Minoan Pre-palatial Sealstones in their economic and social context. A study based on the new material from Archanes-Phourni

Vol. 1: Text and Bibliography

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To my parents for their courage

To Charilena for being the reason of my strength and resilience

Abstract

Sealstones are one of the most important types of artifacts discovered in the Aegean Bronze Age. Their practical use for recording and administrating purposes, their association with identity, prestige and social status, their possible religious or ritual connotations speak clearly for their importance and value. The fact that they are deposited, among other artifacts in tombs, accompanying their owners, demonstrate this value not only in life but also in death. Especially in the pre-palatial period in Crete a large number of seals have come to light, coming mostly from mixed contexts in the Mesara and Asterousia, in south Crete.

The Minoan pre-palatial sealstones from Archanes-Phourni comprise an important corpus of artifacts for many reasons. They come from a site in the North of the island, in contrast to the majority of pre-palatial seals. The excavation and recording techniques used offer the opportunity to study the seals in their context, which is dated with relative certainty. The study of these seals, in comparison with the published ones from the south of the island, may offer significant information about important aspects of life in this period. The examination of materials, shapes, motifs, style groups and consumption patterns of seals may present us with useful insights about craft specialization and technology, internal and external exchange, economic organization and administration, religion and ritual, social differentiation and organization in the pre-palatial period. The study of this multiple and complex role of sealstones can offer us valuable information about the period before the first palaces.

Contents

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Abbreviations

AGD: Antiken Gemmen in deutschen Sammlungen.

CM: Sakellariou A. X., 1958, *Le cachets minoens de la collection Giamalakis,*

EtCret X, Paris.

CMS III: Platon, N., 1969, Iraklion, archaologisches Museum, Teil 1, Die Siegel der Vorpalastzeit, in F. Matz and I. Pini (eds.), Corpus der minoischen und mykenischen Siegel III, Berlin.

CMS IV: Sakellarakis J. and Kenna V. E. G., 1969, Iraklion Sammlung Metaxas, in F. Matz (ed.), Corpus der minoischen und mykenischen Siegel IV, Berlin.

CMS V SIA: Tsipopoulou M., 1992, Chania, Mitsotakis Sammlung, in I. Pini (ed.), Corpus der minoischen und mykenischen Siegel *V Supplementum IA*, Berlin.

CMS V: Pini I., Caskey J. L., Caskey M., Pelon O., Wiencke M. H. and

Younger J. G., 1975, Kleinere griechische Sammlungen, in I. Pini (ed.), Corpus der minoischen und mykenischen Siegel V, Berlin.

CMS X: Betts J. H., 1980, Die Schweizer Sammlungen, in I. Pini (ed.), Corpus der minoischen und mykenischen Siegel X, Berlin.

CMS XI: Pini I., Betts J. H., Gill M. A. V., Surenhagen D. and Waetzoldt H., 1978, Kleinere europaische Sammlungen, in I. Pini (ed.), Corpus der minoischen und mykenischen Siegel XI, Berlin.

Abbreviations of periodicals used in the Bibliography can be found in: Notes for Contributors and Abbreviators, Abbreviations, American Journal of Archaeology 90, 384-394.

EMI: Early Minoan I

EMII: Early Minoan II

EMIIA: Early Minoan IIA

EMIIB: Early Minoan IIB

EMIII: Early Minoan III

MMI: Middle Minoan I

MMIA: Middle Minoan IA

BB: Burial Building

MMIB: Middle Minoan IB

MMII: Middle Minoan II

MMIII: Middle Minoan III

LMIII: Late Minoan III

EBA: Early Bronze Age

EB1: Early Bronze I

EB2: Early Bronze II

MB2: Middle Bronze II

Chapter 1: Introduction

Background to the study

The aim of this thesis is the study of sealstones from the pre-palatial period in the island of Crete, with regard to craft specialisation, internal and external exchange, economy, religion and social organisation. This period has been a subject of great interest in the last three decades, due to its importance concerning state formation and the appearance of the palaces. Although Branigan discussed signs of differentiation in pre-palatial Crete as early as in 1970 (Branigan 1970a), until recently Minoan pre-palatial society was generally identified as egalitarian and unranked, based on the communal burials of the dead in tholos tombs, especially in Mesara, (Branigan 1970b), and on the settlements of Myrtos Fournou Korifi (Warren 1972a) and Vasiliki (Seager 1907; Zois 1976). Small agricultural communities such as Myrtos were believed to function as a unit (or as a complex of a number of units -see Whitelaw 1983), with no signs of differentiation. This view is still accepted by many scholars (e.g. Cherry 1983: 33-45; Watrous 1994: 717), who argue that signs of social differentiation and wealth are not substantial enough to contradict it.

A number of theories have been developed in order to explain the evolution of complex societies in the island, and specifically the development of what we term palatial civilisation. Some accepted migration of people from Egypt, or diffusion of the eastern civilisation in the island of Crete (Evans 1921: 14-20; Pendlebury 1939: 53-55; Hutchinson 1962: 60-63, 138-140; Hood

1990a). Some recognised a continuous process, from simpler to more complex formations (Branigan 1970a; Warren 1965; 1976; 1987), others argued for a sudden change at the end of the pre-palatial period (around MMIA) that led to palatial organisation (Cherry 1983). These and other theories were based on the study of the material culture of the period, on subsistence and economic organisation and on exchange with other regions of the Aegean or the Near East (Renfrew 1969; 1972).

Direct and indirect storage of food (social storage), internal exchanges and redistribution were also considered (Halstead 1981; Halstead and O'Shea 1982), as well as the movement of luxury and prestige items (Manning 1994b). Non-functional approaches (the Mafia theory), based on characteristics of the human nature observed in present societies (Gilman 1981; 1990) were also argued for. All these conflicting theories made the subject of social organisation in pre-palatial Crete important for our understanding of state formation on the island.

Other aspects of the period, namely technology, craft specialisation, religion and economic organisation have also been a subject of study, raising a number of questions concerning these matters. Can we talk about craft specialists in this early period, and if so were they using technologically advanced methods of manufacture? Can we suggest that there was organised religion and an economy advanced enough to require administration? And if so who organised them? Can we recognise elites in this early part of Cretan prehistory?

Material of study

In an attempt to give some possible answers to the questions raised above, a study of pre-palatial sealstones was undertaken by the author, with the unpublished material from the cemetery of Phourni at Archanes (Sakellarakis and Sakellaraki 1991) as its basis. This important material was made available through the generosity of the excavator Dr. Sakellarakis.

As Pini said "...of the many and diverse artifacts in the archaeological record, seals and pottery are the only categories whose development can be traced for virtually the entire duration of the Bronze Age in the Aegean" (Pini 1992: 200). At present some 9000 seals and clay sealings are known from this region and almost half of them, in various museums around the world, are of Cretan provenance. Seals first appeared in Crete in the EMII period at the latest (though some of the seals from Lendas in Mesara could be EMI, see Yule 1980a). According to Pini their use was probably introduced from the Near East, where they were already used in a much earlier period. Particularly in Mesopotamia seals were in use since the fifth millennium BC. The idea was quickly adopted, but developed in an autonomous fashion, fitting the particular needs of the Minoans and their concept of style use and art.

The small size, the shapes, colours and materials as well as the motifs and decorative syntax, make seals one of the most impressive and interesting discoveries in the archaeological record. They are a potentially valuable source of information about craft specialisation and trade, religion, script and chronology, administration and most importantly social organisation.

Nearly one thousand pre-palatial (and early proto-palatial) seals have so far come to light in Crete. Most of them come from the Mesara and Asterousia, in the south of the island. A large number, especially from private collections, or from museums outside Greece, are of unknown provenance and the only piece of information that exists is that they come from Crete (for more details see catalogues). South Crete was, until 1970, the only area that had provided a substantial number of seals from particular sites. Aghia Triadha, Platanos and Moni Odhigitrias, (each with more than a hundred seals from EMII to MMII), Koumasa, Lendas and Kaloi Limenes, are the most prolific sites. In the seventies, however, the excavation of the cemetery of Phourni at Archanes, in the north of the island, changed this picture. With 135 seals dated to the pre- or early proto-palatial period, Archanes became the most prolific individual site, and the only one with substantial number of seals outside Mesara and Asterousia. This fact is itself important as the Archanes corpus is the only group really comparable to the ones from the South of the island.

Naturally sealstones have attracted the attention of a number of scholars through the years, and their study is quite intensive, covering all areas of interest. Pini, Yule, Branigan, Warren, Kryszkowska, Hallager, Blasingham and most recently Sbonias (see Bibliography for relative references) have studied early Minoan seals or particular aspects like material, iconography, workshops or chronology, based mostly on the sealstones from the South. These sealstones come from mixed funerary contexts, covering a long period of time (EMI to MMI or even MMII), most of which were excavated at the beginning of the century. The study of the Archanes seals offers the

opportunity firstly to check their conclusions against another substantial data set and, secondly, to critically assess such conclusions. This material comes from a funerary context in the North of the island, is more precisely dated and more importantly was excavated in the seventies and eighties using better recording techniques. The study of the Archanes sealstone corpus, along with the evidence of other pre-palatial seals, allows us to examine aspects such as craft specialisation and exchange, that were generally overlooked, with regard to sealstones. It also gives us the opportunity to review and revise our ideas about the emergence of elites and the beginning of social inequality -that is, our understanding of the organisation and dynamics of pre-palatial society, a subject widely debated among archaeologists.

Outline of study

The purpose of this thesis is to contribute to our understanding of pre-palatial Crete, through the study of a particular type of material culture, namely sealstones. The thesis will examine the evidence for development in social complexity and organisation, as represented by the social significance and distribution of sealstones, the acquisition and exchange of sealstone materials, the manufacture of sealstones and their symbolism. In order to achieve this goal, the following aspects will be considered.

In the first chapter, a brief review of the archaeological work conducted and the basic views on social organisation, regarding pre-palatial Crete, are presented, in order to give some background information for the period.

The second chapter discusses chronology. Evans's chronological scheme, based on pottery styles, which is widely used in Minoan archaeology, has been critiqued by many scholars. First of all, in terms of absolute chronology, historical synchronisms with Egypt are not the only source of information, as various scientific methods have been introduced, leading to different and sometimes contradictory conclusions (Warren and Hankey 1989; Manning 1994a). In terms of relative chronology, it has been argued that particular "ceramic" sub-phases, such as EMIII, are not really identifiable over the whole island in the archaeological record (Watrous 1994), or that ceramic styles do not represent chronological periods, but are regional manifestations of pottery manufacture and use. Sealstones can play a role in this debate, as they present a distinctive chronological scheme, and cannot easily be incorporated into the ceramic phases of the period. Because of their relatively small number, and the limited number of stylistic groups, they can only be categorised in broader phases, marking long periods of development and change.

