

THE EARLIEST PREHISTORY
OF CYPRUS

FROM COLONIZATION TO EXPLOITATION

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The Earliest Prehistory of Cyprus
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Edited by
Stuart Swiny

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STUART SWINY

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edited by
Stuart Swiny

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*In memory of Porphyrios Dikaios
father of Cypriot Prehistoric archaeology
and with compliments to Vassos Karageorghis
who saw that it thrived*

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P R E F A C E

Nothing short of a revolution has overtaken Cypriot prehistoric studies in the past decade. The movement began with excavations at that enigmatic site of Akrotiri *Aetokremnos* and proceeded, almost on cue, with equally unexpected discoveries at Parekklisha *Shillourokambos* and then Kissonerga *Mylouthkia*. The extent to which the picture has changed may be gauged by reading the first chapter in Vassos Karageorghis' standard survey of early Cypriot history, *From the Stone Age to the Romans*, published in 1982, where the earliest human presence on the island was dated to around 7000 B.C.E. This so-called Khirokitia culture with its massive circular structures, fine stone bowls (but no pottery) and pedestrian chipped stone industry had an agro-pastoral economy heavily dependent on herding caprovids and pigs as well as hunting fallow deer. Cattle were notably absent from the faunal assemblage.

Although my Cypriot archaeological research has tended to focus on the Early and Middle Bronze Ages, as Director of the Cyprus American Archaeological Research Institute from 1980 to 1995, I was able to follow closely and even on occasion participate in the fascinating discoveries taking place at the major early prehistoric excavations on the island, whose often exotic names like Akrotiri *Aetokremnos*, Parekklisha *Shillourokambos*, Kissonerga *Mylouthkia*, Khirokitia *Vouni* and Kalavassos *Tenta* now enrich the vocabulary of Mediterranean studies.

After taking up a teaching position at the University at Albany it seemed opportune in 1998 to gather together, for the first time, the scholars most actively engaged in redrawing the picture of early Cyprus. Expedition Directors Jean Guilaine, Alain Le Brun and Alan Simmons were invited along with colleagues Julie Hansen, David Reese and Jean-Denis Vigne who were working on specific material from their sites. To fully place Cyprus within the context of eastern Mediterranean prehistory "a view from the mainland" was imperative, and Ofer Bar-Yosef graciously accepted to provide that insight.

Most of the papers published in this volume were presented at the Round Table discussion entitled "The Earliest Prehistory of Cyprus: Recent Developments" held at the University at Albany on the 16th of November 1998. It was only in the following summer that I learnt of new discoveries made at Kissonerga *Mylouthkia* which were relevant to the Round Table theme. As a result, Edgar Peltenburg and his colleagues were also invited to contribute to the publication. In order to include papers from all the major figures in the field, I also enquired whether Ian Todd would like to reassess the role of Kalavassos *Tenta*, and to my pleasure he accepted. It should be noted, however, that when the original participants of the Round Table submitted their manuscripts for publication, they were, obviously, unaware of the discussions presented by Edgar Peltenburg and Ian Todd which they did receive at a later date. The three papers by French scholars have been published in English in order to reach a broader readership, and I thank them for their efforts and understanding.

Readers not specifically versed in prehistoric studies may wonder about the terminological differences between "Aceramic Neolithic" and "Pre-Pottery Neolithic" used by different authors in this publication. The terms are synonymous, and at the cost of total consistency I have retained the personal choice of the individual authors. Likewise, a variety of chronological conventions, terms and chronologies are to be found in the literature; in order to clarify their usage, I have asked Alan Simmons to write a *Note on Dating* to be found as an Appendix on page 167.

The aim of the present publication is to provide in a timely manner an easily accessible, comprehensive review of the recent and remarkable developments in Cypriot prehistory. In light of the information presented here, the island should no longer be viewed as an isolated backwater with no impact

on the development of civilization in the Near East, but instead it now emerges as a dynamic partner in the process.

Appropriately enough, the reassessment of the earliest human presence on the island began with the excavations at Akrotiri *Aetokremnos*. In this connection the sub-title of the present volume should have read “From Exploration to Colonization and Exploitation” since the occupants of the *Aetokremnos* rock shelter came as inquisitive hunter gatherers rather than colonists! Although Alan Simmons’ final excavation report has appeared since the Round Table was held, the issue of a cultural or natural origin for the massive pygmy hippopotamus bone deposit still remains controversial. In this volume David Reese presents some new material pending the final publication of the faunal assemblage from the site. One thing is clear, however: *Aetokremnos* is the earliest archaeological site on the island and its excavation has caused a major reassessment of issues connected with Pleistocene faunal extinctions and island colonization world-wide.

The discovery of Parekklisha *Shillourokambos* by the Amathus archaeological survey project, directed by Catherine Petit for the French School at Athens, and subsequent excavation by Jean Guilaine, has helped fill in the yawning gap between the occupation at *Aetokremnos* in the 10th millennium B.C.E. and the canonical Aceramic Neolithic as represented at Khirokitia *Vouni*. The early radiocarbon dates, relative abundance of obsidian and an unusually sophisticated tool kit - for Cyprus - in one clean sweep brought the island into line with developments on the mainland and helped dispel the long accepted “backwater” syndrome. To this scenario was added, perhaps most remarkably of all, the presence of cattle, so conspicuously absent from the archaeological record in the mainphase Neolithic. The excavations are still in progress and each season brings new insights, but it has already added another dimension to our knowledge of the Cypriot Neolithic. As noted by Jean-Denis Vigne, the faunal remains from *Shillourokambos* transcend Cyprus and are of importance to our comprehension of animal domestication in the ancient Near East.

Our understanding of this evidence is reinforced by the interpretative contribution of Edgar Peltenburg and his colleagues. The discoveries of early Neolithic material at Kissonerga *Mylouthkia* adds flesh to the finds at *Shillourokambos*, and the careful wide ranging analysis of Neolithic chipped stone by Carole McCartney along with the material presented by François Briois help the jigsaw fit together.

Issues surrounding the origins of the Aceramic Neolithic culture are brought into focus by Julie Hansen’s review of the botanical evidence. In view of the finds at *Shillourokambos*, an Anatolian origin seems more likely, whereas it had previously been suggested that the presence of Mesopotamian fallow deer indicated a Levantine staging point; but this question is far from being resolved.

To this day Khirokitia boasts the largest exposure of architectural remains and one of the most comprehensively studied Aceramic Neolithic settlements in the eastern Mediterranean. Although Alain Le Brun has diligently published the results of his excavations at Khirokitia over the years, his paper presents important new insights of a social and cultural nature, demonstrating the potential, thus importance, of systematic long-term investigations at a single site, even if much about it is already presumed known. The view from Khirokitia represents the flowering of the development which began at *Mylouthkia*, *Shillourokambos* and also, so Ian Todd informs us in his paper, at Kalavassos *Tenta*.

“The World Around Cyprus” by Ofer Bar-Yosef is a magisterial *mise au point* of the emergence of civilization in the eastern Mediterranean. He outlines the cultural and ecological factors which favored, if not prompted, the colonization of Cyprus and clearly presents his material within a refined and detailed chronological framework that enables the reader to better appreciate developments on the island.

It is a pleasure to acknowledge the support and encouragement received from the President of the University at Albany, Dr. Karen Hitchcock, the Provost and Vice President for Academic Affairs, Dr. Judy Genshaft, and the Chair of the Department of Classics, Professor Louis Roberts. Thanks are due

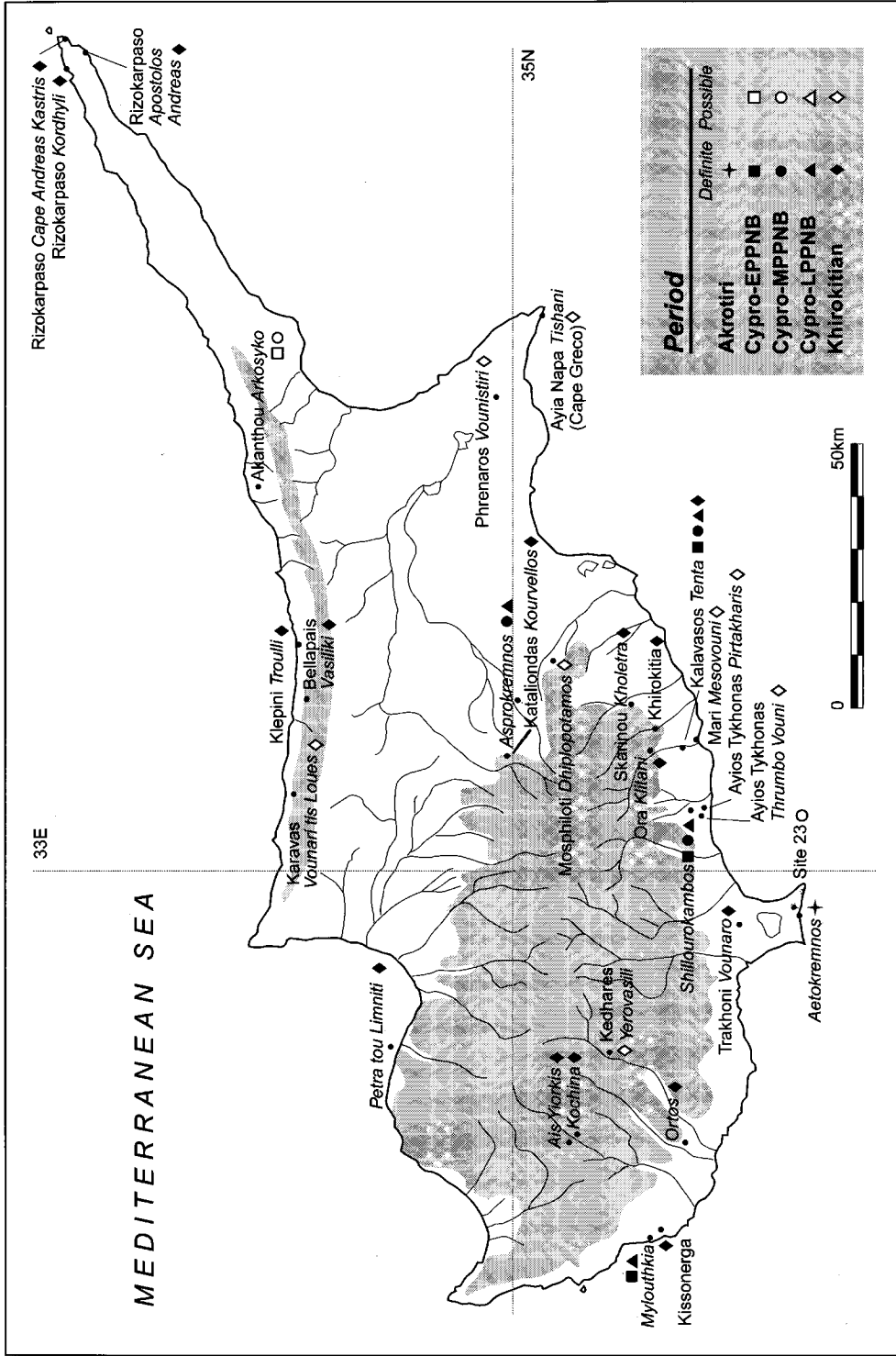
to the Office of the Vice President for Academic Affairs, Dr. Richard Hoffmann, Dean of the College of Arts and Sciences and to the Department of Classics for financial support. I am particularly pleased to recognize Ms. Linda Sajan, the Secretary of the Department of Classics, who, as always, helped in so many ways, ranging from complicated interdepartmental financial transfers to ensuring that the catering arrived on time. As a relative newcomer to the university I was grateful for the interest and support of all my colleagues in the Department, especially Professors Richard Gascogne, Louis Roberts, Paul Wallace and Michael Werner who provided accommodation for the visitors. Michael and Bauba Werner organized with their usual flair and bonhomie a wonderfully Mediterranean dinner party for a cold November night. It would be remiss of me not to acknowledge Mr. Dimitris Michael, the owner of Metro 20 where everybody enjoyed an excellent meal. The world is indeed small, for Mr. Michael, an alumnus of the University at Albany, is a proud Khirokitian!

Two graduate students in the Department of Classics assisted greatly with the preparation of the manuscripts for publication. Ms. Jessica Fisher Neidl diligently proofed each paper and Mr. Barry Dale was responsible for formatting the texts and especially the bibliographies—as well as making corrections where required. Ms. Carole McCartney kindly agreed to check the lithics terminology in my translation of J. Guilaine and F. Briois' paper. I am grateful to Mrs. Kathy Mallak for twice proof-reading the entire manuscript in its final form, and for her help with the index.

I wish to express my appreciation to Dr. Gloria London, editor of the American Schools of Oriental Research Archaeological Reports series, for expediting the publication process and also to Dr. Billie Jean Collins for her advice and timely assistance, which, in my opinion, went well beyond the call of duty.

As usual, I owe much to my wife Helena Wylde Swiny who was involved in the Round Table proceedings from beginning to end. She opened our home in Massachusetts to three jetlagged participants and made sure that all ran smoothly in Albany. Finally, the presence of two seasoned Cyprus hands, Professor Anita Walker and Ms. Lydie Shufro, as well as Mme. Christiane Guilaine and Dr. Renee Corona Simmons, further helped to create the congenial atmosphere which made us all feel a little closer to that remarkable island in the eastern Mediterranean.

Stuart Swiny
Institute of Cypriot Studies
University at Albany
June 1st, 2000



Map of Cyprus showing sites of the Akrotiri, Cypro-Pre-Pottery Neolithic B and Khirokitian phases (map prepared by Peltenberg et al. for "Well-Established Colonists: Mylouthkia I and the Cypro-Pre-Pottery Neolithic B," this volume).

