plath – Böttcher 2011.

[116] See also the criticism of Beckmann 2012, 158 footnote 125.

**Figure 13.2:** *Kalderimi* between Lasithi and Kastelli, northern Dikti (May 2009; photo courtesy of Torben Keßler)

In later Greek times, (some) mountain peaks were regarded as places suitable for the cult of Zeus, but the mountains as such did have some more or less distinct connotations of wildness, liminality *etc.* There is a stark contrast between the way the ancient Greeks attitudinized about mountain folks and the fact that the landscape inhabited by the Greeks is so fundamentally characterized by mountains: Most character traits attributed to mountain people were negative, with the exceptions of courage, urge for freedom and resistance[117].

### 13.2.8 Religion

Mountain cults are an almost universal phenomenon through the ages, and Crete is no difference. Mountains are often seen as transcendental places, being closer

[117] Graßl 1996, 190. 192. Cf. Giorcelli Bersani 2001b, 27–28.

to the divine which abodes above. Of course it can only be conjectured if this was part of the prehistoric mentality, but there does seem to be a particularly strong emphasis on worship in elevated places in the Bronze Age. A strong case can be made for linking the Minoan peak sanctuaries to the (pastoral) economy for which water was essential, and this may have been an important element of the ritual activities. The concern with water is strongly connected with fertility, and these two aspects are fitting explanations for the votive objects found at peak sanctuary sites (zoo- and anthropomorphic figurines, sea shells, pots) as well as their frequent association with springs.

Two other Cretan cult sites, outstanding by way of the long period of time during which they were frequented as well as by the objects found in them, are also situated in the mountains, namely the Psychro and the Idaian cave, in classical times both seemingly dedicated to Zeus, who was often worshipped on mountain tops. The caves attracted pilgrims, in some cases demonstrably organized into processions, which is hardly imaginable without some sort of path leading to them. At least the Idaian cave was definitely too remote from any bigger settlement to make a return journey within one day feasible, which raises the question where these people stayed and how they were catered for. At any rate, all these cult places would have been seasonally inaccessible at least in some periods[118].

## 13.3 Conclusion

Studying the mountains of Crete is justified by the fact that half of Crete is mountainous; to study the mountains is to study the land. The rugged and often remote character of this landscape has strengthened the will and ability of its people to resist outside control. Advantageous for safety and independence, the nature of the terrain also made self-sufficiency laborious, since flat land is not plentiful. Nonetheless, it seems that life in the mountains was not necessarily as marginal as one would think—at least not in all periods. Whereas today, permanent settlement stops at about 750 m above the sea, climate may have enabled people to live year-round at much higher elevations, and economic incentives may have made

[118] Lebessi – Muhly 1990, 334.

this worthwhiles. In times where European subsidies have turned large parts of the island into olive monoculture and modern irrigation has depleted many water resources, it is a worthwhile undertaking to try to gain insight into past man-environment interaction—for its own sake, but also because of the direct connection between then and now: "The importance of the historical sciences is that the past affects the present because past events and processes have constrained the range of options open to events and processes today"[119]. As has been shown, there *ain't no mountain high enough* in Crete to make this statement inapplicable.

[119]Dincauze 2000, 22.

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