In the next three chapters materials, shapes, motifs and stylistic groups of seals will be presented. Sealstones published in the CMS will be used as a comparative basis to the new data that has emerged from the study of the Archanes seals. The meaning of particular materials, shapes and motifs will be discussed, in an attempt to draw possible conclusions on the use of these artifacts in everyday life, as well as in death.

Methods of manufacture and craft specialisation are the themes of the sixth chapter. The existence of specialists in this early period of Cretan

prehistory has recently been a matter of debate. Are sealstones and other artifacts household-made or products of specialists? If there is specialised production, is it possible to recognise types of specialisation and specialists? The answers to these questions are clearly important, with regard to the social organisation of the period and especially the existence of social differentiation. The existence of workshops and the inter-site movement of seals are two points to be investigated, with particular reference to Archanes and Mesara.

Related to that is the subject of the seventh chapter, namely external exchange between Crete and other areas of the Aegean, Egypt and the Near East. Imported sealstones will be presented, as well as others which imitate foreign styles. Also a general overview of exchange in the pre-palatial period will be briefly given.

In chapters 8, 9 and 10 the major aspects of seal use will be discussed. Economic organisation and administration, religion and ritual, and social importance and meaning are the themes of these chapters. Evidence of seal use in these different areas will be discussed, in an attempt to give some answers on the importance of these artifacts.

Concluding, all the above evidence will be reviewed with respect to social organisation and complexity. As material culture is the basic source of information for Cretan prehistory, and especially the pre-palatial period, the study of seals, artifacts that probably played a significant and diversified role, can be most useful. The information derived will be compared and checked against the results of other recent studies, concerning types of artifacts such as pottery, metallurgy and lithics, conducted in various regions of the island.

Crete in the pre-palatial period

For many years the pre-palatial period was perhaps not as well studied as the later periods of the first and the second palaces. This situation, however, has changed in the last three decades, when this era became the subject of study by many scholars (e.g. Branigan 1970a & b, Warren 1972a). Metallurgy (Branigan 1968a), stone vase manufacture (Warren 1969), pottery (Zois 1967; 1968), and subsistence and exchange (Renfrew 1972) were initially the major areas of study along with domestic and burial architecture. In the 80's and 90's there were further artifact based studies, pottery (e.g. Betancourt 1985; Wilson and Day 1994), sealstones (Pini 1981; 1990a; Yule 1980a; Sbonias 1995), metallurgy (Nakou 1995), lithics (Carter 1994), as well as new studies of subsistence and economy (Halstead 1977; 1981) and burial rights, ritual and religion (Branigan 1993; Marinatos 1993). Also multi-period surveys in various parts of the island shed new light on the settlement patterns of the period (Hood, Warren and Cadogan 1964; Blackman and Branigan 1977; Watrous 1982;1993; Moody 1987; Haggis 1996; MacGillivray and Sackett 1984). All of these studies contributed to a growing debate about social development in EBA Crete.

The period is mostly known from the tholos tombs and cemetery sites. Only a few settlements have been explored, such as Myrtos Fournou Korifi (Warren 1972a), Vasiliki (Seager 1905; 1907; Zois 1976), and Trypiti (Vasilakis 1996), along with a number of individual and/or fragmentary houses, like the ones at Knossos (Wilson 1985), Phaistos (Levi 1953; 1963), Tylissos (Chatzidakis 1921; 1934), Palaikastro (Dawkins 1905; MacGillivray and Sackett

1984), Mochlos and Pseira (Seager 1910; 1912; Betancourt and Davaras 1995; Soles 1992: 424-426; Soles and Davaras 1994: 394-396), Malia (e.g. Deshayes and Dessenne 1959), and Debla (Warren and Tzedakis 1974). In contrast a large number of tombs and cemetery sites have been explored in many parts over the island and especially in the South, the Mesara plain and the Asterousia mountains.

The Mesara in southern Crete provides the main bulk of information for the pre-palatial period, being one of the most intensively investigated areas in Crete. The plain itself is only thirty kilometres long and ten wide, but the wider area around it is considerably larger, certainly not less than fifty kilometres east-west and twenty kilometres north-south. The area provided many advantages to its inhabitants, as the plain was fertile and the hills surrounding it were suitable for cultivation. Also, the Yeropotamos river runs across the plain, whilst at the west end lies the sea, within easy access of the whole plain (Branigan 1993: 4-5). Communities across this area seem to have shared common types of material culture and funerary practices. This pattern is evident throughout the EBA, showing considerable prosperity and the production of high quality artifacts. The most distinctive evidence of its prosperity comes from the architecture and contents of the tholos tombs. Groups of two or three tholoi were discovered in sites like Aghia Triadha (Halbherr 1905: 31), Siva (Parìbeni 1915), Koumasa, Aghia Eirini, Drakones (Xanthoudides 1924: 3-53, 76-81), Marathokephalo (Xanthoudides 1918a: 15-23) and Vorou (Marinatos 1931). Other sites such as Porti, Salame, Koutsokera, Christos, Kalathiana (Xanthoudides 1924: 54-88), Aghia Kyriaki

(Blackman and Branigan 1982), and Moni Odhigitrias (Vasilakis 1990), have also contributed to the number of the tholoi in the area.

The usage of the vast majority of the Mesara tombs falls within the ceramic phases EMI-MMI. Some continue being used in MMII and a few have produced Late Minoan finds, but in most cases these relate to a sporadic re-use of the tombs, rather than continuous tradition. Thus, the principal period of use falls in the period from the end of the 4th millennium to the beginning of the 2nd millennium BC.

Outside southern Crete, a small number of tholos tombs have been discovered (Krasi, Gypsades Hill at Knossos, Myrsini in Sitia, and Viannos) (Branigan 1970b: 6-10). However, three important cemetery sites came to light in the north of the island, providing new information on the pre-palatial period, on the small island of Mochlos (Seager 1912; Soles 1988; 1992), at Aghia Photia, with evidence of contacts with the Cyclades (Davaras 1971: 392-396) and at Archanes (Sakellarakis 1965-1975; Sakellarakis and Sakellaraki 1976-1989). The cemetery of Phourni at Archanes is one of the longest-lived in Crete, covering a period from EMII to LMIII. It is situated on a small hill on the northwest of the small town of Archanes, and the northeast of the mountain of Iuktas. The small fertile plain of Archanes is just below it and its east side is thickly cultivated with olives and particularly vines. Twenty-six burial buildings were discovered on the hill, among which there were five tholoi. Two of them (A and D) are dated to LMIII, two cover a period from EMII to MMII (tholoi E and C were the first tholoi built in EMIIA and have also upper levels dated to MMIA-MMII and EMIII/MMIA respectively), while another has various phases

covering a period from MMI to LMIII (tholos B). The majority of the rest of the burial buildings are dated in MMIA, with their use probably extending in the first period of the palaces (for more details see Chapter 2).

As has already been argued (see p. 1), until recently Minoan pre-palatial society was generally identified as egalitarian, and this view is still popular among some scholars. Branigan was the first to argue the development of social differentiation in pre-palatial Crete (1970a: 118-122), and again (1984a; 1985) was one of the first scholars to review the evidence from the Mesara and change the accepted picture. Based on the evidence of status and wealth in many of the Mesara tholoi (e.g. Platanos, Aghia Triadha), the Mochlos tombs and interpreting the complex of buildings in Vasiliki and Myrtos Fournou Korifi in a different way (as "mansions" of local noblemen), he argued for the existence of simple ranked societies, characterised by differentiation of power and wealth, already in EMIIB, with the genos-clan (extended family) being the basis of social organisation. The interpretation of the complex buildings at Vasiliki and Fournou Korifi as mansions has not been accepted (Whitelaw 1983: 331-332), but this does not affect the general importance of Branigan's suggestions.

Whitelaw (1983) studying pottery patterns in Myrtos Fournou Korifi reached a different conclusion. According to him, the settlement had been composed of five or six "recurring modules of roughly the same activity, composition and size" (Whitelaw 1983: 332), representing households, which were the basic organisational units in the community. Each of these units was equated with a nuclear family. Whitelaw also argued that this was true of the

Mesara and Asterousia tholoi, where single families could be the segment of society represented in the tholoi (Whitelaw 1983: 333-337). However, Whitelaw accepted that Mochlos presents a different case, with great differences in the wealth of offerings and the structural elaboration of the tombs. The same could be said about the early settlements at Knossos and Phaistos, where "the distribution of substantial EMI and EMII deposits....suggests fairly large populations....., with necessarily complex forms of social organisation" (Whitelaw 1983: 339). This view was endorsed by Soles (1988: 57-61; 1992: 253-258). Examining the EM cemeteries from North and East Crete, he argued that each of the elaborate tombs represented the burials of an elite family or lineage, and that not all segments of the population were buried in them. These groups had an advanced role in the society (possibly sacred, as the altars outside some tombs suggest) and were in contact with other cultural zones, especially the Cyclades, as demonstrated particularly by the cemetery of Aghia Photia.

Concluding, it could be said that pre-palatial Crete has been the theatre of extensive research and debate in the last decades, leading to opposing views on social organisation in the period. The study of the sealstones from Archanes-Phourni, in comparison with the study of other pre-palatial seals, will be used as a means to explore some of these issues further. The first step in this process will be to examine the chronology of seals and especially of the Archanes-Phourni sealstone assemblage.

Chapter 2: Chronology

Chronology is one of the most important aspects in the study of the past, as it helps us contextualise and interpret excavation findings, and through this process, advance our knowledge of particular periods in the past. The chronology of the Aegean Bronze Age has been a matter of debate from the beginning of the century. This debate has continued unabated and has intensified in the last three decades.