THE FIRST HUMANS AND LAST PYGMY HIPPOPOTAMI OF CYPRUS

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Akrotiri Aetokremnos is the earliest indisputable site on Cyprus, dating to the 10th millennium B.C.E. Aetokremnos has been a controversial site, due both to its early date and, perhaps more significantly, due to the association of cultural materials with extinct endemic Pleistocene fauna, notably the pygmy hippopotamus. This paper summarizes major findings from the site, but directs most of its attention towards addressing the controversial issues surrounding Aetokremnos. Specific points of contention are examined and refuted. I conclude the paper with a discussion of the broader significance of Aetokremnos.

“Heaven knows how true all this was ... the bibliography of Cyprus is so extensive and detailed that the truth must somewhere be on record Oddly enough, too, their stories provided true sometimes when they sounded utterly improbable; Andreas, for example, in describing ancient Cyprus to me produced a home-made imitation of a hippopotamus walking around and browsing in my courtyard which was worthy of Chaplin. It was nearly a year before I caught up with the report of the dwarf hippopotamus which had been unearthed on the Kyrenia range: a prehistoric relic. It was only justice, I suppose, that I myself should be disbelieved by them ...” (Durrell 1986 [originally 1957], *Bitter Lemons of Cyprus*, pp. 94–95).

Sometimes, good things come in small packages. In archaeology, this can be reflected in the often surprising information that can be retrieved from small, innocuous looking sites. This paper is about one such site, which has revolutionized our understanding of the initial human occupation of Cyprus.

Archaeologists working in the Mediterranean traditionally have believed that islands, including Cyprus, were first inhabited by humans relatively late, during the Neolithic period around 6,500–7,000 B.C.E. (Cherry 1990; Le Brun et al. 1987). Researchers also believed that when these early colonists arrived, they did not encounter any of the islands’ unique native mammals, such as pygmy hippopotamus or dwarf elephants. These island-adapted species were felt to have gone extinct long before the arrival of humans, probably as a result of deteriorating climatic conditions.

Recent multidisciplinary excavations on the Akrotiri Peninsula along the southern coast of Cyprus at Akrotiri *Aetokremnos*—or “Vulture Cliff” in Greek¹—(fig. 1) have challenged these traditional sce-

¹ The first references to the site incorrectly translated *Aetokremnos* as “Eagle Cliff” or “Eagles Cliff” instead of “Vulture Cliff.” See Swiny (1995: 9, n. 11).

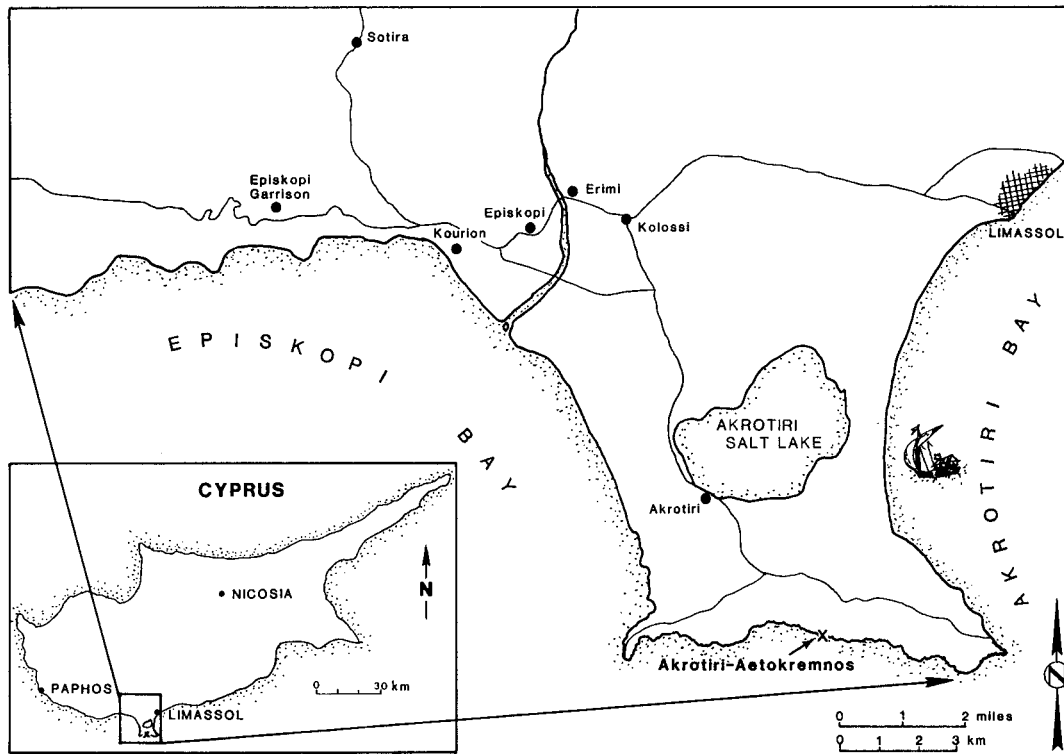


Fig. 1. Location map of Akrotiri Aetokremnos.

narios (Simmons 1988, 1991a, 1999). This essay addresses some of the controversial aspects of *Aetokremnos*. My intention here is not to provide detailed information, which may be found in Simmons (1999); rather, I wish to address the broader significance of *Aetokremnos* as it relates to the first humans to occupy Cyprus. This will be accomplished by first examining the research context within which *Aetokremnos* was investigated. This is followed by a brief summary of the excavations, and then by a more detailed examination of why we argue that the site is indeed cultural. I then conclude with a few comments on *Aetokremnos*' significance.

RESEARCH BACKGROUND AND PROBLEM FORMULATION

To fully understand the significance of *Aetokremnos*, one must realize that for many years there have been claims for early (that is, pre-Neolithic) human occupation of many of the Mediterranean islands, including Cyprus. These are well-summarized by Cherry (1990, 1992). Despite such claims, Cherry has convincingly demonstrated that there are few, if any, compelling arguments for people being on most of the Mediterranean islands during the Late Pleistocene or Early Holocene. Many researchers have noted that in proving a claim of antiquity, especially one that is contrary to consensus opinion, certain conditions must be established that are beyond what is required under "normal" archaeological circumstances (e.g., Cherry 1990: 201–3, 1992: 36; Grayson 1984; Meltzer and Mead 1985). In order for antiquity to be well-established, rigorous scientific archaeological methods must be applied, and certain criteria should be met. These "*must* include sound stratigraphy coupled with a series of chronometric determinations of artifacts indisputably of human manufacture in direct association—i.e., *artifacts, stratigraphy and dates*" (Cherry 1992: 36). Cherry (1992) shows that in nearly

every instance in the Mediterranean these criteria cannot be met, thereby refuting claims for early antiquity. I am in complete agreement with Cherry on this issue. I also am convinced that *Aetokremnos* meets and exceeds these criteria.

Aetokremnos notwithstanding, Cyprus has not been immune from claims for early antiquity (e.g., Adovasio et al. 1975; Stockton 1968; Vita-Finzi 1973). While these are intriguing declarations, they cannot be well-supported using the rigorous methods outlined by Cherry. Until the excavation of *Aetokremnos*, there were simply no convincingly documented sites that predate the Aceramic Neolithic. Indeed, the Aceramic Neolithic has, until the important new discoveries from *Shillourokambos* (Guilaine et al. 1995 and elsewhere in this volume), and *Mylouthkia* (Peltenburg et al. 2000; this volume), been dated relatively late in the Near Eastern Neolithic sequence.

Perhaps even more intriguing than its antiquity, *Aetokremnos* also has considerable bearing on the topic of extinctions of megafauna at the end of the Pleistocene period, roughly some 12,000–10,000 years ago. Researchers have long debated whether the massive global faunal extinctions at the end of the last ice age, best studied in North America, were caused by humans or environmental change (Diamond 1989; Grayson 1991; Martin and Klein 1984). Although a contentious issue with no final resolution, compelling archaeological evidence indicating that humans were the principal culprits in these extinction episodes is rare.

While demonstrating that human-induced extinctions dating back into the Late Pleistocene or Early Holocene is difficult, it is well-documented that humans have caused fairly rapid extinctions in island contexts during more recent time periods. These usually have been associated with food producing, or Neolithic, economic strategies, rather than with hunter-gatherers (e.g., Anderson 1991; Steadman 1995). Thus, we know that humans can cause rapid island extinctions—there is abundant “recent” evidence for this. *Aetokremnos* has now shed new light on this controversial topic by suggesting an extinction scenario dating back to the Early Holocene by peoples who were essentially practicing a hunting (primarily) and gathering economy.

Within both a regional and wider context, then, *Aetokremnos* is significant from at least two perspectives. First, it is one of the oldest well-documented sites on any of the Mediterranean islands. Second, it suggests that humans may well have been responsible for the extinction of endemic fauna, notably the Cypriot pygmy hippopotamus, *Phanourios minutus*.

EXCAVATION SUMMARY

When initially discovered by amateur archaeologists, *Aetokremnos* did not appear promising. The collapsed rockshelter contained a surface scatter of bones identified as belonging to pygmy hippopotami, a layer of marine shell, and a few chipped stone artifacts. The likelihood of intact materials appeared slight, and there was no compelling evidence to suggest that the artifacts were contemporaneous with the bones. Radiocarbon determinations on surface bone suggested a date of ca. 8-9,000 B.C.E., but these were equivocal since others indicated a more recent occupation.

Despite its innocuous appearance, the early dates at *Aetokremnos* caused some contention, since they pre-dated the Neolithic. Even more tantalizing was the *possible* association of cultural remains with animals thought to have gone extinct far earlier. Although numerous fossil sites throughout Cyprus and other Mediterranean islands contain pygmy hippopotami (Reese 1989; Sondaar 1986; Swiny 1988), never before has an association with humans been clearly documented.

Thus, although both the chronology and the association of extinct animals with the cultural materials at *Aetokremnos* were questionable, the site generated enough interest to warrant scientific excavation. Adding to the urgency for immediate study was *Aetokremnos*' location, perched as it was on the edge of a precipitous cliff some 40 meters above the Mediterranean Sea (fig. 2). With each winter, more and more of the site was eroding into the waters below.

SOME COMMENTS ON THE AKROTIRI *AETOKREMNAS* FAUNA

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The recently published final report on the excavations at Akrotiri Aetokremnos (Simmons 1999) includes short reports on the faunal remains. A separate volume will discuss this material in detail. Here a few of these topics are addressed, such as the butchered and burnt bones, the comparison of Aetokremnos with other Cypriot Late Pleistocene fossil sites, the fauna from features and from above the rock-shelter floor as well as the excavated pygmy elephant remains.

In 1999, the final report on the excavations of the pre-Neolithic eroded rock-shelter of Akrotiri *Aetokremnos* in southern Cyprus was published (Simmons 1999). The volume included abbreviated studies on the mammals and invertebrates recovered, although the bird bones were fully described by Mourer-Chavurié (1999). The faunal analysis was not completed when the volume was prepared for publication; furthermore, there was inadequate space to include a proper study of the fauna. For these reasons a separate publication is currently being prepared that focuses solely on the faunal remains.

Most researchers now agree (Patton 1996: 69–71; Dermitzakis et al. 1997: 14; Martin and Steadman 1999: 19, 42, 43; Hadjisterkotis et al. 2000: 600–603; Sondaar 2000: 205–8; Sondaar and van der Geer 2000: 67–68; Todd this volume; Mavridis in press) that this site *does* exhibit human association with the extinct endemic Cypriot pygmy hippopotamus (*Phanourios minutus*) and pygmy elephant (*Elephas cypriotes*).

However, some researchers still have problems with our work. Bunimovitz and Barkai (1996) were the first to publish an article suggesting that *Aetokremnos* was a typical Late Pleistocene Cypriot fossil mammal deposit with a later prehistoric archaeological site situated directly above. Since then, Simmons (1996, 1999, this volume) and I (Reese 1996) have attempted to demonstrate that there is strong evidence for this association, although three recent researchers, Olsen (1999), Grayson (2000) and Binford (2000), consider that Bunimovitz and Barkai were indeed correct, and that the lowest, Stratum 4, bones are a natural accumulation. In the present paper several topics of the faunal analysis are addressed in order to answer questions concerning the finds at *Aetokremnos*. The lack of butchered bones, but high frequency of burnt bone is discussed along with a comparison of *Aetokremnos* with other Cypriot Late Pleistocene fossil sites, in order to emphasize the differences between these and the Akrotiri deposit. Also included is detailed information on the faunal remains from the excavated “special deposits” or features, followed by a discussion of the bones discovered just above the rock-shelter floor (Stratum 4C) and a description of all the pygmy elephant remains from the site.

BUTCHERY AND BURNING

Olsen, an expert on butchered animal bones, was particularly troubled by the lack of cut/butchery marks on the bones, which is a question that has been addressed fully by Simmons in this volume and elsewhere (1996: 100–101; 1999: 292–95). Olsen was also concerned by the extent of burning, an issue discussed by Simmons (1996: 98–99, 1999: 289–92). Burnt bones are very rarely noted as present in the Cypriot Neolithic faunal collections. However, at Aceramic and Ceramic Neolithic Dhali *Agridhi*, 118, or 17.7 % of the 665 bones found in the 1972 season were burnt (Schwartz 1974: 104ff.). It is interesting that neither Carter (1989) nor Croft (1989) mention any burnt bones when they later studied this collection; some researchers simply do not record burning information.

Two prehistoric sites in Jordan offer useful comparanda. The Mushabian (ca. 14,500–12,500 B.P.) site of Syria in the Wadi Hisma of southern Jordan produced a very high incidence of burnt bones, 562 of 1,640 bones or 34.3%, including 35.3% of all *Gazella*, 32.6% of caprines, and 31.8% of equids (Klein 1995: 416).