In the case of pre-palatial Crete and specifically sealstone manufacture, chronology plays a very important role. The chronological systems used in Minoan archaeology are based either on pottery studies (Evans 1921-1935), or on the different phases of the palaces (Platon 1968). The relatively small number of sealstones and the limited number of stylistic groups, makes the task of incorporating these artifacts in the known systems extremely difficult. Different patterns emerge from their study, especially during the pre-palatial, which create a picture of change and development that can enhance our understanding of the period. Can we talk about a continuous development in sealstone manufacture or are sudden changes observable? Such a question may have far-reaching implications for our interpretation of the period, especially regarding the origins of palatial civilisation. A brief presentation of the history of research in Aegean prehistoric chronology will follow, in an attempt to put the above points in context.

History of research until 1970

The Bronze Age in the three main areas of the Aegean (Crete, Cyclades, Mainland) was "organised" in three main periods, Early, Middle and Late, each of which was further categorised in three sub-periods (I, II, III). Most of the sub-periods were also divided in two sub-phases (e.g. Ia, Ib, IIa, IIb etc.). This categorisation was first established by Evans, at the beginning of the century (1921-35), for Knossos and was based on the pottery sequence. Evans' system was generally accepted and is still in use today, but presented some inherent problems. Firstly, his sequence was based mostly on the Knossian finds but was attributed to the whole island, on the grounds that the same styles were observable in different areas. Pottery manufacture was considered to be a uniform development over the whole island and neither regional variations nor exchange were considered. Secondly the ceramic phases were perceived as representing true periods in the past, and marking change and development. The evolutionary view of simple patterns of organisation being replaced by more advanced ones was never questioned by Evans and his contemporaries.

It was not very long after Evans introduced this chronological scheme that the first serious objections were raised. Aaberg (1933: 274-282) argued that EMI and MMI material was a product of the Neolithic population, and that Minoan culture arrived in the island in the 18th century BC. Thus the Neolithic continued until approximately 1800, when the Minoan civilisation of the palaces abruptly appeared. Levi (1953; 1960: 121; 1963: 162) also rejected Evans' scheme, based on his excavations at Phaistos. He regarded Early Minoan

pottery as transitional between the Neolithic and the Middle Minoan pottery. So, according to him, the Early Minoan covered only a small transitional period between Neolithic and MM periods.

These two assumptions were generally not accepted by scholars, who argued that substantial EM material from the tholoi in Mesara and stratified EM deposits (Knossos, Vasiliki, Mochlos, Pseira, Palaikastro, Lebena) proved that Evans' general chronological scheme was nearer the truth (Hutchinson 1962: 137; Branigan 1970a: 16-21, Warren 1965). The EM period was much longer than Levi thought, and as it is the period before the first palaces appeared, it was considered to be very important regarding the origins of palatial civilisation.

As Evans' system was still debated, another, more general, division was introduced by Platon: Pre-palatial, Proto-palatial, Neo-palatial and Post-palatial periods (Platon 1968). This system was based on the different phases of the palaces, and was also accepted and is still used today. It is based on clearly observable turning points and it does provide us with the general framework for change and development in Minoan civilisation. However, it is too broad, and does not allow us to follow developments within each phase into sharp forms. For example the pre-palatial era is not characterised by the same unchanging patterns of social and economic behaviour throughout its duration, and the picture of development is more complicated than this system indicates. For these reasons the more detailed system created by Evans is still preferred by the majority of the scholars working in this field (see below discussion of relative chronology).

Discussion of the relative chronology of the Aegean Bronze Age was followed by an on-going and fierce debate about its absolute chronology, based on correlations with the well established Egyptian chronology. The dating of the eruption of the Thera volcano and the application of new methods of dating in archaeology provided the scientific basis for this discussion.

In the following table one can see the basic chronological schemes proposed by scholars until 1970, heavily depended on Egyptian correlations and the first C14 dates:

	Evans	Pendlebury	Weinberg	Hutchinson	Hood (Knossos)
EMI	3400-2800	2900-2800	3200-2600	2600-2300	2300-2220
EMII	2800-2400	2800-2500	2600-	2300-2100	2220-
EMIII	2400-2100	2500-2200	-2000	2100-1950	-2100
MMIA	2100-2000	2200-2100	2000-	1950- ?	2100-ca 1980
MMIB	2000-1900	2100-2000		? -1825	ca 1980-ca 1920
MMIIA	1900-				

Table 2.1: Absolute chronologies for pre-palatial Crete, 1920-1970

Evans based his assumptions on Egyptian correlations and preferred a higher date for EMI (Evans 1921: 25-26, 70, 102, 126, 202). Pendlebury, following the same path, lowered this date for EMI, with the other dates more or less the same (Pendlebury 1939: 301). Weinberg puts EMI along with later Neolithic, so this chronology is also higher (Weinberg 1947: 181). Finally Hutchinson (1962: 138, 141, 155, 197) dated EMI in 2500, lower than previous estimations and Hood (1961/62: 95) adopted an even lower chronology with EMI beginning only in 2300 BC.

Absolute Chronology

A discussion of absolute chronology is important, since the evidence of the sealstones may help to establish the period of use of the tombs from which they come. The connection between the number of seals and the numbers of dead in each tomb is evidently related to the period of use of each tomb in calendar years. Whether EMI started in 3500 BC. or in 3200 BC is not of great consequence for the course of this study, because few if any sealstones can be placed in EMI. However, it is important to establish the length of time over which the seals were used, as this is relevant to the size of the contributing populations. A brief discussion of the problems involved will be presented in an attempt to put pre-palatial seals in their chronological context, and more importantly, to show roughly the duration of each period, in which seals and tombs were used.

Since 1960, and particularly after 1970 the use of C-14 dating brought many changes in the absolute Aegean chronology. Many scholars proposed chronological schemes, based on the results of radiocarbon dating. Astrom offered a new chronology for MMI based on synchronisms with Egyptian chronology, already tested with the radiocarbon dating method (Äastrom 1967). Renfrew (1972: 221) also used radio carbon dating along with synchronisms among Crete, the Cyclades, the Mainland and Anatolia for his proposed chronology for the Aegean world and particularly Crete (EMI 3200-2700, EMII 2700-2400/2300, EMIII 2400/2300-2100/2000, MMIA 2100/2000-....), while Branigan (1975: 368), who also took into account radiocarbon dates, Aegean correlations and relative chronology synchronisms presented another scheme:

EMI 2650-2450, EMIIA 2450-ca 2220, EMIIB ca 2220-2120, EMIII 2120-ca 2080, MMIA ca 2080-.....

Kemp and Merillees, examining Middle Minoan pottery imported in Egypt proposed a higher chronology for MM and eventually EM (MMIB: post 2000, MMII...-1775/1750, Kemp and Merrilles 1980: 266-267), and Cadogan (1983) using a combination of radio-carbon dating and Aegean correlations presented a higher chronology as far as EMI and EMII are concerned (EMI 3300-2700, EMII 2700-2250) (Cadogan 1983: 517).

In 1989 Warren and Hankey attempted to provide a solution for all this controversy on Aegean Bronze Age Chronology. Combining radiocarbon dates and correlations between Crete, Mainland, Cyclades, Egypt and Anatolia. Their results for the pre-palatial period are presented in the following table:

FN end 3650/3500 BC	EMIII 2300/2150-2160/2025 BC
EMI 3650/3500-3000/2900 BC	MMIA 2160/1979-20th cent. BC
EMII 3000/2900-2300/2150 BC	MMIB 19th century BC

Table 2.2: Pre-palatial absolute chronology according to Warren and Hankey

(the chronological table for the whole Bronze Age of Crete, Cyclades and the Mainland can be found in Warren and Hankey 1989: 169).

The recent discussion on the date of the eruption of the volcano at Santorini has implications for pre-palatial chronology. Believing that the eruption of the volcano took place at the higher date of c. 1625 BC (evidence from the ice core), rather than 1500 BC, and accepting that archaeologically it

is proven that the eruption took place in LMIA, Manning creates a much higher chronology for MM and LM (MMIII 1800/1775-1725/1700, LMIA 1725/1700-1630/20). That means that the earlier chronology also moves higher, with MMII ending in 1800 BC (Manning 1988: 56; 1989). Manning's arguments have been challenged by more recent research on the subject of the Santorini eruption (Buckland et al. 1997: 581-587), on the grounds that this eruption has not necessarily left traces on the ice core. In any case, as far as the earlier phases of the Bronze Age are concerned, Manning does not date EMI earlier than 3300 BC., claiming that it most probably started around 3100-3000 BC. For EMII a date of 2650 BC. is suggested, while EMIII is put around 2200 BC. and MMIA around 2050 BC., ending around 1900 BC., when the appearance of the palaces is believed to take place (Manning 1994a: 168-174; 217-220). These conclusions are based mainly on radiocarbon dating, from sites in Crete, the Cyclades, the Mainland and Anatolia, and the synchronisms between them.

The chronological span of both seal and tomb use in the pre- and early proto-palatial period cannot yet be closely defined with confidence. Sealstone use seems to be introduced at around 2700 BC. (or earlier if the seals of Lebena II, lower level, are EMI). The practice remains in use until the end of the Bronze Age. It could be said that pre-palatial patterns and styles remain in use up to MMII, when different styles are introduced (for example Malia Workshop or seals in hard stones). On the other hand, the period of tomb use seem to be around 450 years for each of EMI and EMII, and 150 years for each of EMIII and MMIA, at least according to Manning's chronology. The importance of these calculations will be extensively discussed in Chapter 10.

Relative Chronology

Regardless of the arguments over absolute chronology, it is the relative chronology of Minoan Crete which is of great significance for the study of any type of material culture of the period. As Platon's scheme is too broad to give the precision needed for detailed examination of material culture, Evans' tripartite system based on pottery groups is the most commonly used. However, this has caused problems, firstly because the details of the pottery sequence are not fully established, and secondly because other types of material culture cannot always be really incorporated into this system. The following discussion will expand on this point and establish a chronological system to be used in the succeeding chapters.

Evans' system was criticised mostly on the grounds that it confused ceramic phases and periods of time. The distinction between FN and EMI was one problem discussed. FN represents the transitional phase between Neolithic and Early Minoan periods. It is mostly known from Phaistos, where two homogeneous layers of occupation were recognised (Vagnetti and Belli 1978: 128), but related material was also found in several other sites (see Vagnetti and Belli 1978: 127-143). At Knossos, however, the situation is quite complicated. J. Evans wrote that Knossos LN was earlier than Phaistos Neolithic (Evans J. 1968: 276), but a deposit was subsequently found in Area FF in the West Court including pottery with a high incidence of features characteristic of the Phaistos FN. Some of these were also found in Knossos LN levels, but others were without previous parallels at Knossos (Evans J. 1971: 113-114). These finds confirmed the existence of FN pottery in Knossos.