Burnt bones are also common at PPNB Ain Ghazal, from both the larger mammals as well as foxes and hares (Köhler-Rollefson et al. 1988: 424). Thus, the *Aetokremnos* bone assemblage, with over 29% of the bones burnt, is not unique.

AETOKREMNOS COMPARED WITH LATE PLEISTOCENE CYPRIOT SITES

I have personally examined all the extant pygmy mammal sites of Cyprus and the bones from these deposits (Reese 1989; 1995). Of thirty-three Late Pleistocene sites, the four largest bone collections come from: Akanthou *Arkhangelos Mikhail* (2,599 fragments, 30+ MNI), Ayia Irini *Pervolia* (2,076 bones, including material studied in Stockholm after Reese 1995 was published), Kissonerga *Kleiotoudes/Ayios Phanentos* (1,549 bones, 40+ MNI), and Ayia Irini *Dragontovounari* (1,329 bones, 22+ MNI). The four largest collections together produced less than half the number of bones from *Aetokremnos* Stratum 4C. Also, while *Aetokremnos* Stratum 2 has much fewer *Phanourios* bones (3,966 bones from 29 MNI, with 46.3% burnt) than Stratum 4, this stratum alone has more bones than any single Late Pleistocene Cypriot hippopotamus site.

The overall faunal picture at *Aetokremnos* is very different from the other sites—a single coastal cave deposit has a handful of marine shells (*Aetokremnos* has over 21,500 individuals), only two have a total of four or five bird bone fragments (*Aetokremnos* has 3,205), none exhibit snake remains (*Aetokremnos* has 232 bones), and one has yielded a few possible tortoise remains (*Aetokremnos* has evidence for over 14 individuals). One of the fossil sites has a single burnt bone (Reese 1995: pl. 29) in a collection of about 2,600 fragments. And, equally significant, the other sites are lacking in chipped stone, picrolite and shell ornaments, or a worked calcarenite disk.

FAUNA FROM FEATURES

The eleven cultural features at *Aetokremnos* have been discussed by Simmons and Reese (1999: 95–112). Here I wish to highlight the faunal remains from these special deposits and provide some more detailed information (Table 1). Note that Binford (2000) is incorrect in stating that “It is very significant that no documented features originate within the bone bed.” Features 2 (casual hearth), 3 (burnt fauna concentration) and 9 (casual hearth) are all well within the Stratum 4 bone bed (Simmons and Reese 1999: 100–103, 110; Reese 1996: 107–8).

The suggested age for *Phanourios* is based on pig (*Sus scrofa*) aging information.

Table 1. Faunal remains from *Aetokremnos* features.

(Abbreviations: MNI = Minimum Number of Individuals; mo(s) = months; yr(s) = years)

FEATURE 1 (Ash heap/hearth area) (Simmons and Reese 1999: 95–100)
 IN AND SOUTH OF FEATURE 1 (Str. 2A-B)
 224 *Phanourios* bones (125 burnt, 55.8%), 2 MNI (one over 3.5 yrs)
 193 bird bones (44 burnt, 22.8%) – 7 MNI: 3 *Otis* (2 female, male), 3 *Anser* sp., 1 mid-sized Anseriform
 668 *Monodonta* (149 burnt, 22.3%), 17 *Patella* (5 burnt), 10 *Columbella* (1 bead, 8 stringable, 1 unstringable, 3 burnt), 5 *Dentalium* (3 beads, 1 burnt grey), 3 *Conus* (3 holed at apex), 1 *Glycymeris* (burnt fragment), 1 operculum, 2 *Helix*

AROUND FEATURE 1 (Strs. 2A/4) (Simmons and Reese 1999: 98)
 1,656 *Phanourios* bones (545 burnt, 35%), 7 MNI (one under 1 yr and six over 3 yrs [one over 3.5 yrs])
Monodonta (uncounted and used for ¹⁴C date)

FEATURE 2 (Casual hearth; Str. 4B) (Simmons and Reese 1999: 100–101)
 44 *Phanourios* bones (39 burnt/partly burnt, 88.6%), 2 MNI
 24 *Monodonta* (3 burnt), 6 *Helix*

FEATURE 3 (Burnt fauna concentration; Str. 4A-B) (Simmons and Reese 1999: 101–2)
 62,587 *Phanourios* bones (55,457 burnt, 88.6%), 50 MNI (15 MNI under 1 yr [four over 1 mo but under 6 mos], 32 over 3.5 yrs) (Reese and Roler 1999: 161)
 5 *Elephas* bones: distal radius epiphysis, probably partly burnt; vertebra centrum (UF), 3 ?ribs
 47 bird bones (6 burnt) – 2 MNI: 1 *Otis* (female), 1 *Athene*
 5 *Vipera* vertebrae (2 samples)
 ?*Geochelone* s.l. hands/feet of young with coracoid (stout) and tibia (stout), metatarsus (stout), caudal vertebrae, ?fragment of caudal vertebrae, burnt green (3 samples); ?*Testudo* carapacial fragments, fragment of peripheral, diaphysis of left femur
 195 *Monodonta* (45 burnt, 23.1%), 12 *Patella* (5 burnt), 2 *Columbella* (2 holed), 1 *Dentalium* (has some orange color on it)

FEATURE 4 (Hearth, activity area)
 ACTUAL FEATURE 4 (Str. 2A) (Simmons and Reese 1999: 102–3)
 108 *Phanourios* bones (104 burnt, 96.3%), 2 MNI (one subadult, one adult)
 300 bird bones (103 burnt/charred, 34.3%) – 7 MNI: 3 *Otis* (male, female [burnt]), 3 *Anser* sp. (1 burnt), 1 *Anas*; eggshell
 440 *Monodonta* (135 burnt, 30.7%), 22 *Patella* (13 burnt), 2 *Dentalium* (1 bead)

MIXED AND PERIPHERAL TO FEATURE 4 (Str. 2A) (Simmons and Reese 1999: 103)
 123 *Phanourios* bones (80 burnt/partly burnt, 65%), 2 MNI (one over 3 yrs)
 1 *Sus* phalanx 3 - partly burnt
 68 bird bones (14 burnt, 20.6%) – 5 MNI: 2 *Otis* (male [burnt], female), 1 *Anser* sp. (burnt), 1 *Anas*, 1 *Phalacrocorax* (burnt)
 1,813 *Monodonta* (339 burnt, 18.7%), 46 *Patella* (6 burnt), 3 *Columbella* (2 open apex, 1 unmodified), 3 *Dentalium* (3 beads), 3 *Conus* (3 holed), 2 *Glycymeris* (1 holed, 1 burnt), 1 *Cerithium* (holed)

OVER FEATURE 4 (Strs. 1/2A) (Simmons and Reese 1999: 103)

43 *Phanourios* bones (30 burnt/partly burnt, 72%), 1 MNI (adult)
 71 bird bones (27 burnt, 38%) – 1 MNI: *Otis* (female, burnt)
 4 *Vipera* vertebrae
 706 *Monodonta* (96 burnt, 13.6%), 27 *Patella* (10 burnt), 3 *Dentalium* (1 bead), 1 *Columbella* (open apex), 1 *Conus* (unmodified)

FEATURE 5 (Shell concentration) (Str. 2A) (Simmons and Reese 1999: 105–7)

217 *Phanourios* bones (54 burnt, 24.9%), 2 MNI (one over 3 yrs)
 184 bird bones (34 burnt, 18.5%) – 8 MNI: 5 *Otis* (3 male, 2 female [1 burnt]), 2 *Anser* sp.,
 1 Anseriform; eggshells
 1,874 *Monodonta* (188 burnt, 10%), 48 *Patella* (8 burnt), 1 *Columbella* (open apex), 1 *Dentalium*

MIXED FEATURE 5 (Strs. 2A/4, section collapse) (Simmons and Reese 1999: 106)

1,405 *Phanourios* bones (251 burnt, 17.9%), 4 MNI (one under 1 yr and two over 3.5 yrs)
 9 *Elephas* bones - 6 tusk fragments, vertebra, 2 ribs
 69 bird bones (33 burnt, 47.8%) – 4 MNI: 3 *Otis* (2 male [1 burnt], 1 female), 1 *Anser* sp.
 1 *Vipera* vertebra (burnt)
 ?*Geochelone* s.l. ?carapacial and plastral fragments
 292+ *Monodonta* (33+ burnt, 11.3%), 5+ *Patella* (3 burnt), 2 *Dentalium* (1 *D. rubescens/vulgare* bead)

JUST BELOW FEATURE 5 (Str. 2A lower) (Simmons and Reese 1999: 105–6)

24 *Phanourios* bones (14 burnt/partly burnt), 1 MNI (adult)
 105 bird bones – 9 MNI: 8 *Otis* (6 male, 2 female), 1 *Anser anser/A. fabalis*
 74 *Monodonta* (12 burnt, 16.2%), 2 *Dentalium*

FEATURE 6 (Casual hearth, stone-lined) (Strs. 1/2 + 2 lower)

PROBABLE TOP OF FEATURE 6 (Str. 2A lower) (Simmons and Reese 1999: 107)

14 *Phanourios* bones (3 burnt/partly burnt), 1 MNI
 53 bird bones (1 burnt) – 3 MNI: 1 *Otis* (male), 1 *Columba*, 1 *Corvus*; eggshell
 2 *Vipera* vertebrae
 573 *Monodonta* (88 burnt, 15.4%), 12 *Patella*, 2 *Columbella* (2 holed apex and on body), 2 *Dentalium* (1 bead), 1 *Conus* (holed apex)

ACTUAL FEATURE 6 (Str. 2A lower) (Simmons and Reese 1999: 107)

8 bird bones - unidentifiable (1 burnt); eggshell
 150 *Monodonta* (12 burnt, 8%), 3 *Patella* (2 burnt)

BOTTOM OF FEATURE 6 OR TOP OF FEATURE 7 - N95E90 (Str. 2A lower) (Simmons and Reese 1999: 107)

21 *Phanourios* bones (16 burnt), 2 MNI (one young, one adult)
 4 bird bones – 2 MNI: 2 *Otis* (male, female)
 2 *Vipera* vertebrae
 404 *Monodonta* (39 burnt, 9.7%), 7 *Patella* (1 burnt), 1 *Columbella* (holed upper body)

PAREKKLISHA SHILLOUROKAMBOS: AN EARLY NEOLITHIC SITE IN CYPRUS

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The site of Parekklisha Shillourokambos has for the first time in Cyprus provided concrete evidence for an early phase of the Aceramic Neolithic, belonging to the second half of the 9th millennium cal. B.C.E. This arrival of agro-pastoralists on the island is thus contemporary with the early PPNB of the northern Levant. Interaction with the neighboring continent in the spheres of lithic technology, the transfer of ritual and the exchange of ideas relating to agriculture and animal husbandry is obvious.

Shillourokambos has two main periods of occupation:

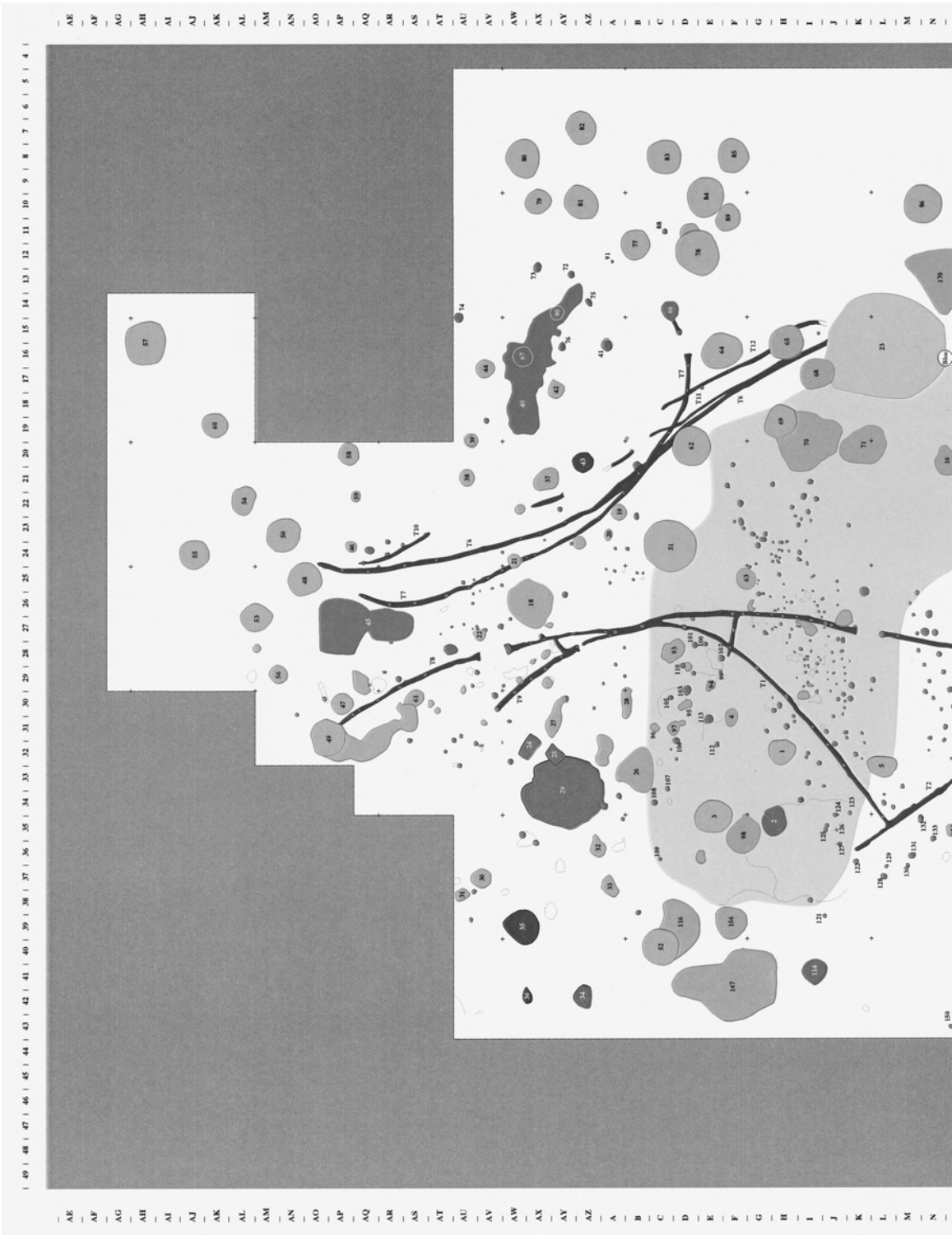
The Early Phases A and B (8200–7500 B.C.E.) are characterized by deep wells, large wooden enclosures probably for livestock, the gradual evolution from wattle and daub to the use of stone and mud, the choice of translucent chert for projectile points and elements in sickles, as well as quantities of imported Anatolian obsidian.