This fact along with the evidence from other sites elsewhere in Crete was taken as evidence by Vagnetti and Belli "to support the view that in Crete there existed a phase transitional from LN to EMI, which, although anticipating EM features, retains very much of the long preceding Neolithic tradition" (Vagnetti and Belli 1978: 159).

However, the distinction between FN and EMI is not clear. Weinberg (1947: 178-179) claimed that FN (sub-neolithic in his terms) persisted at least in central and southern Crete, while the EMI culture was becoming established. Whilst Vagnetti and Belli included Lebena tholos II and Kyparissi cave in FN, Warren (1965: 17; 1980: 489) believed them to be EMI. Cadogan (1983: 508) also doubted that deposits such as Partira, the Eileithyia cave at Amnisos, Phourni Well and Aghios Nikolaos burials could be included only in FN and not also in EMI (for the catalogues of EMI sites see Warren 1980: 489; Cadogan 1983: 508).

Hood (1990a; 1990b) though, was the one who discussed this problem extensively in the context of Knossos and in comparison with the Phaistos material. He claimed that the FN in Phaistos and EMIA in Knossos considerably overlapped in time, based on the fact that the deposits of LN in Knossos that have the same features with FN in Phaistos seem to be shallow and confined to a single building level. On the contrary at Phaistos FN deposits are deep with at least two building levels and the Minoan pottery above them seems to belong in EMIB. EMIA as found in the Knossos Palace Well is hardly represented at Phaistos. So it looks as if there was an overlap in time between EMIA in Knossos and FN in Phaistos, something that leads Hood to the

conclusion that immigrants came to Knossos at this time and settled bringing their own civilisation and pottery (Hood 1990a: 374-375).

The problem of FN and EMI is not easy to solve. As Wilson and Day (1994) have shown there is imported Aghios Onouphrios style pottery from the Mesara in the Palace Well in EMI, so EMI in North Central Crete cannot be entirely contemporary with FN South Central Crete. Also the possibility that FN is a regional style should be considered, as pottery of this style could be transferred from a centre to other areas of the island (see Wilson and Day 1994 for a similar situation in EMI). Further deposits should be studied (for example Lebena tholos II and the lower level at Krasi) in order to clarify this problem.

The problem of Final Neolithic/Early Minoan I chronology is relevant to sealstones, because the existence of seals in EMI is still debated. Branigan and Pini accept that none of the seals can be dated to EMI and that there is no evidence from Crete for the production of sealstones before EMII, so seals probably appeared in Minoan Crete during EMII (Branigan 1970a: 137-139; Pini 1992: 200-205). Warren points out that dating necessarily involves stylistic judgements because most of the seals come from tombs with a wide range of date (EM-MM), they are often chance discoveries with no known contexts and they may have been made at a time earlier than that of their find context. He argues that seals can be dated in EMI only after a stylistic evaluation and none can be confidently ascribed to EMI. Furthermore, he contends that all the seals found in Tholos II at Lebena are dated later than EMII (Warren 1970: 29-35). However, the situation at Lebena is not clear. In the CMS (CMS IIi 1969: 193)

eight of the seals are recorded as found in the lower level of Tomb II and it is possible, therefore, that they are of EMI date, although this is not widely accepted.

Only when the final report on Lebena is published and we know more about the context in which these seals were found, will it be possible to decide about their EMI or EMII date. Stylistically the author considers it possible that some of these seals *could* belong to EMI, although the designs that decorate the seals are more or less the same in EMI and EMII, and the shapes and materials continue in the next period. The development and quality of the seals of the EMII period, along with the advanced craftsmanship skills that some of the EMII seals show, make it likely that seal manufacture had begun in the EMI period.

The case of EMIII pottery is also complicated, as both the existence of the phase and its geographical distribution have been disputed. It is of particular significance for the study of sealstones, since a large part of the corpus may be dated to EMIII and later. In particular some seals from Tholos C at Archanes, dated by its excavator to EMIII, may form the first group of sealstones from a closed EMIII context (see later sections on the Archanes-Phourni cemetery and sealstones).

Three main views have been put forward concerning EMIII. The first is the traditional one, considering the phase as a distinctive chronological period, characterised by the same pottery styles on an island-wide basis, though perhaps with different duration in different areas. The second view considers the pottery styles of the period as regional, therefore explaining the differences

between different sites and areas. Finally, the third view denies the existence of the period altogether and dates its pottery styles to previous or later periods.

The first, and more traditional, of these views was supported by Zois, Betancourt and Warren. Zois argued that there was an EMIII period with distinctive white-on-dark pottery, found in closed contexts at Gournia, Vasiliki, Mochlos, Palaikastro, Pseira and Malia. According to him the scarcity of EMIII pottery in the Mesara and Knossos was due to the fact that the white-on-dark style was developed in the East and introduced to the North and South later on, during its final phase, just before MMIA. The polychrome MMIA style was developed from the earlier white-on-dark and existed in East Crete, having the same characteristics as in Knossos or Mesara (Zois 1968: 151-153).

Betancourt, examining the EMIII/MMI East Cretan White-on-Dark and Dark-on-Light pottery, drew the conclusion that is possible to distinguish an EMIII ceramic phase all over the island, but with regional variation in its duration. He believed that EMIII in north-central Crete was a short phase that was succeeded by MMIA, while in East Crete the style still went on. So, according to him, MMIA at Knossos began earlier than MMIA in East Crete, and Knossian MMIB began later, so that the two MMIA periods could slightly overlap. MMI then persisted for a long time in the east, contemporary with north central Cretan MMII (Betancourt 1977: 351).

Warren accepted this difference in duration between the two areas of the island. In the east, deposits like the ones in Gournia, Vasiliki, Palaikastro, Mochlos, Pseira, and Malia were characterised as EMIII, followed by MMIA polychrome deposits, such as the ones at Palaikastro and Khaimazi. At

Knossos there was a shorter pre-polychrome MMIA phase, followed by the much longer, polychrome, MMIA (Warren 1980: 490-492).

Cadogan also identified pure EMIII deposits in Knossos, Malia, Gournia, and several other sites in eastern Crete, such as Kastri at Palaikastro. In MMIA, polychrome pottery replaced the white-on-dark in north-central Crete, while in the east of the island the two styles co-existed side by side (Cadogan 1983: 508-509).

The second view argued for the regional character of pottery styles. Hood (1966: 110-111) talked about a pre-polychrome MMIA phase in Knossos, that could be EMIII, but is not EMIII pottery as defined by Evans (he described EMIII as it exists in East Crete based on stray finds from Knossos and on deposits from East Crete). Alexiou, not able to distinguish an EMIII pottery style in Lebena, also accepted that EMIII, as defined at Gournia, is an East Cretan ceramic style, contemporary with MMIA in the south (Mesara) and the North (Knossos) (Alexiou 1961/62: 88-91).

Branigan (1970a: 32-35) agreed that EMIII and MMIA pottery were very difficult to distinguish, but noted that there was a distinction between the two periods, as it emerged from the Gournia "North Trench" deposit, Vasiliki and Palaikastro. Knossos also had a different EMIII pre-polychrome style, and small quantities of the eastern style, while Mesara probably developed a distinctive culture. So he drew the conclusion that there is an EMIII period, with distinctive styles in different areas of the island, and the EMIII light-on-dark pottery style was principally associated with eastern Crete.

The problem with all the above views is that they define the period in question on the basis of a particular ceramic style. White-on-dark pottery is considered as the distinctive characteristic of the period on an island wide basis. Light-on-dark pottery exists in EMII Knossos (Wilson 1985), and is not introduced in EMIII, although this style is different than the East Cretan White-on-Dark. The regional character of the different styles should be looked at, in comparison with stratigraphic evidence from various sites.

In this respect, pre-palatial deposits at Knossos have been studied in the last twenty years by Andreou, Momigliano, Wilson and Day. Andreou (1978) claimed that the Upper East Well deposit, and possibly the North quarter of the City and the lower floor of House B deposits, with creamy white coloured decoration on a dark surface, or a lustrous red to brown or grey on a light surface, can be dated to EMIII, a period before polychromy appears in Knossos. The pottery of this phase at Knossos, has very little in common with the EMIII pottery that is found in East Crete and consequently both styles could be considered regional (Andreou 1978: 12-16, 25).

Momigliano (1991), examining pottery groups assigned by Evans to MMIA, concluded that some of these groups can be re-dated to MMII and some in a phase she calls EMIII/MMIA, but "as a temporary solution and as a way to indicate the problems involved" (Momigliano 1991: 268). Wilson identified the following deposits at Knossos as EMIII: South Front Early Houses-fill between two plaster floors and above lower floor deposit; Houses A, B and Well to the north of House A, all beneath the West Court; The Upper East Well deposit; The deposit from the North Quarter of the City; The Royal

Road north deposits. Wilson argued that EMIII was simply a continuation of EMIIB developments that led to the formation of the Old Palace period pottery style (Wilson 1994: 33-35). (See also Cadogan *et al.* 1993 for the whole stratigraphic and pottery sequence at Knossos).

Recent petrograpic analysis of pottery samples has shown that the East Cretan White-on-Dark is only made in the Isthmus Area and when found at Malia, Petras or Knossos it is imported. There is also a new deposit at Poros which has East Cretan imports, it is earlier than MMIA and later than EMIIB and can be called EMIII (Day and Wilson, pers. comm., 1997).

These arguments, however, are not accepted by Watrous, who discussed this matter in his review of Cretan prehistory (1994). Although he accepted that in Knossos and a few other sites in the East there are EMIII stratigraphic levels, he claimed that at Knossos pottery identified as EMII/III or EMIII could be EMIIB or MMIA, that in Mochlos pottery identified as EMIII is possibly EMIIB, and in East Crete the light-on-dark pottery style belongs to the MMIA period, as it is contemporary with Knossian MMIA. He also argued that Tholos C in Archanes should be dated to MMIA, along with most of the burial buildings in Phourni (Watrous 1994: 717-731).