The Middle and Late Phases (from 7500 B.C.E.) show considerable evolution and the appearance of typically Cypriot cultural traits, such as the use of local opaque chert, the production of robust blades, the development of harvesting knives that replace the multiple elements for sickles, and a paucity of obsidian. A large depression contained a contracted burial and a range of artifacts, and the building tradition is characterized by massive circular structures of canonical Khirokitia Culture type.

The site is reoccupied during the Ceramic Neolithic Sotira Culture or the Early Chalcolithic.

The site of *Shillourokambos* near Parekklisha village 6 km east of Limassol in southern Cyprus, has yielded evidence of several periods of occupation belonging to the earliest known phases of the Cypriot Neolithic. A series of calibrated ¹⁴C determinations suggests that occupation of the site began towards the end of the ninth millennium B.C.E. and continued throughout the eighth millennium, thus lasting more than one thousand years. This time span corresponds to the development of features which were to become characteristic of the main-phase Khirokitia Culture attributed to the seventh millennium B.C.E.

Evidence for this stage of development was little known prior the excavations at Parekklisha *Shillourokambos* (hereafter *Shillourokambos*) with the exception of a small area investigated by Ian Todd at Kalavassos *Tenta* (hereafter *Tenta*).¹ This consisted of a series of post holes cut into the bedrock



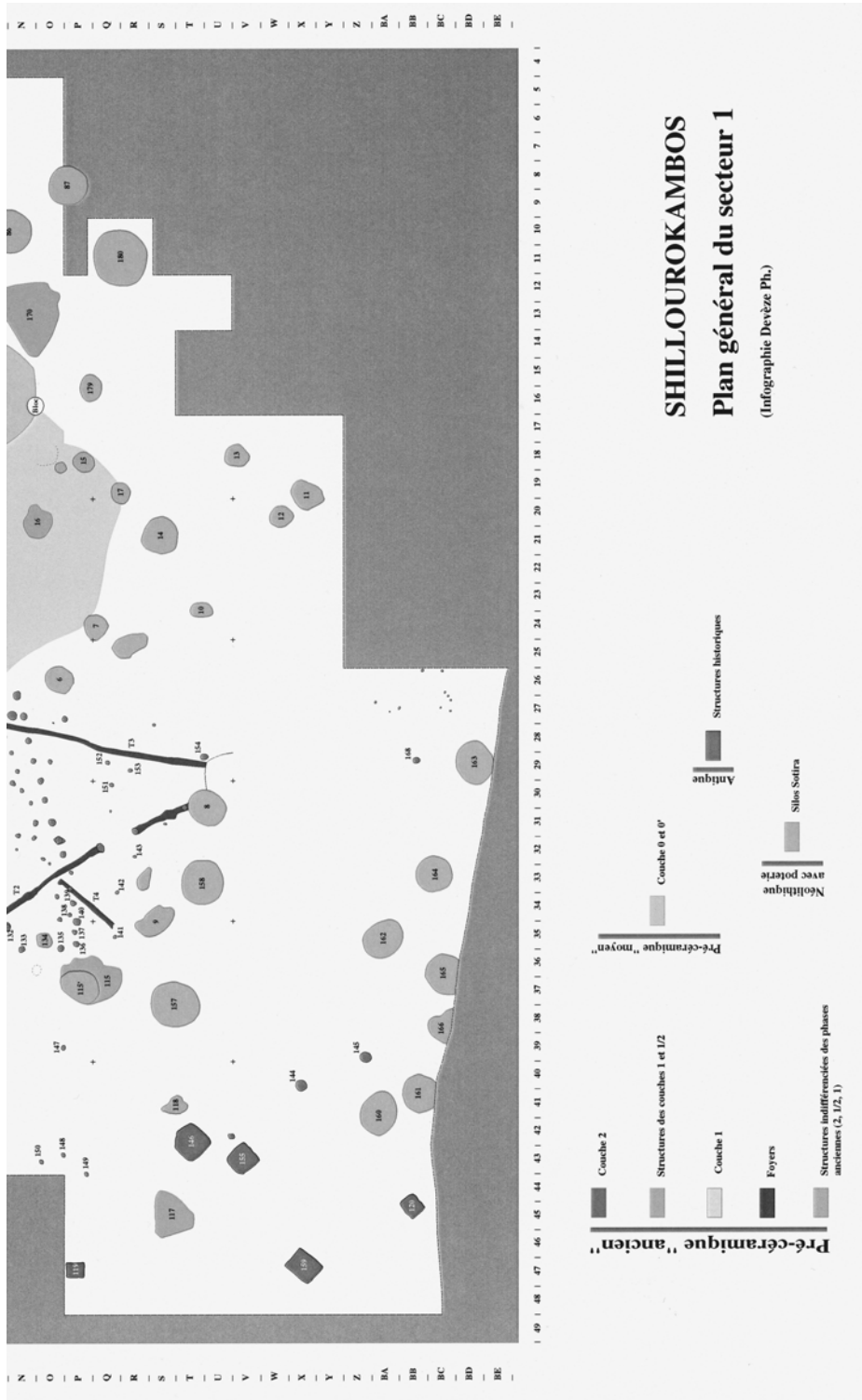


Fig. 1. Site plan of Parekklisthia Shillourokambos. North to top of plan. Scale: each grid square measures 1 x 1 m.

that belong to the earliest phase of occupation and yielded several intriguing dates. One early ^{14}C determinatin (Kt18: 9240 \pm 130 b.p. or, after calibration, ca. 8100 B.C.E.) was, unfortunately, weakened by the presence of several other dates with unacceptably large standard deviations from the same deposit.

Our knowledge of this early phase is incomplete because it has only been recorded at a single site with a complex taphonomy, namely Shillourokambos, a site which is currently under excavation. Despite this caveat, the information that can be obtained from Shillourokambos is sufficient to tackle the issues central to any discussion on the early prehistory of Cyprus. These concern the manner of the transfer of the subsistence economy from the mainland and the possibility of detecting cultural traits connected with this colonization.

When we began our investigations in 1992 there were numerous questions surrounding the issue of early human occupation in Cyprus. The main ones are commented on below, along with our responses:

1. Why was the canonical 7th millennium cal. B.C.E. Aceramic Neolithic of Cyprus so late, and thus contemporaneous with the last phase of the PPNB? Indeed, pottery appears on the mainland, from Cilicia to Byblos, around 7000 B.C.E. while Cyprus failed to adopt the use of fired clay. It is now possible to state with little doubt that the neolithization of Cyprus began much earlier, in the second half of the 9th millennium B.C.E., a time which corresponds to the transition from early to middle PPNB. Thus the Khirokitia Culture settlements studied to date belong to a developed, later stage, of the Cypriot Neolithic.
2. The second issue concerns the lack of projectile points in the Khirokitia Culture, whereas they are common on the mainland. The answer to this question is in fact quite simple: when Cyprus was first colonized by agro-pastoralists a number of PPNB techniques also make their appearance on the island, specifically the knowledge of bi-polar blade production. This technique is used for the manufacture of blades intended as projectile points which are diagnostic of the earlier levels at *Shillourokambos*, but then disappear in the middle phases, around 7500 B.C.E. Such a pattern of development would explain why projectile points no longer occur during the canonical Khirokitia Culture. During this early phase at *Shillourokambos* overseas contacts were frequent as proven by over 300 small blades of Anatolian obsidian; in the later phases of the Aceramic Neolithic such imports are rare.
3. Why was the Near Eastern subsistence economy based on domesticated caprovids, pigs and cattle, which was transmitted by diffusion to the surrounding regions, so radically different in Cyprus? Indeed, prior to the excavations at *Shillourokambos* none of the previously known Aceramic Neolithic settlements had provided evidence for cattle. Our work at *Shillourokambos* has demonstrated that cattle were in fact present in the earliest Cypriot Neolithic, but for unknown reasons the species died out in the 8th millennium B.C.E.
4. Finally, why did the Cypriot Aceramic develop such a unique architectural tradition based on stone or pisé circular structures, some of which have abnormally thick walls in relation to the enclosed space, whereas contemporary traditions from Anatolia to Palestine have all adopted a rectilinear module? To this question we cannot provide an answer, but it should be noted that in the earliest phase at *Shillourokambos*, when wooden structures alone were recorded, circular ground plans already seem to be in use.

The site chosen for *Shillourokambos* was a plateau rising slightly above the surrounding plain which trends gently south. The more escarped southern edge of the settlement has a more pronounced

¹ At the time of writing nothing had been published on the early material from Kissonerga *Mylouthkia*.

LARGE MAMMALS OF EARLY ACERAMIC NEOLITHIC CYPRUS: PRELIMINARY RESULTS FROM PAREKKLISHA SHILLOUROKAMBOS

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The Preliminary results of archaeozoological analysis of the 9th-8th millennia B.C.E. Aceramic site of Parekklisha Shillourokambos are summarized. They indicate that fox, domestic dog, cat, domestic pig, Mesopotamian fallow deer and “predomestic” sheep, goat and cattle were introduced to the island at that time. These data shed light on both the history of man/animal relationships on Cyprus and on the first steps of animal domestication and its spread in the Near East.

Recent excavations directed by Jean Guilaine in the Limassol District have uncovered Parekklisha *Shillourokambos*, the earliest known large Neolithic site on Cyprus. It testifies to the presence on the island of true Aceramic cultures very similar to the PPNB of the mainland (Guilaine et al. 1995; 2000 with references), one millennium earlier than the well-known Aceramic Neolithic Khirokitia *Vouni* and Kalavassos *Tenta* cultures (Le Brun et al. 1987; Todd 1987). *Shillourokambos* was inhabited from the end of the 9th millennium to the second half of the 8th millennium cal B.C.E., during a long Aceramic phase, perhaps contemporaneous with the end of the Early PPNB, and certainly overlapping with the Middle and Late PPNB of the Near East. It yielded a wide range of cultural remains, including numerous animal bones, the study of which is in progress. Nevertheless, more than 6200 animal bones have already been studied, and it is possible to summarize here the preliminary results (see more details in Vigne et al. 2000).

GENERAL CHARACTERISTICS AND ORIGINS OF THE FAUNA

All phases of occupation at the site yielded faunal remains, although they vary in quantity: Early Phase A (Late 9th millennium B.C.E., with 220 identifiable bones), Early Phase B (first half of the 8th millennium B.C.E., with 1100 identifiable bones), Middle Phase (middle of the 8th millennium B.C.E., with 3300 identifiable bones) and Late Phase (second half of the 8th millennium B.C.E., with 1640 identifiable bones). Generally speaking, shell, fish, bird and small mammal remains are very rare, which probably indicates that marine resources and small game were of lesser importance to the subsistence economy.

Already in Early Phase A, large mammal assemblages consist of pig (then dominant), Mesopotamian

fallow deer, sheep, goat and cattle. Dog and the European fox are attested from Early Phase B. Cat is represented by only one definite humerus shaft from the Middle Phase. Cattle are very scarce in the Middle Phase, and are absent from the Late Phase.

There are absolutely no remains attributed to, or even suggesting the presence of the Cyprus autochthonous endemic mammal species (dwarf hippopotamus and pygmy elephants and the genet; Boekschoten and Sondaar 1972; Reese 1995, 1996a), which, therefore, were probably extinct by that time. At the Late Pleistocene site of Akrotiri *Aetokremnos* (10th millennium B.C.E.), Reese (1999) recorded 14 pig phalanges and metapodials, and interpreted them as the remains of wild boar hides brought by hunters from the mainland, rather than as evidence for the presence of pigs inhabiting the island at that time. Four other pig phalanges from the same site were incorrectly attributed to fallow deer (Reese 1999). Radiocarbon dating of these bones is currently in progress. Thus, none of the species recorded at *Shillourokambos* is attested in the Pleistocene autochthonous faunal assemblages of Cyprus, which suggests that they were introduced to Cyprus by the Aceramic inhabitants.

A similar origin for the fauna of Khirokitia was suggested by Davis (1984). *Shillourokambos* strengthens his argument and shows that the arrival of these species took place as early as the end of the 9th millennium cal B.C.E., which is an important contribution to the knowledge of early navigation in the eastern Mediterranean (Vigne 1999). It is also a significant development in the history of the relationship between early Neolithic humans and animals in the Near East, since their appearance on Cyprus testifies to the fact that each of the introduced species enjoyed a privileged status, either economic or symbolic, in the societies where domestication was emerging. Therefore, it is necessary to carefully examine on the basis of archaeozoological data the possible status of each species at *Shillourokambos*.

STATUS OF THE SPECIES RECORDED AT *SHILLOUROKAMBOS*

From their very first appearance at *Shillourokambos*, dog (*Canis familiaris*) and pig (*Sus scrofa*) are of such small size that they must have been domesticated. Selective kill-off patterns of pig during Early Phase B suggest strict annual and seasonal managing and strengthen the evidence for domestication. In contrast, the skeletal characteristics of the European fox (*Vulpes vulpes*) and Mesopotamian fallow deer (*Dama mesopotamica*) do not differ from present day wild populations. In all phases at *Shillourokambos*, with the exception of the latest ones, sufficient amounts of deer bones suggest that animals were killed and butchered far from the site. This kill pattern is indicated by a consistent and significant absence of bones of the head, including antlers, as well as a lack of vertebrae and limb extremities (metapodials and phalanges), all of which deliver little or no meat. Moreover, both sexes seem to have been killed equally, and the distribution of age classes argues for hunting of groups of females and young, rather than for husbandry. Therefore deer, which dominate the faunal assemblage of Early Phase B, seem to have been hunted and not herded.

The robust skeletal size of sheep and goat is identical to those of their wild counterparts on the mainland, respectively the Oriental moufflon (*Ovis orientalis*) and the Bezoar goat (*Capra aegagrus*). Their horn cores and sexual dimorphism do not differ from those of the wild species, except perhaps for small variations in the shape of some male sheep horn cores. However, by comparison with the fallow deer, adult female ovis and capra are significantly more numerous than males and the presence of all parts of the skeleton, without any significant absence of bones which bear little meat, suggest that animals were killed and butchered near to or on-site. Mortality profiles indicate selective slaughtering of young adult males, which seems more in agreement with husbandry than hunting. All these observations argue for selective breeding of caprovids, and also suggest that their morphology had not been modified by comparison with that of their wild ancestors. We propose to name them "predomestic" sheep and goat (Vigne and Buitenhuis 1999).

There are only 115 cattle bones attributed to the three earlier phases of the site, which precludes discussion of sex ratios or kill-off patterns. However, since all parts of the skeleton were represented, including bones with little flesh, it appears that cattle actually lived on the island and were not imported as butchered joints of meat. The evidence suggests that cattle were slaughtered and butchered on-site or nearby. Eighteen metric measurements seem to indicate that the skeletal size was similar to that of wild cattle (*Bos primigenius*) in the Near East, although some individuals might have been more diminutive than the smaller specimens on the mainland. Thus, although poorly documented, the status of cattle at *Shillourokambos* seems to be nearer to sheep and goat than to that of deer. Cattle were probably bred as a “predomestic” species. These observations cast a new light on the history of cattle in Cyprus, since the species was thought to have been introduced very late to the island, not before the Early Bronze Age (Croft 1991; Reese 1996b). One may also question why the species disappeared only a few centuries after its first introduction to the island during the early Aceramic phase, and why it remained absent from Cyprus for four millennia during the remainder of the Neolithic and the Chalcolithic, in spite of frequent intercommunication with the mainland. *Shillourokambos* provides information on this issue, since the disappearance of cattle during the Middle Phase is associated with significant changes both in lithic technology and animal husbandry. The origins of these changes are thus more likely to have been caused by cultural rather than natural factors.

Nevertheless, it appears that all the ungulates introduced to Cyprus by early Aceramic people at the end of the 9th millennium cal B.C.E. were herded to varying degrees, either as domestic (pig) or as “predomestic” (i.e. morphologically unmodified sheep, goats and cattle) animals. The only exception seems to be the Mesopotamian fallow deer, which was probably a game species throughout the 8th millennium, though it cannot be excluded that it had been tentatively herded at the time of the island’s initial colonization. These observations provide significant information on the beginning of husbandry in the Near East.

CYPRUS AND THE BEGINNING OF ANIMAL HUSBANDRY IN THE NEAR EAST

Until recently, it was accepted that animal husbandry in the Near East was not initiated prior to the beginning of the Middle PPNB (i.e. early 8th millennium B.C.E.), and did not spread westward beyond its place of origin in southeastern Anatolia before the Late PPNB (second half of the 8th millennium B.C.E.). Moreover, only sheep and goat were considered to have been herded during the Middle PPNB, domestic pig and cattle having emerged during the Late PPNB (Helmer 1992; Bar-Yosef and Meadow 1995; Legge 1996). However, studies recently published (Saña 1997; Horwitz and Ducos 1998; Rosenberg et al. 1998; Peters et al. 1999; Zeder and Hesse 2000) suggest that sheep and goat were domesticated slightly earlier, together with pig and perhaps cattle, and that the spread of these domesticates from their area of origin took place as early as the Middle PPNB.

Preliminary results from *Shillourokambos* suggest that by the end of the 9th millennium, all four species were in some way herded on the mainland and spread far enough from their point of origin to be transported to Cyprus by sea. The *Shillourokambos* assemblage also demonstrates that these animals, only recently herded, may have maintained the same skeletal morphology as their wild ancestors (i.e. that of “predomestic” animals) for a long time. This explains why they cannot be recognized as domesticates from bone assemblages on the mainland, where the remains of both hunted wild and “predomestic” herded animals are indistinguishable and often found mixed together. Consequently, the preliminary results from *Shillourokambos* suggest that researchers should re-examine Early and Middle PPNB bone assemblages and give greater importance to non-morphological criteria for recognizing early husbandry as recently did Zeder and Hesse (2000). The Cypriot material discussed here suggests that it would be profitable to reconsider the first stages of animal husbandry with less

WELL-ESTABLISHED COLONISTS:
MYLOUTHKIA 1 AND THE
CYPRO-PRE-POTTERY NEOLITHIC B

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During the 1990s, excavations at Kissonerga Mylouthkia, western Cyprus, yielded data-rich fills of well shafts and other features that provide startling new evidence for human occupation on the island during the 10th and 9th millennia B.P. Radiocarbon dates from short-lived cereal and other plant taxa enable us to contextualize the site in terms of Cypriot prehistory and the precocious migration of farmers, probably from the Levantine mainland. This newly unfolding testimony indicates that immigrant groups with links to the later Khirokitian had colonized Cyprus long before that classic phase, thus providing support for the antecedent development hypothesis. Insular traits such as the adaptations to local chert resources, and mainland diagnostics such as special skull treatments typify Mylouthkia assemblages. They point to one or more influxes of colonists with PPNB traditions and to a prolonged development which culminated in the emergence of the distinctively Cypriot Khirokitian Neolithic. The

term Cypro-PPNB is proposed in order to convey salient characteristics of this hitherto unknown period in Cypriot prehistory.

The last decade of the 20th century has witnessed startling developments in our understanding of the beginnings of human settlement in Cyprus. Only ten years ago, in a contribution to *Néolithisations*, Alain Le Brun justifiably stated that “as there is no clear evidence of human presence in Cyprus before the sudden appearance, at the beginning of the 6th millennium, of a civilization of farmers to whom pottery was unknown, the Neolithization of the island as well as the origin of the [Khirokitian] culture are problematic” (Le Brun 1989a: 95). He was reflecting a well established, consensual view, since claims for earlier, Pre-Neolithic occupation were widely regarded as ambiguous at best (e.g. Cherry 1990: 151–52; Simmons et al. 1999: 21–25). Yet, in the late 1980s, *Aetokremnos* was starting to yield more compelling evidence for just such an occupation. This enabled Held to refine the consensual position by stating that “the conundrum of the immediate predecessor of the island’s Aceramic settlement has remained unsolved” (Held 1989: 8). For Held, as for others, the Akrotiri Phase occupants of the *Aetokremnos* rock shelter represent utilization rather than colonization of the island, whether by seasonal visitors or more regularly settled hunter-gatherers. They have no discernible links with the Khirokitian about three millennia later (Held 1992: 119–20; Simmons et al. 1999: 323). Thus, while *Aetokremnos* provides challenging evidence for early sea navigation, island utilization and man’s role in megafaunal extinctions, it has not had a direct bearing on the critical issues of colonization and the successful establishment of sedentary farmers on Cyprus. As shown in recent chronological charts of the island’s prehistory (e.g. Knapp et al. 1994: 381, fig. 1), this has resulted in a chronological gap from ca. 8500 to 7000/6500 cal. B.C.E.

The gap, or before that the complete absence of sustainable evidence for pre-Khirokitian occupation, did not prevent prehistorians from essaying models for this stage of Cypriot prehistory. Chief amongst these were the antecedent and the Khirokitian colonization models. The former postulated that since the Aceramic Neolithic as it was then known was such a fully developed *sui generis* phenomenon with only a few much earlier mainland traits, intermediate precursors must exist on the island for what was termed the “Para-Neolithic” (Watkins 1973). The latter accepted the evidence as it was and posited dual colonizing processes to account for the unique character of the Khirokitian: a loss in transmission of certain cultural features and an elaboration of other features. Demographic stress was the trigger for migration, and it was couched in terms of a 7th–6th millennium cal B.C.E. settlement regression model on the mainland (Stanley Price 1977). The debate has many ramifications on how archaeologists perceive culture change and colonizing processes, but it lacked empirical evidence. This crucial evidence has now started to emerge as a result of lithic studies (McCartney 1998, in press a), excavations of Kissonerga *Mylouthkia* (from 1989), Parekklisha *Shillourokambos* (from 1992) (henceforth *Mylouthkia* and *Shillourokambos*), reconsideration of Kalavastos-*Tenta* (below) and perhaps the site of Akanthou *Arkosyko* (see Frontispiece for these and other Aceramic sites).

DATING THE CYPRO-PPNB

Radiocarbon dates confirming the existence of human occupation during this seminal period of ca. 1500 years come from at least three excavated sites. Those from *Shillourokambos* and *Tenta* are published elsewhere (Briois et al. 1997; Todd 1987: 174–78). Further dates from *Shillourokambos* will provide a more secure and refined chronological framework (Vigne et al. 2000; Guilaine and Briois this volume). The *Mylouthkia* dates have not been published before. They are presented here and will be treated in more detail in the *Lemba Archaeological Project*-Vol. III.1 (*LAP* III.1).

A coherent set of AMS dates (Table 1) come from charred seeds in the abandonment fills of two discrete wells, 116 and 133, described below. They suggest that the wells, which belong to *Mylouthkia*

Periods 1A and 1B respectively, are separated by about a millennium, a separation that corresponds with the typological development of associated chipped stone and the fall-off rate of obsidian. Deposits in the wells were compact with rubble voids, undisturbed and with little evidence for root, animal or water action. The ^{14}C samples from earlier well 116 come from the main and second last, ca. 1.7 and 3.7 m below the extant rim of the well. Those from well 133 are derived from seeds located almost 2 m below the surviving lip of the well. Turning to chronometric data from other sites belonging to the

Table 1. Kissonerga-*Mylouthkia* Period 1 radiocarbon (AMS) date list.

Period	Context	Code	Sample	Years bp	$\delta^{13}\text{C}$	Cal BC from Oxcal	
			Material			1 sigma	2 sigma
	Well 116.124	OxA-7460	C482 barley	9315±60	-23.0%	8,430–8,200	8,590–8,090
	Well 116.123	AA-33128	C481 grain	9235±70	-21.4%	8,350–8,090	8,410–8,080
	Well 116.124	AA-33129	C482 grain	9110±70	-23.4%	8,330–8,030	8,340–8,000
	Well 133.264	OxA-7461	C531 Pistacia	8185±55	-23.1%	7,260–7,040	7,420–7,030
	Well 133.264	AA-33130	C531 Lolium sp	8025±65	-22.9%	7,040–6,760	7,250–6,600

period ca. 9500–8000 B.P., Table 2 shows that well 116 is contemporary with *Shillourokambos* Early A and part of *Tenta* Period 5. Well 133 should be contemporary with *Shillourokambos* Late Phase and *Tenta* top of the site. There are no deposits in these wells or other excavated *Mylouthkia* components that equate with *Shillourokambos* Early B and Middle. With the possible exception of *Tenta*, we lack settlement plans of this period, and our evidence comes mainly from fragmentary, though impressive, negative features.

The possibility that the hierarchical settlement plan of *Tenta* top of site belongs to this epoch merits further consideration (see also Todd, this volume). “Top of site” here refers to the solid architecture starting with Str. 36 and not the underlying Period 5 timber phase. The excavator, Todd, stated that there was no stratigraphic evidence against a sequence in which the discrete top of site was early, but he concluded it belonged to the much later, penultimate period of the site (Todd 1987: 177; cf. Knapp et al. 1994, 385). On the other hand, the radiocarbon evidence points unambiguously to the 9th millennium B.P. All securely associated determinations are contemporary with *Mylouthkia* 1B and *Shillourokambos* (Middle)–Late Phase (Table 2). The small set of dates is consistent: there are no anomalies. The four other pre-8000 B.P. dates come from the Lower South Slopes where there is a concentration of later dates, but two of these (shown on Table 2) antedate structures there and the other two are from open air hearths in areas where there had been earlier timber structures (cf. re-deposition/burning of old wood). So, radiocarbon determinations indicate that the remarkably well-defined plan of a topographically and architecturally dominant structure surrounded by rows of smaller buildings belongs to the Cypro-PPNB and that some settlements of the period consisted of communities with communal/public(?) structures. The genesis of the social organization expressed by this distinctive spatial arrangement may exist at such sites as Pre-Pottery Neolithic A (PPNA) Jerf el Ahmar, a settlement with similar hierarchical plan (Stordeur 1999: 142, fig. 8).