The weakness of this view is that it does not take into account stratigraphic and stylistic evidence presented for the areas mentioned. Andreou, Momigliano, Wilson and Day (see above) have already successfully proved the stratigraphic and stylistic existence of EMIII in Knossos (see also Cadogan *et al.*, 1993/ Early Houses upper deposit dated in EMIII, and Momigliano and Wilson 1996), and Poros. At Gournia, Vasiliki, and Palaikastro

EMIII deposits are stratified above EMIIB ones. Additionally the period can be defined in stylistic terms, at least for Knossos and East Crete. The publication of Tholos C at Archanes may also throw some light in this respect. At present, it seems problematic to leave aside these points and to argue that a distinctive style or deposit should belong in the preceding or succeeding periods.

The role of sealstones

Can seals help us address these chronological problems? Until now scholars studying seals have tried to incorporate seal chronology in terms of ceramic chronology. Kenna (1960: 13-27) proposed EMII, EMIII and transitional phases for pre-palatial seals, but this categorisation was dismissed later on, as it was based wrongly on the assumed contemporary existence and use of three-sided prisms made of soft stone in North Crete and of ivory seals in South Crete. We now know, based on the chronology of the Malia Workshop (Yule 1980a: 66-69), that three-sided prisms are dated to MMII. Equally many ivory and bone seals have been discovered at Archanes in the north and a few in other areas in East or North Crete.

Yule attempted to base his chronology on contexts, but the mixed funerary deposits from which the majority of seals come, forced him to propose a system with style groups and motifs, shapes and materials, belonging to two or even three succeeding periods (see Yule 1980a: 6-20 and 24-117 and Chapter 5).

Recently Sbonias categorised pre-palatial seals in three basic phases, which he dated to EMII, EMIII-MMIA early, MMIA late-MMIB respectively

(Sbonias 1995: 65-70). The present author accepts this basic categorisation of early seals in three phases, in stylistic terms, though their characterisation as specifically EMIII, MMIA early or late is somewhat problematic, because EMIII is yet to be defined in Mesara from where most of the seals come, and MMIA early and late phases are difficult to distinguish, even for pottery. Some sealstones, coming from closed contexts, could be dated in specific ceramic phases (for example from Myrtos Fournou Korifi, Lebena, and Archanes), but it seems that the same stylistic characteristics are observable for longer periods. Therefore, three phases of seal use can be distinguished, each characterised by different patterns of manufacture, use of materials and different stylistic preferences. These phases will be referred to as Phase I, II and III, while a later one (Phase IV) will also be distinguished in order to incorporate a few later seals from Archanes-Phourni that fall into the MMII period and later proto-palatial period.

Early pre-palatial seals (Phase I) are usually made of soft stone or bone, with a few hippopotamus ivory examples already appearing, in a variety of shapes (some elaborate examples appear, especially in Archanes and to a lesser extent in Lebena) and have mostly simple, irregular, linear motifs, though again there are some examples of better quality.

Figure 2.1: Seal dated to Phase I, from Archanes-Phourni.

Later pre-palatial seals (Phase II) are mostly made of hippopotamus ivory, though examples in other materials still exist. They are modelled in a variety of shapes, with the stamp cylinders and the cones being the most numerous, and present complex motifs of human and animal figures, plant and leaf designs, spirals and regular geometric designs like meanders and wavy bands, spread all over the sealface in unending rapport and with many filling designs that leave no empty spaces on the sealface.

Figure 2.2: Seal dated to Phase II, from Archanes Phourni.

Another group of seals can be dated at the end of the pre-palatial period (Phase III) and the beginning of the first palaces, just before the Malia Workshop and the Phaistos sealings. This group consists of seals made of bone, soft stone, white paste and hippopotamus ivory in smaller scale, modelled in more or less the same shapes but with motifs created in a different stylistic approach. The designs are often engraved inside a single or a double border, single motifs or a combination of two or three are presented and, in contrast to the earlier phase, large spaces are left empty. Hieroglyphic signs appear and are used as motifs. New methods of manufacture are developed leading to elaborate examples (see also Chapters 3, 4, 5, on Materials, Shapes, Motifs-Decorative Syntax-Style Groups).

Figure 2.3: Seal dated to phase III, from Archanes-Phourni

The first group consists of seals found in Lebena tholoi II and IIa, Archanes Tholos E lower level, Archanes Tholos C lower level, possibly Mochlos, Krasi and Myrtos Fournou Korifi, as well as seals from mixed contexts (like other Mesara tholoi) that begin in EMII:

Lebena tholos II, lower level, is dated by Alexiou to EMI (Alexiou 1960; 1961/62) and it is above a thin FN level and below an EMII-MMIA level.
Mochlos, area outside tomb II, with one seal, is dated by Seager (1912: 109) to EMII.
Krasi (also with one seal in this group) is dated to EMI-EMII (Marinatos 1929: 123-131; Warren 1980: 489).
Lebena tholos IIa, lower level is dated to EMII (Alexiou 1960; 1961/62; Warren 1980: 489).
Myrtos Fournou Korifi is dated by Warren to EMIIA and EMIIB, with the seals belonging to the second phase (Warren 1972a).
Archanes Tholos E, lower level, is dated to EMIIA (Panayotopoulos 1996: 237), while Tholos C is currently under study and the possibility of a lower EMII level seems likely (Papadatos, pers. com.).

Table 2.3: Closed dated contexts with seals dated to phase I

Other areas with early material and seals of this group are:

Mochlos tombs I-VI (Seager 1912: 17-56; Warren 1980: 490),

Sphoungaras, in East Crete is another site dated in EMII-EMIII, with one or two possible examples of this group (Hall 1912: 48-55; Warren 1965: 20),

Maronia (Platon 1954b: 364-365; CMS IIi: 498),

Krotos (Vasilakis 1983),

Aghia Triadha, where tholos A is dated from EMII to MMII (Banti 1930/31; Branigan 1970b: 166; Warren 1965: 20),

Koumasa where tholoi A and B are also dated from EMII to MMII (Xanthoudides 1924: 8-32; Branigan 1970b: 167; Warren 1965: 20; Warren 1980: 489-490),

Lebena tholoi I and Ib, II upper level and III, dated from EMII to MMIA (Alexiou 1960; 1961/62; Warren 1980: 489-492),

Marathokephalo, from EMII to MMIB (Xanthoudides 1918a: 15-23; Branigan 1970b: 168; Warren 1965: 20),

Platanos, where tholoi A and C have EMII material (Xanthoudides 1924: 88-125; Branigan 1970b: 168),

Porti, which is dated by Xanthoudides in EMIII-MMIA-MMIB, but has two or three seals that belong to this group (Xanthoudides 1924: 57-63; Branigan 1970b: 168)

Siva, dated from EMI to MMIA (Paribeni 1915; Branigan 1970b: 168; Warren 1965: 20).

The Mitsotakis Collection (CMS VSA) and Metaxas Collection (CMS IV), (with the majority of seals coming from Moni Odhigitrias and Kaloi Limenes), also have seals that belong to this group.

Also some seals from later contexts in Archanes-Phourni could probably be incorporated in this group. One can see that the majority of sites, beside Archanes, Mochlos and Krasi are from the south of the island.

We can conclude from all these that phase I is contemporary with ceramic phases EMI? and EMII. Based on the closed contexts of the period it is noticeable that seals from EMI? to EMIIB have small differences, and the style groups of the period (see Chapter 5) are present in nearly all the contexts mentioned.

The second group of seals come mostly from mixed contexts like Kalathiana, dated from EMII to MMIB (Xanthoudides 1924: 81-87), Aghia Triadha, Koumasa, Lebena, Marathokephalo, Platanos, Porti, Siva, Moni Odhigitrias, Kaloi Limenes in the south, the Mochlos tombs II and XVIII (EMII-MMIA) (see previous paragraphs), Archanes (Sakellarakis and Sakellaraki 1991), Gournes, dated in MMIA (Chatzidakis 1915: 61-63;1918: 45-58), the Trapeza cave, with finds from the Neolithic to MMIA (Pendlebury et al. 1935/36: 18-24), the Viannos tombs, dated by Platon to EMIII (Platon, 1954a: 511-513; CMS IIi Nr: 525) in central Crete, and Palaikastro, with four seals probably from the ossuary, dated in the pre-palatial period (Bosanquet and Dawkins 1902/3; 1904/5: 268-272; CMS IIi Nr: 571), in East Crete. It is clear that the majority of these contexts are mixed (with the possible exception of the Viannos tombs), with material from the beginning to the end of the pre-palatial period, or even later. The case of Tholos C, at Archanes may be important in this respect, as it could provide us with the first closed EMIII context with sealstones. The upper level of the tholos seems to belong to this period, but its

study has not been completed yet, so no certain results are available (Papadatos, pers. comm.). Also the seals from Burial Building 19, come from a level dated to MMIA, providing us with another opportunity of more precise dating (Maggidis 1994: 22, 30-38).

Therefore, Phase II is considered by the author as roughly contemporary with the EMIII and MMIA periods, and clearly pre-palatial, based on material from Tholos C and Burial Building 19 at Archanes, and the Viannos tombs (dated to EMIII). These contexts, along with other mixed ones mentioned in the previous paragraph that are basically MMIA and pre-palatial and have either small quantities or no proto-palatial material (for example Gournes and Trapeza in Central Crete, Mochlos tombs and the ossuary of Palaikastro in the east), make the distinction of this Phase possible.

Finally the third group of seals consists of those found in Aghios Onouphrios, dated from EMI to MMII (Evans 1895: 105-138; Branigan 1970b: 166; Warren 1965: 20), Aghia Triadha, Koumasa, Lebena, Platanos (mostly from tholos B), Porti, Siva, Moni Odhigitrias, Kaloi Limenes, Malia and Phaistos, along with Archanes (see above). These contexts are also mixed, but it is also evident that the majority are quite late in the pre-palatial period, and cover also the beginning of the first palaces. It seems clear that Phase III partly overlaps with the previous phase and in the author's opinion it is, in a way, a transitional phase between pre- and Proto-palatial periods. It probably starts in MMIA and continues into MMIB and the beginning of the palaces.

The Archanes-Phourni cemetery presents a unique opportunity to study examples of these style groups from closed or at least well dated contexts. A

detailed presentation of the cemetery follows in an attempt to put the sealstones in context, and to provide the chronological horizon for each tholos and burial building.

Archanes-Phourni

The cemetery of Phourni at Archanes (figure 2.4) is one of the most important prehistoric cemeteries in the Aegean extending from the beginning to the end of the Cretan Bronze Age. Twenty-six buildings, among which are five tholoi, came to light, most of them burial structures but some with other purposes. Two of the tholoi (A and D), seven Mycenean shaft graves and Building 21 are dated to LMIII by their excavator. Buildings 4 and 17 were built in the neo-palatial period, with the first having an administrative purpose (Sakellarakis and Sakellaraki 1991: 67-90, 128-135).