KALAVASOS TENTA REVISITED

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Five seasons of excavation were undertaken at the Aceramic Neolithic site of Kalavasos Tenta between the years 1976 and 1984. The site lies adjacent to the southern coast, between Limassol and Larnaca. Substantial stone and mud-brick architecture was excavated on the top of the site and on the southern slopes, comprising domestic buildings clustered in a small village on a strategically placed natural hill. In comparison with nearby Khirokitia Vouni the site was expected to date to the sixth millennium B.C.E. However, a series of radiocarbon assays included a number of dates in the eighth and seventh millennia B.C.E. The occupation of the site was divided into five chronological periods, the earliest of which (Period 5) was marked only by lightly built structures. Analysis of the stratigraphy, radiocarbon dates and some of the artifacts strongly suggests that Period 5 at Tenta is contemporary with the earlier Aceramic phases at Parekklisha Shillourokambos.

The Aceramic Neolithic site of Kalavasos *Tenta* is located in the lower reaches of the Vasilikos river valley, approximately half way between Limassol and Larnaca, in the southern coastal region of the island. It consists of a settlement on a small natural hill, 3.2 km north of the coast. Excavations were initially undertaken by P. Dikaios in 1947, but his campaign was brief and no full report was ever published. More extensive excavations were undertaken by the Vasilikos Valley Project, directed by the writer, in the years 1976–1979 and 1984. The first volume of the final excavation report, detailing the site and its setting, the architecture and chronology, was published in 1987 (Todd 1987); the second volume covering the artifacts, human burials, flora, fauna and site territory analysis, is about to be sent to press at the time of writing. The site is now open to visitors, and a summary guide (Todd 1998) has been published.

The recent excavations were centered on the top of the site and the lower southern slopes. Substantial architectural remains of stone and mud-brick were encountered in both areas (figs. 1–2), in some cases with up to three superimposed building levels. Outside these areas, small soundings generally revealed a lack of well preserved architecture, and in some cases remains of the Ceramic Neolithic phase. This latter phase is marked on the site by areas of pits containing ceramics and other artifacts, but no contemporary standing structures were encountered. Although one of the original aims of the excavation was to try to find evidence of continuity of occupation from the Aceramic to the Ceramic Neolithic phase, all of the information retrieved from the excavation pointed in the opposite direction. There seems to have been a lengthy gap between these two main phases of utilization of the site. The focus of this paper is on the earlier, Aceramic settlement, and no further consideration will be given here to the later phase.

The site of *Tenta* is strategically located on a small natural hill which affords an excellent view up the valley toward the Troodos Mountains and down the valley toward the coast. It overlooks an easy crossing of the river, lying on the major east-west route along the southern coastal fringe of the island

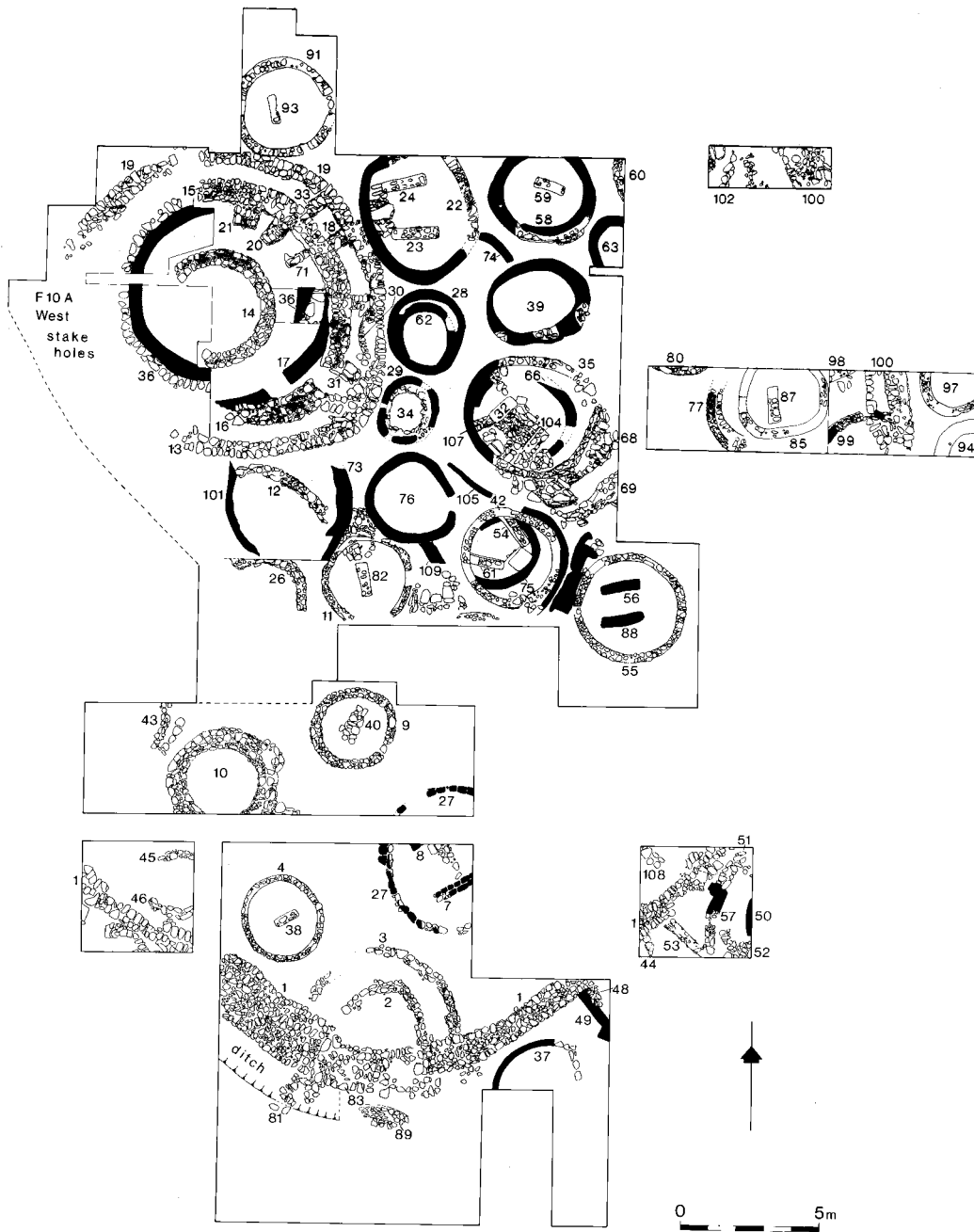


Fig. 1. Plan of major architectural and other features at Tenta. Mud-brick walls are shown in solid black.



Fig. 2. General view of upper part of Tenta with Structures 11 and 42 in foreground, from the southsoutheast.

which is still very important today. The circular, or at least curvilinear domestic structures of the village clustered on the upper reaches of the hill, surrounded, in an early phase of the settlement, by a substantial encircling wall and a ditch cut in the *havara* (secondary limestone) immediately outside it. While the factors governing the choice of location of the settlement are unknown, the desire for security clearly played a significant part.

Kalavassos *Tenta* is not the only Aceramic Neolithic settlement known in the southern reaches of the Vasilikos valley. An extensive field survey has been undertaken of the valley from the Kalavassos Dam down to the coast, the results of which, in conjunction with information derived from the construction of the Nicosia-Limassol highway, have provided evidence of Aceramic Neolithic occupation at four localities in addition to the settlement at *Tenta*. The most southerly site named Mari *Mesovouni*, located 1 km north of the coast, comprised a village settlement on a steep-sided, flat-topped hill in a strategic position overlooking the coast. The proximity of the site to *Tenta* is surprising, but the two sites may not have been occupied at exactly the same time. The site has unfortunately been destroyed in recent years and the hill quarried away.

During the construction of the bridge over the Vasilikos river for the new Nicosia-Limassol highway, one of the foundation trenches for the bridge supports revealed a small ash-filled pit at a depth of 5.5 m below the present flood plain, in association with a small quantity of chipped stone tools. A radiocarbon date from the pit suggests use of this part of the river bank in a late phase of the Aceramic Neolithic. The extent of the site is unknown. To the north of Kalavassos village, remains of probably two more Aceramic Neolithic settlements have been located by the field survey, but the fieldwork has not yet been completed. The information presently available indicates that Aceramic Neolithic settlers had penetrated the northern part of the valley well to the north of Kalavassos, and occupation of this phase was by no means restricted to the coastal zone. This pattern of settlement must be borne in mind in any consideration of the history of the earliest settlement or utilization of the valley.

AT THE OTHER END OF THE SEQUENCE: THE CYPRIOT ACERAMIC NEOLITHIC AS SEEN FROM KHIROKITIA

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The 7th millennium B.C.E. site of Khirokitia Vouni illustrates the end of the cultural process which began with Parekklisha Shillourokambos. The purpose of this paper is to present the main discoveries of the excavations at Khirokitia and to concomitantly assess the differences between the beginning and the end of the sequence. The scale of communal projects recorded in all phases of the settlement suggests the existence of a well-structured society. This is the focus of the present study, which offers a tentative analysis based on the organization of domestic space and funerary customs.

The preceding contributions illustrate how greatly our knowledge of Cypriot prehistory has progressed in these last years. The excavations at Parekklisha *Shillourokambos* have cast light on the initial colonization of the island, hence on the beginning of the Cypriot Aceramic Neolithic period. In contrast, the site of Khirokitia *Vouni* (hereafter Khirokitia) belongs to the end of the Aceramic sequence in the 7th millennium cal. B.C.E., which corresponds to the apogee of this period's cultural development just prior to its collapse. The Cypriot Aceramic civilization had evolved in the distinctive, closed environment of an island and once the founding wave of settlement ebbed, all relations with the outside world seem to have ceased.

Khirokitia differs in many respects from *Shillourokambos*—by its location, its massive architecture, its chipped and ground stone industries, the scarcity of obsidian, and its faunal assemblage. Addressing the issues raised by these points, I shall attempt to present the view of Aceramic Neolithic Cyprus as seen from Khirokitia.

The site was discovered in 1934 by Porphyrios Dikaïos (Dikaïos 1953) who, on behalf of the Department of Antiquities, conducted six field campaigns between 1936 and 1946. The exploration of the site was resumed in 1977 by a French mission (Le Brun 1984, 1989, 1994, in press b) sponsored by the Centre National de la Recherche Scientifique and the French Ministry of Foreign Affairs. The first objective was to continue the study of the process of neolithization in an insular context, which had begun with the excavation of the small contemporary settlement of Cape Andreas *Kastros* (LeBrun 1981). The second was to try to answer questions concerning the site's internal organization and location in space.

Khirokitia is situated about 6 km from the southern coast of the island, in the Maroni river valley, which stretches from the Troodos Mountain range to the sea. The Neolithic settlement covers an area of approximately one and a half hectares on the slope of a hill. Khirokitia thus fits the typical pattern of Aceramic sites

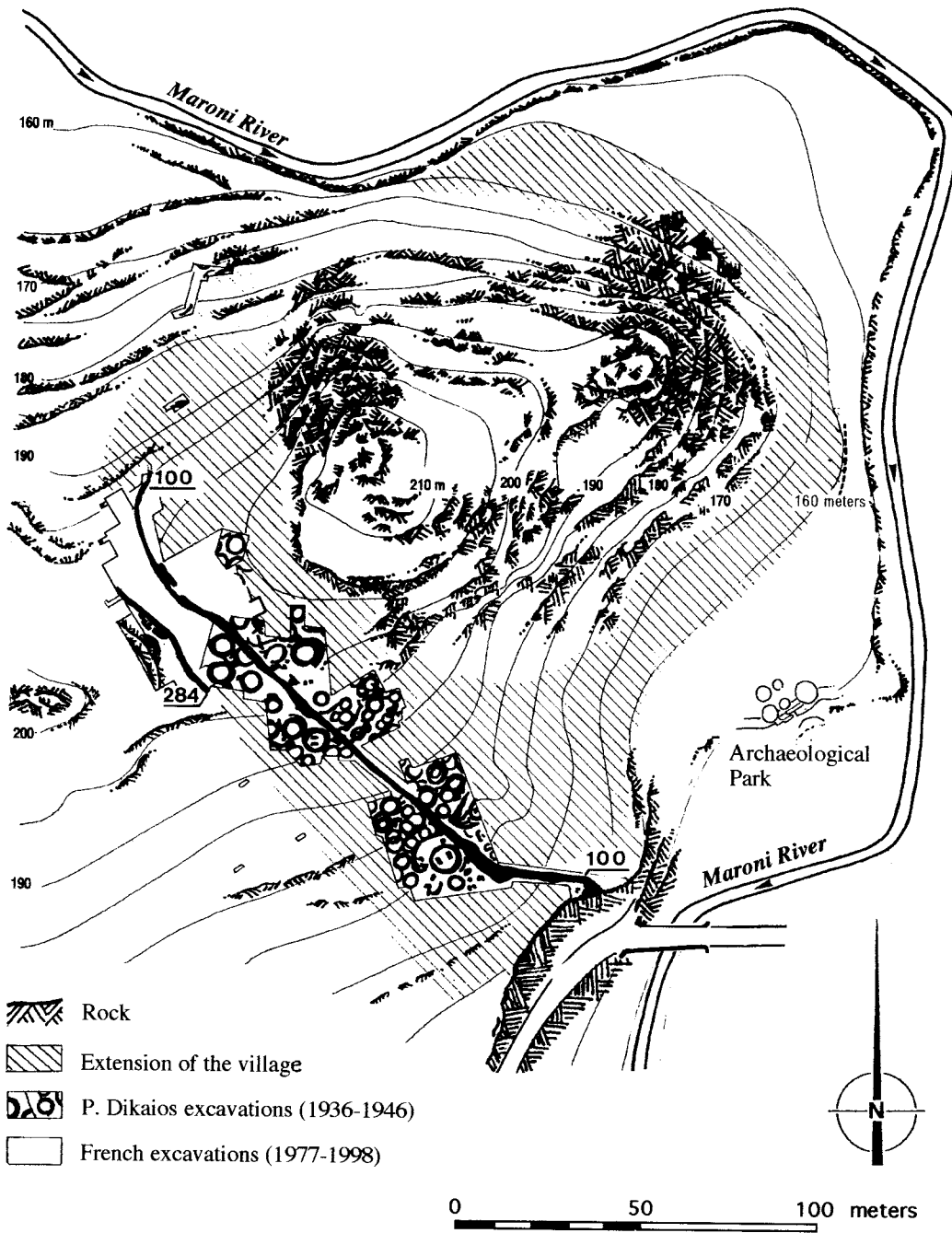


Fig. 1. Khirokitia. General plan of the site.

characterized, with the notable exception of *Shillourokambos*, as being located on hills, promontories, or some other naturally protected feature.