Most of the buildings of the cemetery were built in the pre-palatial period, which is also their main period of use, and some belong to the Proto-palatial period or continue in use during this time. The first tholos of the cemetery, Tholos E, was built in the EMII period, as its lower level is securely dated to EMIIA (Panayotopoulos 1996: 237). 117 burial gifts were discovered, made of ivory, marble, obsidian, schist, steatite, bone and other materials, accompanying burials made on the floor. Among these burial gifts, eight seals were discovered, comprising a group that can be securely dated to this early phase. The upper level of Tholos E is mainly dated to MMIA, but has also MMIB and MMII material (Panayotopoulos 1996: 144-145). Fifty six burials were made in this

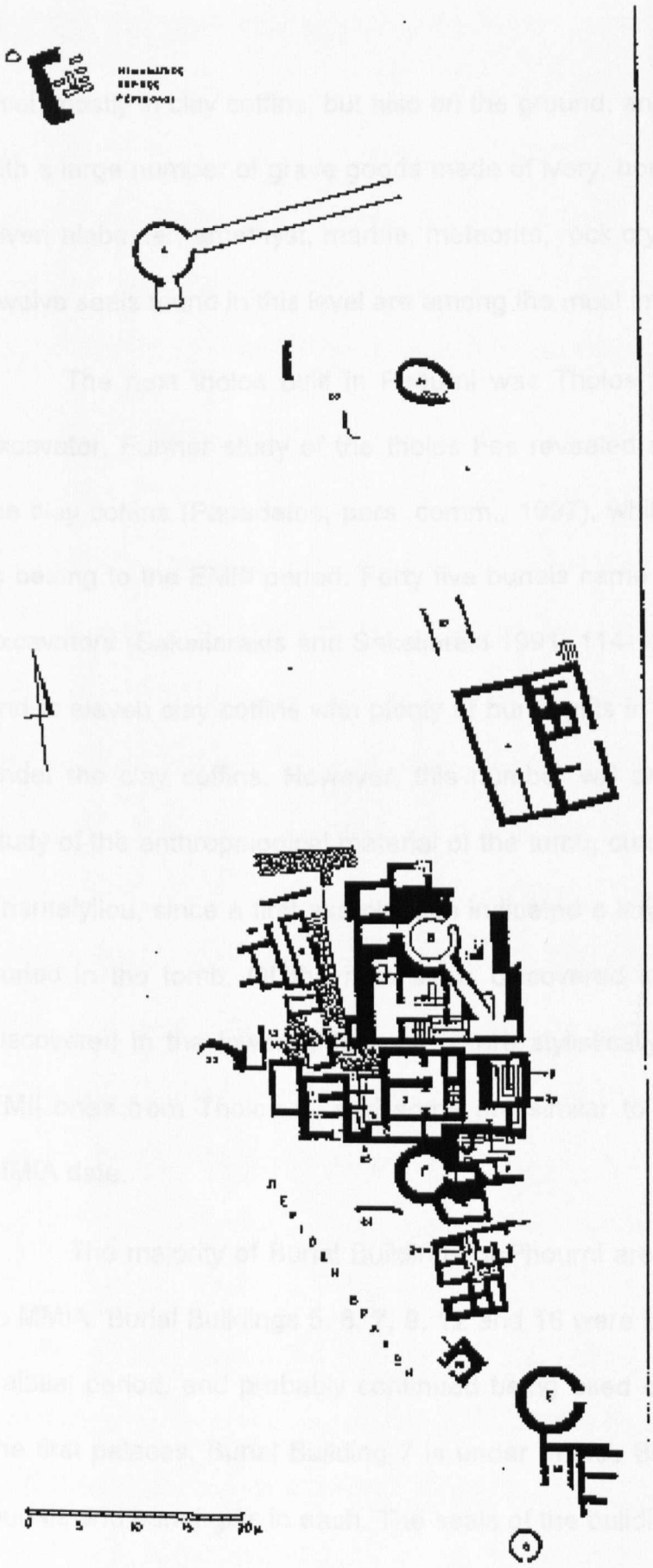

Figure 2.4: The Archanes-Phourni Cemetery

level, mostly in clay coffins, but also on the ground, and the bodies were buried with a large number of grave goods made of ivory, bone, clay, faience, bronze, silver, alabaster, amethyst, marble, meteorite, rock crystal and other materials. Twelve seals found in this level are among the most impressive finds.

The next tholos built in Phourni was Tholos C, dated to EMIII by its excavator. Further study of the tholos has revealed a lower EMII level under the clay coffins (Papadatos, pers. comm., 1997), while the upper level seems to belong to the EMIII period. Forty five burials came to light, according to the excavators (Sakellarakis and Sakellaraki 1991: 114-120), made on the ground and in eleven clay coffins with plenty of burial gifts in precious materials found under the clay coffins. However, this number will probably change after the study of the anthropological material of the tomb, currently undertaken by Sevi Triantafyllou, since a first examination indicated a larger number of individuals buried in the tomb. Of the nine seals discovered in the tholos, some were discovered in the lower EMII level or are stylistically related to the previous EMII ones from Tholos E, and some are similar to ivory seals of EMIII and MMIA date.

The majority of Burial Buildings of Phourni are dated by their excavator to MMIA. Burial Buildings 5, 6, 7, 9, 12 and 16 were built at the end of the pre-palatial period, and probably continued being used during the early stages of the first palaces. Burial Building 7 is under Tholos B, and had six rooms with burials and burial gifts in each. The seals of the building basically belong to the pre-palatial period, but some could be slightly later. Burial Building 6 is an

ossuary with 6 rooms, and a large number of burials and burial gifts, among which are many elaborate seals. The group of hieroglyphic seals from this building is important for the sphragistic tradition of the region, being the first step of later developments (hieroglyphic seals of the Malia Workshop; see Sbonias 1995). Pottery from nearby the building has lately been dated from MMI to MMII (Lachanas 1994; Sakellarakis and Sakellaraki 1991: 96-104).

Burial Building 12 is not well preserved, and only two rooms can be reconstructed. It was probably an ossuary, like Burial Building 6, with burials moved there from the tholoi or other burial buildings. Groups of skulls found together with only a few other bones confirm this view. In contrast, Burial Building 5 is one of the biggest in Phourni, containing ten rooms with a large number of burials, and was built on the older Building 25. Many seals came to light in this building, one of which was imported (a Syrian cylinder seal). The building was still in use at the beginning of the Proto-palatial period. Burial Building 8 was built over an older one (Burial Building 26) and is small, with two rooms and burials on the floor, while Burial Building 9 is one of the richest in the cemetery. It was built outside Tholos C, superimposed on the older Burial Building 13, and three rooms have been excavated, with burials in clay coffins and burial pithoi. Two of the rooms have three burial levels and one five, each with a large number of burials and rich burial gifts. The building probably continued being used at the beginning of the proto-palatial period, as the many burial levels show and the seals found in it mostly belong to the second and the third stylistic phases (see above). Finally Burial Building 16, on the south side of Tholos E, is not very well preserved. Three rooms have been identified with

burials in clay coffins. The building is probably contemporary with Tholos E and continues in use into the early proto-palatial period (Sakellarakis and Sakellaraki 1991: 104-108, 114, 120-122, 128).

At the end of the pre-palatial period Tholos B was constructed over Burial Building 7, and continued in use until LMIIIA. Five or six architectural phases of the tholos are mentioned by its excavator, with material from MMIA, MMII, LMI and LMIIIA. According to Sakellarakis and Sakellaraki (1991: 90-96) the first four architectural phases are dated to MMIA and the last two in LMI and LMIIIA respectively.

Burial Building 3 was also constructed at the end of the pre-palatial period and used until LM. It was square in shape, with six rooms, built on the south side of Tholos B and had individual burials in clay coffins, in two burial levels. Three hieroglyphic seals found in the lower level are evidence of the earlier phase of the building (Sakellarakis and Sakellaraki 1991: 108-114).

Burial Buildings 18 and 19, north of Tholos E are also important for our consideration. The first is dated to the proto-palatial period, with the first three south rooms built in MMIA, again over an earlier building (24). Burials were made in clay coffins, pithoi and in the ground. Four levels were distinguished. Most of the seals of the building can be dated from the later pre-palatial to the proto-palatial period, but a few could be earlier and retained as heirlooms (see later discussion in Chapter 10). Burial Building 19 is another building constructed in MMIA. Its arched shape and two burial levels with hundreds of burial gifts, especially pottery, are dated in MMIA and MMIB, apparently the

principal period of use in Phourni. Four seals were discovered in the lower level (Sakellarakis and Sakellaraki 1991: 122-126).

Many burials and burial gifts were also discovered among the rocks on the west side of the cemetery. Probably burials and gifts from various tholoi and Burial Buildings were moved there so the buildings could be cleaned and new burials made (Sakellarakis and Sakellaraki 1991: 135).

Archanes-Phourni sealstones

Taking into account the chronological framework provided by the various burial buildings and tholoi in Phourni, together with the three basic stylistic phases of seals discussed earlier, the author has assigned dates to the 136 seals and sealings from Phourni. Because of the lack of precise stratigraphic dating in most cases, and the fact that in some cases sealstones were probably kept for longer periods and passed from one generation to the other, the basic criterion used was style. The dating of particular styles was based on sealstones from securely dated contexts and contextual information was also taken into account. Information of pottery dating, and parallels with other materials were used, when possible, mostly as a way to combine the chronological sequence for seals, with Evans' general one for Minoan Crete.

Archanes-Phourni seals can be categorised in three phases, that cover a period contemporary with EMII-MMIB. A few may belong to a fourth phase, contemporary with the period of the Malia workshop and the Phaistos sealings (MMII).

Fourteen seals (Cat. Nr. 1-14) can be dated in Phase I which, as shown above, is roughly contemporary with the EMI? (see discussion above) and EMII periods. The first eight were found in the lower level of Tholos E, which is securely dated to EMIIA (Panayotopoulos 1996), two were discovered in the lower EMII level of tholos C that can also be dated from EMIIA (Papadatos pers. comm.), two were stray finds from the area of the rocks and the area south of Burial Building 19 and can only stylistically be dated to this phase and two more come from Burial Buildings 5 and 6. These latter two come from later contexts, but as they belong to a style group with Cycladic/Helladic affinities (see Chapter 5), which is dated to EMII, they were probably retained as older heirlooms. The seals of this phase are made of soft stone and bone, but the first examples of hippopotamus ivory appear. Simple shapes (conical, pyramidal) along with more elaborate ones (zoomorphic, buttons) show different approaches within the same phase. Linear motifs are the most numerous, but spirals and rapport motifs appear.