The hill chosen for the Neolithic settlement lies within a sharp bend of the river, which protects it on the north, east and southeast (fig. 1). When the site was occupied, the river had a more substantial rate of flow than at present, as shown by recent research undertaken on the southeast flank of the settlement along the bank where several structures suffered from floods and shifts in the course of the river bed.

This natural protection, however, does not exist to the west where the village is open to the neighboring hills. In place of such natural defenses, a long, linear stone structure was built, crossing the settlement from north to south, providing artificial protection (fig. 1, structure 100). It is not within the scope of this article to provide a detailed discussion of the work carried out on this structure or of our observations resulting from this research: suffice it to say that it is no longer viewed as the “main road” of the village, as posited by Dikaios, but as a perimeter wall. When the settlement spread to the west onto previously unoccupied land, the same pattern was repeated and the development was accompanied by the simultaneous building of a new boundary in the form of an impressive stone wall (fig. 1, structure 284).

The concept of an intentionally enclosed, built space, involving the construction of an artificial boundary implies obvious architectural skill. The architectural endeavor, relying on the use of stone and mud in the form of mudbricks and pisé, expresses itself in two ways: first in the creation of public works for the good of the community and second in the development of domestic architecture. Whichever category a structure at Khirokitia falls into, the architecture at the site is always substantial. Such solidity is concomitant with sophistication, a point emphasized by the way in which this enclosed world communicated with that outside, as represented by the access points incorporated into the village enclosure wall. In order to connect two surfaces located on the same level, but separated by a barrier, it is simply a matter of making an opening in the barrier. At Khirokitia, however, the process is not so simple as the hill slope complicates the issue. The two surfaces that need to intercommunicate are separated by a difference of more than 2 m and the thick wall only adds to the difficulty. The solution adopted to overcome this problem was to construct a stairway of twelve steps, comprising three flights at right angles to one another incorporated within a stone structure built against the exterior face of the perimeter wall (figs. 2, 3).

As for domestic architecture, the basic architectural unit is a structure with a circular ground plan and not a rectangular one as seen in most contemporaneous villages in the Near East. This cultural choice remains constant throughout the occupation of the site and buildings are round from the earliest level to the latest. The exterior diameters of structures vary from between 2.3 m for the smallest and 9.8 m for the largest. Before construction began, the ground surface was roughly prepared to support the walls, which were then built directly onto the underlying deposits, usually without a foundation trench. Floors were covered with mud plaster also placed directly on the underlying deposits, or more rarely, on a layer of stones. The mud plaster was worked from the floor up against the interior face of the wall where it also served as a base for painted mural decoration. In the present article I do not plan to discuss the issue of roofing, but suffice it to say that all the data recovered from Khirokitia indicate the use of flat, terraced roofs.

Each of these circular units defined a habitation area and was a component of a larger domestic space: the house. Evidence suggests that the space within individual circular units may sometimes have been increased by a kind of loft resting on pillars. The interior space could be without features, or was subdivided by low partition walls and platforms, usually trapezoidal in shape. Domestic installations such as fireplaces, pits, or basins are also found. The ideal house form, as reconstructed on the basis of information yielded by the excavation, may be defined as a compound with several units grouped around an open space acting as a sort of small, inner “courtyard” containing a grain grinding installation.

ACERAMIC NEOLITHIC PLANT REMAINS IN CYPRUS: CLUES TO THEIR ORIGINS?

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Plant remains recovered from Aceramic Neolithic sites in Cyprus are compared to the predominant plants found on PPNA and PPNB sites in the Near East (Israel, Jordan, Syria and Turkey) in an attempt to identify a plant or plants that may provide a clue to the origins of the early farming communities of Cyprus. The species identified in the Cypriot Aceramic Neolithic are all found in contemporary sites throughout the Near East and Turkey and do not point to a particular area of origin. If annual species of wild rye were to be found it may provide a more definite link with southern Turkey, but given the paucity of sites that have produced this plant, such a connection would be highly speculative.

Although one site is now known to predate the Aceramic Neolithic of Cyprus (Simmons this volume), there is, as yet, no evidence for a continuous sequence of occupation on the island into the earliest Aceramic Neolithic. As a result of this lacuna it is impossible to identify an indigenous development of agriculture and village life, and the origin of these early farming communities remains unclear. One avenue of inquiry concerns the crops that were introduced by the immigrants. If it were possible to identify among the Cypriot sites a similar assemblage of crops, perhaps a species with a narrowly focused distribution in the Near East, it might be feasible to locate the area of origin of the Cypriot Aceramic Neolithic culture. In this paper the data on the plant remains recovered from Aceramic Neolithic sites in Cyprus are presented and compared to the predominant plants found on PPNA and PPNB sites in the Near East (Israel, Jordan, Syria and Turkey) in an attempt to identify a plant or plants capable of providing a clue to the origins of the early farming communities of Cyprus.

THE NATURE OF THE EVIDENCE

Before embarking on any discussion of plant remains it will be helpful to discuss some of the problems associated with comparative studies in palaeoethnobotany in general and with analysis of plant remains in Cyprus in particular. Attempts to compare plant remains from sites in the Near East with those from Cyprus require consideration of the differences in methods of recovery and sampling, taphonomic processes, and preservation on the various sites. Some have been systematically water sieved from the outset with the purpose of recovering botanical material. Others have been sampled post-excavation, from the balks of the trenches. Still others were not water sieved at all, having been excavated prior to the introduction of such procedures, and the recovered plant remains were only

those that could be seen during excavation. Thus it is impossible to compare quantities of remains from one site to another as different recovery methods result in different quantities of material.

Taphonomic processes must also be taken into account since sampling only deposits where carbon is evident, such as hearths, may not recover all types of plants utilized or preserved on the site. Floor deposits, dumps, or pits may have quite different assemblages representing different plant processing steps, disposal or storage areas. Samples taken only from balks generally have little contextual information attached to them.

The problems of differential preservation are difficult to assess as the lack of material may be due to poor preservation conditions or true lack of deposition. Poor preservation is likely on fairly shallow sites. In the Mediterranean summer the ground dries sufficiently to dry out carbonized remains in the upper 50 cm to 1 m of sediment. When the rains come in October and November, water percolating into the cracks of the dried ground is quickly absorbed by the carbon that splits and fragments. Subsequent tectonic movement and bioturbation further break up the material and disperses it through the deposit. When excavated, the carbonized plant remains appear as small flecks of carbon that are not recovered well during flotation and are difficult to identify.

On Cyprus, the problem of poor preservation (or lack of deposition) varies from site to site. At Khirokitia preservation is quite good and large quantities of plant remains have been recovered from many deposits, even though the site has not been intensively water sieved. At Kalavastos *Tenta*, just 6 km away, on the other hand, systematic water sieving was carried out from the beginning of the project and nearly every deposit excavated was sampled (Hansen forthcoming). However, relatively few remains were recovered compared to Khirokitia. More than 400 samples were processed at Kalavastos *Tenta* yet only 165 of the Aceramic Neolithic samples yielded plant remains totaling a mere 1076 items. At Khirokitia, 241 samples have been examined with approximately 9000 items identified¹ (Hansen 1989, 1994; Miller 1984; Waines and Stanley Price 1977). The reason for this difference in the two sites is somewhat puzzling since the sediments, calcareous *kafkalla*, and the depth of deposits from the surface, 3–4 m, are similar at both. The site of Parekklisha *Shillourokambos* (Guilaine this volume) is very close to the surface and has so far produced no plant remains, despite water sieving attempts. Thus, the botanical evidence for early farming or plant use on Cyprus is rather poor, with only five Aceramic Neolithic sites having produced plant remains so far: Kalavastos *Tenta*, Khirokitia, Cape Andreas *Kastros*, Kholetria *Ortos* and Dhali *Agridhi* (Table 1, fig. 1). Dhali *Agridhi* has not been included in the following discussion, however, because of the paucity of remains at that site. Utilizing the data from the other four sites, we can begin to look at the types of plants recovered and compare them to some of the contemporary Near Eastern sites.

CYPRIO T ACERAMIC NEOLITHIC PLANT REMAINS

Table 1 provides some of the data for the sites in Cyprus that have produced sufficient plant material to allow an examination of early farming. Only the primary domesticated cereals, legumes, and a few of the dominant wild plants recovered from these sites are included in Table 1 and fig. 1, but it should be noted that none produced large quantities of “weed” seeds with the exception of ryegrass (*Lolium* sp.). This may be due to the fact that the crops were largely processed outside of the areas excavated, perhaps beyond the confines of the village, or alternatively, that there were relatively few other weeds associated with the crops.

Fig. 1 shows the ubiquity of some key species at the four sites that produced sufficient material. Ubiquity, or presence analysis, looks at the number of samples in which a particular taxon is represented at a site and expresses that as a percentage of the total number of samples (Popper 1988). In this

¹ At this writing, not all of the Khirokitia material has been analyzed or counted.

Table 1. Ubiquity of selected species from Cypriot Aceramic Neolithic sites.*

Species	Cape Andreas		Khirokitia		Tenta		Ortos	
	23 samples		241 samples		165 samples		40 samples	
	#	%	#	%	#	%	#	%
Einkorn	18	78	97	40	31	19	9	22
Emmer	20	87	64	26	26	16	3	7
Barley	15	65	34	14	35	21	8	20
Lentil	21	91	94	39	60	36	32	80
Pea	3	13	1	<1	5	3	1	2
Bitter Vetch	0	0	3	1	5	3	1	2
Vetch	1	4	15	6	12	7	5	12
Fig	2	9	34	14	11	7	2	5
Olive	7	30	8	3	0	0	0	0
Pistachio	3	13	43	18	17	10	19	47
Ryegrass	20	87	82	34	3	2	29	72

way it is possible to look at the relative representation of the various species at different sites. This should not be interpreted as equivalent to relative importance of different species, however, since we are not comparing similar contexts from site to site and the types of remains may, in part, depend on the type of context. For example, a hearth might be expected to contain a different assemblage of taxa than a storage pit or midden. Nonetheless, ubiquity provides a useful indicator of which species are better represented on these sites.

Clearly, einkorn (*Triticum monococcum*), emmer (*Triticum dicoccum*), lentil (*Lens culinaris*), and ryegrass (*Lolium* sp.) are well represented on all four sites. It should be noted that the relatively low representation of ryegrass at Kalavastos *Tenta* might be due to poor preservation. The high representation of unidentified grasses (Gramineae) at this site may include ryegrass caryopses that were not identifiable as such. As already noted, ryegrass is a weed of cereal crops, but it is so abundant at Cape Andreas *Kastros* that van Zeist (1981) was led to wonder whether it might have been utilized as a food resource. It is impossible, however, at this point to make that claim for any of the sites until a more thorough analysis of the contextual data has been undertaken.

Among the cereal crops at all sites, it appears that emmer and einkorn are fairly equally represented, with barley appearing less often. Whether these were individual crops or grown as maslin is difficult to say, although at Khirokitia relatively pure deposits of both einkorn and emmer grain and chaff have been recovered, suggesting that at this site they were separate crops. It is interesting that no

* References for Tables and Figures:

Abu Hureyra – de Moulins 1997; Ain Ghazal – Rollefson and Kafafi 1994; Rollefson and Simmons 1988, 1985; Rollefson et al. 1985; Aswad – van Zeist and Bakker-Heeres 1979, 1982; Basta – Gebel et al. 1988; Beidha – Helbaek 1966; Bouqras – van Zeist and Waterbolk-van Rooijin 1985; Cafer Huyuk – de Moulins 1997; Can Hasan III – Hillman 1972, 1978; Cape Andreas *Kastros* – van Zeist 1981; Cayönü – van Zeist 1972; Dhali Agridi – Stewart 1974; El Kowm II – de Moulins 1997; Ghoraiḫ – van Zeist and Bakker-Heeres 1982; Hacilar – Helbaek 1970; Jericho – Hopf 1983; Khirokitia – Waines and Stanley-Price 1974; Miller 1984; Hansen 1989, 1994; Mureybit – van Zeist 1970; van Zeist and Bakker-Heeres 1984b; Nahal Hemar – Kislev 1988; Nahal Oren – Legge 1986; Noy et al. 1973; Netiv Hagdud – Kislev 1985b; Ortos – O'Brien and Hansen in press; Ramad I and II – van Zeist and Bakker-Heeres 1982; Ras Shamra Vc – van Zeist and Bakker-Heeres 1982; Tenta – Hansen forthcoming; Yifith'el – Kislev 1985a

THE WORLD AROUND CYPRUS: FROM EPI-PALEOLITHIC FORAGERS TO THE COLLAPSE OF THE PPNB CIVILIZATION

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This paper is an overview of the Epi-Paleolithic and early Neolithic of the Levant and Anatolia, based on the calibrated B.C.E. chronology as calculated using INTCAL98 (or Calib 4.1). Despite certain chronological ambiguities, and with reference to proxy climatic data, the cultural sequence is described against a background of fluctuating environmental conditions. Among the most decisive paleo-climatic changes were the Younger Dryas (11/10.800–9.600/9.500 B.C.E.), at the end of which intentional cultivation was established in the Levant, and the climatic crisis of ca. 6400/6200 B.C.E., which marked the collapse of the PPNB civilization. The onset of the cultural changes occurred with the appearance of the Early Natufian non-egalitarian society. The cold and dry conditions in the Levant during the Younger Dryas led to increased mobility and efforts to negotiate equality amongst members of various groups. The systematic cultivation of cereals and legumes resulted within a short time in major social change. Most prominent was the rapid population increase during the PPNA, which led to the emergence of the PPNB civilization—an expanding agglomeration of several social entities (tribes?). A variable settlement pattern characterizes each of the archaeologically identified territories of the PPNB civilization, where large central villages differ from ceremonial centers, hamlets, and sacred locales. The interaction sphere incorporates the marginal semi-sedentary and mobile foragers, as well as special quarry sites (e.g., for obsidian). Long distance connections are marked by the exchange and trade of chlorite stone bowls, obsidian, stone bangles, and marine shells. The final collapse of this civilization is attributed to an abrupt climatic change that is well-marked in the date sequences of both speleothems and pollen cores, an event recognized globally. The population of the large settlements in part dispersed and founded small hamlets and farmsteads, and in part moved westward and northward into more humid regions.

This paper is not intended as a full survey of our knowledge concerning the late Epi-Paleolithic and Early Neolithic of the eastern Mediterranean, a vast region within which Cyprus is located. Various summaries are already available (e.g., Aurenche and Kozłowski 1999; Banning 1998; Bar-Yosef and Meadow 1995; Harris 1998; Kozłowski 1999; Özdoğan 1997). It is instead aimed at those interested in the origin of the early colonizers of Cyprus. As these people crossed the Mediterranean Sea from the mainland, it is appropriate to try and gain some insights in this home area concerning the transition from late foragers to early farmers-herders. This was a complex socioeconomic process. It began when foragers implemented intentional cultivation of wild cereals and legumes, and

culminated in the establishment of fully-fledged crop agriculture. Penning and tending wild populations of goat, sheep, cattle, and pig occurred later. Domesticated forms appeared in due course after a period of several centuries. Following Childe, we incorporate the intricate, step-wise economic changes, which were intertwined with major upheavals of social structures, under the term the “Neolithic Revolution.” The major cultural outcome of this process is labeled here, following the traditional terminology, as the “PPNB civilization.” I believe that the use of such a highly charged term is justified in view of the striking archaeological discoveries of major PPNB sites during the last two decades (Özdoğan and Basgelen 1999). Moreover, given the demonstrated high level of technology achieved during this period (including building two floor houses, stone tool making, early use of metals, emergence of pottery, intensive use of fibers, extensive trade and exchange, and the like), it is not surprising that seafaring became part and parcel of societal ventures (e.g., Cherry 1990).

The first visitors evidenced in the prehistory of Cyprus were late Epi-Paleolithic foragers (Simmons, this volume). They were followed by Early Neolithic villagers (Guilaine, this volume; Peltenburg *et al.*, this volume), bringing the issues involved in this island’s colonizations to the forefront of prehistoric research. Although most of the Mediterranean islands are not as far away from the continent as are those of the Pacific Ocean, similar questions concerning the technology of seafaring have been raised (e.g., Kirch 1997). The questions are often ‘when,’ ‘who,’ and ‘why.’ Dating the first colonization provides the answer to ‘when.’ For the ‘why’ we may consider curiosity as a basic instinct of *Homo sapiens sapiens*. Development of adequate technology enabled humans to reach previously unattainable islands. Suggesting ‘who’ were the first to land on an island necessitates the identification of the original homeland of the travelers. At that point in the discussion we enter the treacherous field of equating archaeological finds with people. However, tracking the cultural markers can be done if the information from both areas, the homeland and the new land, is well documented. Archaeologists working in the Near East have long been busy sourcing the movements of specific raw materials, finished objects, seeds for crops, and even live animals. In the case of the early colonization of Cyprus, the review of neighboring continental regions could greatly assist in determining from where the early Cypriots arrived.

A survey of the archaeological evidence may provide insights concerning the advantages and the difficulties that faced those who lived in the ‘old homeland’ and decided to cross the sea to settle in a ‘new land.’ Recognizing the nature and kind of immigrations is not solely a problem of archaeologists. Bio-geographers and sociologists study the same issues, and to an equal extent the impacts caused by colonizing species, including people, on island ecosystems (e.g., Cherry 1990; Kirch 1997 and references therein). These systems are often ecologically unique as they have definite boundaries and a lower degree of biodiversity, which is therefore prone to even minor disturbing effects, such as the introduction of new crops or animals, overkill of local fauna, and the like. The focus of this paper, however, is not the island of Cyprus itself but the source areas for its prehistoric populations. Using the archaeological records of late Epi-Paleolithic and early Neolithic periods of the Near East—information concerning the material culture components such as house and tool types, vegetal species, and animals, in conjunction with tentatively reconstructed cosmologies—it may be possible to characterize potential areas from which the colonizing groups sailed.

THE CHRONOLOGY

This review proceeds from a short survey of the chronology of the Terminal Pleistocene through the first half of the Holocene, based on calibrated radiocarbon dates. It incorporates the main archaeological entities of the late Epi-Paleolithic and the early Neolithic. The latter is also known as the Pre-Pottery (or Aceramic) Neolithic, subdivided following Kenyon’s terms as PPNA and PPNB. The current dating for these subdivisions is presented in fig. 1. This version provides the reader with the

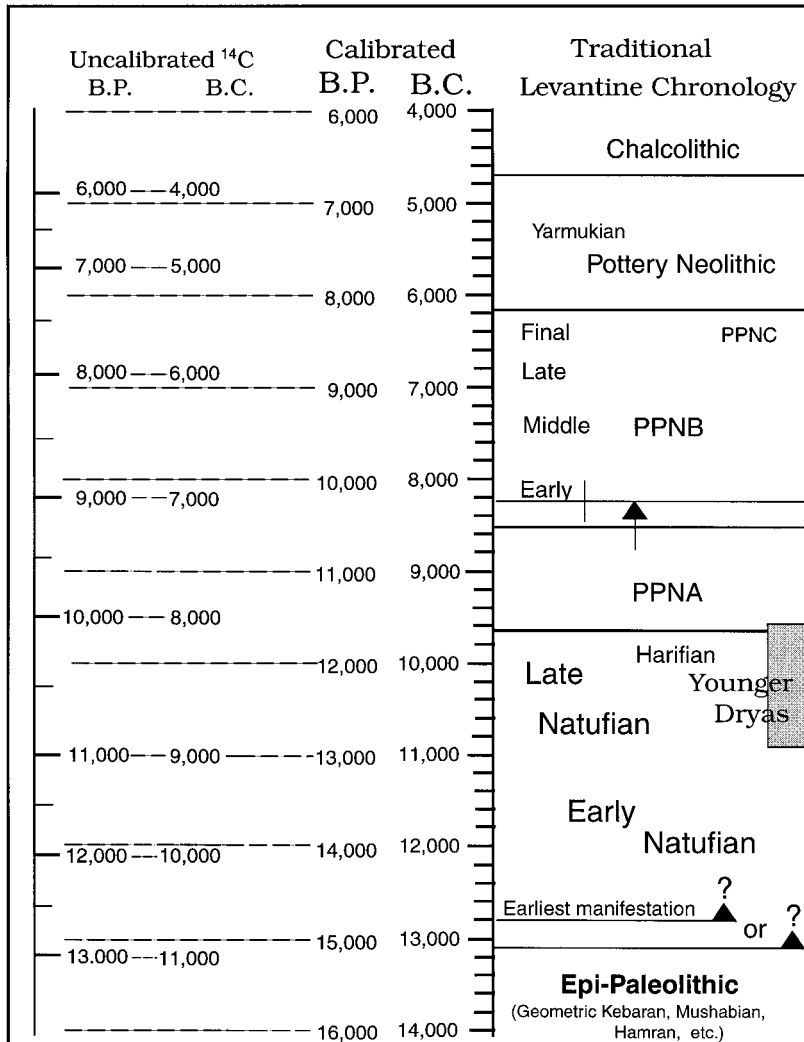


Fig. 1. The calibrated chronology of the Levant.

timescales of uncalibrated and calibrated B.P. and B.C.E. dates. INTCAL98, or Calib. 4.2 (Stuiver et al. 1998), was employed in creating fig. 1. In order to keep the chronology in a simple form, I made the following choice. A radiocarbon date often has more than one optional calibrated date, especially if calculated within two S.D.(standard deviations) (95% of probability). However, I used the median figure produced by the software, as calculated with only one standard deviation. Obviously this procedure does not mean that the calibrated date is calendrically accurate.

The cultural chronology of the late Epi-Paleolithic and Neolithic periods in the eastern Mediterranean—based on stratified and radiocarbon dated sites—is relatively well-known. The increasing number of published ¹⁴C readings, produced either by the traditional method or by Accelerator Mass Spectrometer, facilitates long distance correlations within this vast region. In addition, the realization that the AMS measurements can use very small samples has encouraged archaeologists to submit seeds for direct dating. However, in the enthusiasm accompanying recognition of the amount of real time that is allocated to cultural entities, we should not forget that the need to record and scrutinize the context

APPENDIX: A NOTE ON DATING

Alan H. Simmons

There are many different ways of telling time. Even when we use presumed calendar years, there is some variation on what dates actually mean. This can be a particularly vexing problem when dealing with ancient literate societies that had their own calendar systems, but even in prehistoric archaeology, “absolute” dates in fact are not absolute.

An absolute archaeological timescale must date from, or to, a fixed point in time. Generally, archaeologists refer to time within the Christian calendar, which by convention is taken as the birth of Christ, supposedly in the year A.D. 1. In this calendar B.C. represents “before Christ,” while A.D. represents “Anno Domini,” or “the year of our lord.” In some instances, to avoid cultural insensitivity, B.C. may be referred to as “B.C.E.,” meaning “Before the Common Era,” and A.D. may be represented as “C.E.,” or “Common Era.” In other cases, some archaeologists avoid the B.C./A.D. dichotomy altogether, preferring instead to refer to dates as “b.p.,” or “before present,” with “present” being established as 1950. In this volume the “B.C.E.” convention, as well as b.p. have been used.

There is, unfortunately, often a large degree of inconsistency in how dates are presented in terms of upper case (e.g., B.C.) or lower case (e.g., b.p.). Technically speaking, upper case is the “scientific” convention preferred by radiocarbon laboratories, while lower case is the “historical” convention often preferred by archaeologists. As noted, however, this often is inconsistently presented. In this volume, we have attempted consistency by using upper case for B.C./A.D. dates and lower case for B.P. dates.

Further clarification is required on the presentation of dates in this volume when they are based on radiocarbon chronologies, as are most prehistoric time frames. Radiocarbon dating, developed in 1949 by the physicists J. Arnold and W. Libby, represented a true revolution in prehistoric dating. With recent developments, virtually anything that once was living can be radiocarbon dated, although certain materials, charcoal especially, are better than others, such as shell for example. Different materials present different problems in reliability, but the radiocarbon method has overall proven to be highly effective for dating samples up to approximately 50,000 years old. One must realize, however, that radiocarbon determinations are, in fact, statistical approximations. That is to say, when a laboratory calculates a radiocarbon determination, as with any radiometric dating method, the results are always presented with a standard deviation or sigma figure, which is a statistical plus or minus factor. One standard deviation, which is the convention with which dates are presented, represents only a 68% statistical certainty that the given date falls within the range represented by the plus/minus factor. If the standard deviation is doubled, however, the statistical certainty jumps to approximately 95%, and if tripled, it is around 99%. Given these statistical uncertainties, it is clear that the smaller the standard deviation, the better.

For many years, archaeologists were content with their radiocarbon determinations. In the 1970s, however, additional research questioned the reliability of radiocarbon dating. Dendrochronology (tree-ring dating), which is one of our most accurate dating methods, often reliable to the calendar year, demonstrated both the inaccuracy and provided the solution to the problem. When some ancient Bristlecone pines that had been tree-ring dated were also radiocarbon dated, the results were surprising in that they were consistently younger, especially for trees dating to 1200 B.C.E. or earlier. The reason for this

variation, it was determined, was that a basic assumption for radiocarbon dating—that the concentration of ^{14}C in the atmosphere was constant through time—was shown to be incorrect. We now know that it has varied, largely due to changes in the earth's magnetic field so that the concentration of radiocarbon in the atmosphere has varied in the past, rather than remained steady, as previously assumed. This meant that in many cases, the radiocarbon determinations were in fact often too young. Fortunately, it is possible to correct this error back to around 12,000 years ago. The correction is done by calibrating the radiocarbon determinations with tree-ring chronologies. Thus in contemporary archaeology, many radiocarbon determinations are presented in both their uncalibrated form, usually as a B.C./A.D. or B.P. date, and in their calibrated form, which is more accurate in relation to an actual calendar date. The calibrated dates are often expressed as "cal. B.C.," or, in this volume, as "cal. B.C.E." Note that calibrated dates are not presented as a mean figure with the \pm error.

Additional information on dating may be found in many publications, such as Fagan (1999: 82–90) or Renfrew and Bahn (2000:117–70), as well as from laboratories, such as Beta-Analytic (www.radiocarbon.com).

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