Fourteen more seals from Phourni (Cat Nr 15-28) could be dated to Phase I, but this dating is problematic for various reasons. Sealstone Cat. Nr. 15 comes from the lower level of Tholos C, but is stylistically unique for this early phase and is closer to seals from the next phase (see Chapter 5). It could be explained as an early appearance of leaves on ivory seals, and particularly on stamp cylinders, a trend that will be popular in the subsequent phase. There remains, though, the possibility that this single seal is out of context.

The next three seals were also found in Tholos C. Cat. Nr. 16 comes from the upper level (dated in EMIII/MMIA), but stylistically belongs to the

previous tradition. Cat. Nrs. 17 and 18 can not be dated stratigraphically, but like the previous one are closer to the earlier seals. Finally, three more seals found as stray finds in the "Area of the Rocks" (Cat. Nr. 27, 28), and the area between Burial Buildings 18 and 19 (Cat. Nr. 26) can be dated to this phase, as well as seven from later contexts (two from Burial Building 5, Cat. Nr. 19- 20, three from Burial Buildings 6, 9, and 12, Cat. Nr. 21, 22 and 24 respectively, one from the room between Burial Buildings 8 and 9, Cat. Nr. 23, and one from Burial Building 18, Cat. Nr. 25). The date of these last seven seals is extremely problematic, as they could be explained as late examples of an older tradition, and therefore be contemporary with their context.

Thirty-three seals (Cat. Nr. 29-61) belong to Phase II. Three come from the upper level of Tholos C and are dated to EMIII/MMIA (Cat. Nr. 29-31), while the next 26 (Cat. Nr. 32-57) come from contexts basically dated to MMIA (Burial Buildings 5, 6, 7, 9, 16, 18, and Tholos E), but also with later material. The seals from Burial Buildings 9, and 18 come from lower burial levels, although no clear chronological difference between the levels has been established. The rest can be put in this phase only stylistically, as they are mostly made of hippopotamus ivory, their usual shapes are stamp cylinders and cones, and they are decorated with spirals, parades of lions, wild goats and scorpions, meanders and bands, leaves and rosettes (see Chapter 5). Bone and steatite are rarely used but there are few examples in the style-groups of this phase. Finally four sealstones from Burial Building 19 (Cat. Nr. 58-61) come from a closed MMIA context, and can be incorporated in this phase.

Three more zoomorphic seals (Cat. Nr. 62-64) may belong to this or the next phase, as they can not be positively dated. The first, (Cat. Nr. 62) modelled as a fly, is a unique shape, the second (Cat. Nr. 63) is only partly preserved, while the third (Cat. Nr. 64) has few diagnostic characteristics.

The majority of the seals from Phourni belong to Phase III, which is contemporary with MMIA and MMIB, namely the end of the pre-palatial period and the beginning of the first palaces (Cat. Nr. 65-119). The contexts of these seals are: Tholos E, Burial Buildings 3, 5, 6, 7, 9, 16, 18, the area between 8 and 9 and 18 and 19, the Area of the Rocks and south of Tholos E. All these are dated to MMIA and continue into the proto-palatial period. It is not possible stratigraphically to date these deposits more precisely but it is clear that some (for example Burial Building 5) are scarcely represented in this phase, while others (like 18, 3, 9, area between 8 and 9) are heavily represented.

In this phase, bone, white paste and soft stone are the basic materials, but hippopotamus ivory is still used in Archanes. Some ivory seals of the phase have a strong stylistic similarity with seals of the previous phase, but the methods of manufacture used are more advanced.

Finally a few seals (Cat. Nr. 120-128) belong to Phase IV, which in the author's opinion is a Proto-palatial phase, contemporary with the Malia workshop and the Phaistos sealings. Most of these come from Tholos E and Burial Building 18, which continue until MMII. Three seals were found in and around Burial Building 6, from which MMII pottery was also recorded (see Lachanas 1994) and one from Burial Building 5. Hard stones and bronze,

three-sided prisms made of steatite with animal motifs, and architectonic designs are the characteristics of this phase.

Two clay sealings in the shape of a conical seal are separately categorised (Cat. Nr. 129-130) and probably belong to Phase III, as their contexts are late, Burial Building 18 at Phourni, and the Palatial Building in Tourkogeitonia, but their designs (floating humans and animal parades) could be earlier. The designs of four more sealings (Cat. Nr. 131 and 133-135) stamped on burial clay vessels, like clay coffins and pithoi, can not be recognised, so their chronology is unknown. They come from Burial Building 5 and the "Area of the Rocks" and were stamped on a pre-palatial clay coffin. Finally one more sealing made probably from a three-sided prism belongs to phase IV (Cat. Nr. 136), while another, from Aghios Nikolaos, in the settlement of Archanes, comes from a MMIA/MMIB context (Cat. Nr. 132), and probably belongs to phase III.

Conclusions

We have concluded that Evans' ceramic chronology scheme is not applicable to the developments in seal manufacture. These seem to be following a different pattern of development and the phases that are observable include more than one ceramic phase. Phase I covers the first part of the pre-palatial period, phase II the later pre-palatial and Phase III starts at the end of the pre-palatial and lasts until the early phase of the first palaces. This dating system is based on evidence from closed and mixed contexts, that shows that a more detailed chronology (like the one for pottery) is not possible, regarding sealstones.

Nevertheless the chronology of sealstone development is very important, regarding change and development in the pre- and proto-palatial periods. In EMIII and MMIA changes seem to take place in seal manufacture. New materials become popular, different stylistic groups occur, new methods of manufacture are used. These results seem to be in agreement with studies of other types of material culture, such as pottery (Day and Wilson, pers. comm.). However, two points must be kept in mind:

Firstly, it is not possible to talk about sudden changes in either EMII or MMIA. The materials that become popular in the later period were already in use in earlier times, seals are modelled in the same shapes, and stylistic groups, though distinctive, are not completely different and present common motifs. At the beginning of the palace period new materials and methods are used, but again common points emerge, that show a continuity of tradition. The first steps of later developments (for example the hieroglyphic script on the MMII Malia workshop seals) can be seen, in some cases, in the pre-palatial (for example the "Archanes" script).

Secondly, this continuity should not be contemplated as evidence for a linear, "evolutionary" development from the simple pre-palatial to the advanced proto-palatial period. Seal manufacture seems to have been quite advanced in the first part of the pre-palatial, as some elaborate examples show. Hippopotamus ivory was used from the beginning, zoomorphic shapes that demand high skill and longer hours of work appear in EMII contexts. The first simple steatite and bone seals with simple linear motifs reflect stylistic preferences, which continue, sometimes, in later periods. Reasons of different nature may be

responsible for the simplicity of motifs (for example social reasons: a particular meaning of a design for a period of time). Technological developments at the end of the pre-palatial, like the use of the lathe (see Chapter 6), allow the utilisation of harder stones and the perfect rendering of shapes and motifs, a fact that may be connected to social developments. If we consider the number of pre-palatial seals, their importance and meaning in different areas like the economy, religion, prestige and identity, it is difficult to place them in the context of a simple, egalitarian society. The study of materials will follow, in an attempt to shed some light on these matters, concerning seal manufacture and use in pre-palatial Crete.

Chapter 3: Materials

The study of the materials of the pre-palatial sealstones illuminates many aspects of chronology, technology and manufacturing methods of the period. The use of harder or softer materials, and the information we can obtain from methods of working with these materials, may offer insights into the preferences of both manufacturers and users, and into the skills and technologies available to the sealstone makers. The question of craft specialisation may also be examined tentatively in this light, with regard to access to scarce materials, and the skill and time needed in order to work them.

Imported materials are also of great importance because they constitute sound evidence of contact with other areas of the Aegean or the Near East, while local animal materials pertain the exploitation of domestic and wild resources. Finally the choice of particular materials may be associated with status and prestige, and consequently offer us information about the social significance of seals and the social organisation of the period.

Until 1970 steatite and elephant ivory were widely thought to be the only materials used for Early Cretan seals. However, further close study of this aspect revealed that other materials, such as chlorite and serpentine (serpentinite), bone, hippopotamus ivory, boar's tusk and rarely other materials, for example clay, were also used in Minoan seals (Yule 1980a: 192-201; Sbonias 1995: 38-63).

When Xanthoudides excavated the tholos tombs of Mesara, he brought to light an impressive number of sealstones, thought to be made of ivory and steatite. Notably at Platanos, he recognised more than fifty seals made of ivory and nearly as many of steatite (Xanthoudides 1924: 111-121). This discovery led to the conclusion, vigorously expressed by Evans in the preface of The Vaulted Tombs of Mesara, that the greater part of the earlier seals are of ivory, executed on a comparatively large scale and skilfully modelled. Naturally Evans considered that as one of the many indications of continuous intercourse with the Nile valley or the opposite North African coasts (Evans 1924: v-xiii).

Branigan, in his study of Pre-palatial Crete, presented a slightly different picture. Beside the common materials, ivory and serpentine (steatite), he also mentioned limestone, and occasionally other forms of stone. He argued that in EMIII and MMIA the more frequent use of ivory may be taken as an indication of increasing contact and trade between Crete, Egypt and the Eastern Mediterranean (Branigan 1970a: 142). Here we may present a more complete account of basic materials used in sealstone manufacture, (in order to provide the reader with general information concerning this subject).

Bone-Boar's Tusk-Ivory-White Pieces

The studies of Olga Krzyszkowska in the last fifteen years have changed considerably the picture we have of materials used for sealstones in the Aegean generally, and especially in pre-palatial Crete, particularly with reference to bone and ivory sealstones.

Yule, in his important work on Early Cretan Seals (Yule 1980a: 192), admitted that bone and ivory could easily be confused, but generally accepted the identifications published in the CMS. There, most of the "ivory" seals are published as "Elfenbein". Krzyszkowska presented us with three very important modifications of the orthodox view:

1) Almost half of the seals published as ivory, at least in the CMS IIi, should be re-classified as bone or boar's tusk. Certain shapes are associated with bone, a few are found in boar's tusk, while others occur almost exclusively in ivory. The seal shapes are usually derived from the natural morphological features of the raw material, which is why only a few shapes occur equally in all three materials (Krzyszkowska 1989: 112).

2) Some seals considered to be "ivory" or bone, are made from different materials, such as the "white pieces" (Krzyszkowska 1989: 112).

3) Objects considered to be made of elephant ivory, are sometimes, in fact, made of hippopotamus ivory. In fact it is possible that only hippopotamus ivory was used for pre-palatial objects, and especially seals (Krzyszkowska 1988: 228-229).

Bearing in mind these three points, the basic characteristics and sources of the four materials above will be presented:

a) BONE: Characteristics: Cattle metatarsals and metacarpals, bones of the hind and fore feet, have straight shafts and thick walls, so they are suitable for seal manufacture. They have no distinctive covering and their outer surface is simply a modification of compact bone. When unworked, these surfaces will

display a coarse and "grainy" appearance and texture, but smoothing usually removes such effects. For this reason on broken surfaces the material will seem very coarse and irregular, while worked surfaces are smoothed and polished. This material is not particularly hard, consequently it is quite easy to work with, although there is always the danger of damaging it, while modelling the shape of the seal (Krzyszkowska 1990: 53-57). Sources: Wild or domesticated animals (cattle, sheep and pigs), that were probably used as food sources, provide the bone for working. The amount and type of bone used depends on the domestic economy. In hunting economies meat is the basic element of diet, so supplies of bone may have been regularly available. On the contrary in economies where cereals, olives, milk products and fish are the basic food sources, the slaughtering of animals is relatively rare, so the amount of available bone is small (Krzyszkowska 1990: 53-57). In an island environment like Crete, sheep and goats seem to have been the major domestic animals, along with pig on a lesser scale, while only small amounts of cattle bones have come to light. Of course these results originate from the study of assemblages which may be problematic, namely Myrtos Fournou Korifi (Jarman 1972) and Debla (Warren and Tzedakis 1974: 333-334). The first had only three hundred pieces of bone preserved, while the second was not a small assemblage but was probably a site for shepherds, on a mountain, so goats and sheep naturally predominated. However, sheep and goats seem to be the most important domesticated animals from the Neolithic (Halstead 1987: 74-78), although more studies are needed, especially for the pre-palatial period.

Wild animals, like the wild boar, could also be a source of bone for seal makers.

b) BOAR'S TUSK: Characteristics: These are the lower canines of the wild boar, consisting of dentine, and covered on the two faces by a layer of enamel, like all teeth. They are triangular in section and have a tapering pulp cavity at the proximal end. The pulp cavity may appear as a triangular gap on the surface of a sealstone made from a transerve tusk section, or as a vestigial "heartline" in solid sections. There may be glistening enamel on the outer surface. The material is not very hard (6-7 on the Mohs scale, the outer surface enamel) (Krzyszkowska 1990: 48-52). Sources: The wild boar, that lives in forest and woodland habitats, is the only source of this material. Wild boar bone is found from the Neolithic, and makes up a significant proportion of Bronze Age assemblages (Halstead 1987: 74) . The scene of a wild boar hunt is depicted on one of the Tiryns frescoes, and later myths, like the one of the Kalydonian boar, are further evidence of the existence and use of the animal (Krzyszkowska 1989: 113). Also the depiction of an animal that appears to be a wild boar, is visible on a bronze dagger from Anemospilia (Sakellarakis and Sakellaraki 1991: 151-154), dated to MMIII.

c) HIPPOPOTAMUS IVORY: A material that is not native to Crete and was imported from Egypt and the Near East, hippopotamus ivory seems to have been used for the great majority of "ivory" pre-palatial Cretan seals. Characteristics: Incisors: straight teeth, consisting of dentine and enamel on the outer surface, with a sub-triangular section and very distinctive structure. The lamellae appear discontinuous and wavy and in the centre of the tusks a

"heartline" appears, a feature associated with dentine formation, which is occasionally visible on finished objects. Lower canines: curving tusks with a distinctive sub-triangular section. Their lamellae are again wavy and discontinuous, while in the centre of the tusks, at the junction between the surface of the pulp cavity and the dentine, the "commissure" appears as an angled line of black dots or holes (Krzyszkowska 1990: 38-47). This material is not harder than boar's tusk (6-7 on the Mohs scale, the outer surface enamel). Sources: Hippopotamus is an animal well documented in Egypt in antiquity. Harpooning of the animal is depicted in tombs (Krzyszkowska 1990: 20) and its ivory seems to have been used in considerable quantities, particularly during Pre-dynastic times and the Old Kingdom.

d) WHITE PIECES: A number of seals described in the literature as frit-faience, white steatite, or white paste, constitute a coherent group termed "white pieces". Yule describes frit as a simple compound of silicate of lime and copper. After firing, powdering and mixing this compound with water, it was moulded with silica grains into objects and when fired the grains fused together (Forbes 1957: 110-111). On the other hand faience was described as "powdered silica held together by some liquid binder such as milk of lime" (Yule 1980a: 194; Also see Forbes 1957: 110). Krzyszkowska says that "these seals may appear to have a second layer different from the substance beneath. Where this layer has been lost, the substance seems to contain a number of raised "bubbles" and elsewhere "craters"...This features suggest that the substance itself is man-made or that a naturally occurring material, such as steatite, was transformed in some manner during manufacture" (Krzyszkowska

1989: 116). Hughes-Brock confirmed this with the chemical analysis of four sealstones from the Ashmolean Museum in Oxford. Using Scanning-Electron Microscopy and Electron-Probe Microanalysis, it was discovered that the material is soft stone, talc-sepiolite or steatite, burnt or else modified (Hughes-Brock 1989: 87-88).

These seals show a great diversity, some are soft and friable, while others have the soapy texture of steatite below the thin surface layer, because they were produced by two different methods. Some were made in the same way as other stone seals, after they were detached with a pointed tool from a core of steatite. Others were made from paste, "a preparation of pulverised steatite and an unknown cohesive agent, which was worked with a pointed tool after solidification...they were originally glazed...with copper as their basic component (of the material)" (Pini 1992: 203-204). The most important characteristic, however, of all these seals is the fact that they were manufactured artifacts. Although bone and soft stone were easily available, a manufactured material is used for a number of seals, and that can be important with regard to technology, production and social organisation.

Soft Stones

The situation with the use of soft stones in the manufacture of sealstones is an even more complicated matter. Steatite was considered to be the material commonly used for sealstones, but as Warren demonstrated in his work on Minoan Stone Vases, quite often serpentine (or more correctly serpentinite, see Nesse 1991) or even chlorite were referred to as steatite in

Minoan publications (Warren 1969: 129-140). It is, though, very difficult to distinguish between these materials, especially the first two, macroscopically.

Steatite is talc, extremely soft, soapy, shiny and white, red, green, brown or black in colour. Serpentinite is harder than steatite and could be less soapy, depending on the amount of steatite and other rocks it contains (Yule 1980a: 198). There are several varieties of serpentinite:

1) The first, consisting mainly of serpentine, with other minerals in smaller proportions, chiefly steatite or chlorite, is blue/grey/black with green, brown and pale buff patches, lightish grey.

2) The second is popular in Mesara, lighter in colour, brown, green or greyish. This material is richer in steatite, since it is softer and soapier than the first variety.

3) The third is pale grey, or yellowish green, with black veins.

Besides these three, there are also a few other rare varieties (Warren 1969: 138). Finally, chlorite is a metamorphic rock, found along with different amounts of steatite, feldspar and other materials, in metamorphic rocks. It is greyish and may have a sugary, crystalline or schistose appearance.

Clearly it is difficult to make a distinction, at least between serpentine (serpentinite) and steatite, without scientific methods. However, if we keep in mind that colour and hardness are the important factors and not the distinctions between the minerals, a classification as either steatite or serpentine is perhaps sufficient for most purposes. This is supported by the fact that the sources of these soft stones tend to be the same. Becker gave us

a detailed account of the sources of soft stone all over Crete (Becker 1975; Becker 1976). One can observe that:

1) There are a few sources in North Crete, like Gonies, Gonies Lepria and Phodele.

2) Several in the immediate west and north of the Mesara, (Saktouria, West Pixicas, Vorizia, Kamares, Kamares-Zaros).

3) A few in Mesara and the Asterousia mountains (Plora near Platanos, Miamou -Lendas, Krotos in the Asterousia).

4) Many sources in Viannos and East Crete (Pervola, Keraton, Pevkos, Tertsa in Viannos, Sarakina Valley, identified by Warren as the source for Myrtos, Katharo, Kalo Chorio-Gournia, Mochlos and Pseira in the East) (see Becker 1976: 364-365 for a detailed map).

Alternative materials

Other stones: Amygdaloid basalt and calcite (banded tufa) are materials used for two of the seals from Myrtos, Fournou Korifi in EMIIB (Warren 1972a: 226-227).

Clay: Few examples of clay seals have survived from the Aegean Bronze Age and especially from the EM and MM periods. Of course we can assume that these examples represent a much larger number which have completely disintegrated, but these seals would appear to be substitutes of those made of other materials. The few examples that exist are mentioned in detail by Pini (1984) and include those from Platanos and Gournia which appear to be the earliest.

Wood: This is another material that could have been used for seals but none have survived and no trace of wood grain has been noticed on seal impressions. On the other hand as Branigan observes: "...the Lerna sealings of EHII constitute a large group of impressions for which it is very difficult to find corresponding parallels amongst extant and contemporary seals" (Branigan 1976: 157). So there is a possibility that these impressions were made by wooden seals, rotted since then or clay ones that have disintegrated.

Metal: During the Early and Middle Bronze Age in the Aegean, metal was definitely used for seals. Four or five metal seals, a ring that has a seal for a bezel and fourteen other finger rings with metal bezels are mentioned and discussed by Branigan (1976). They come from Poliochni, Naxos, Thermi, Aghios Stephanos (Lakonia), Corinth, Mochlos, and Crete, where most of them were found. They are dated from EB2 to MB2.

Hard stones

From the end of MMIA and through the old-palace period seal manufacturers also used harder stones. Agate, Onyx, Sardonyx, Carnelian and Sard, Chalcedony, Hard Grey Stone, Hematite, Jasper, Lapis lazuli, Marble, Rock-crystal, Quartz and Amethyst are all harder stones discussed by Yule and were mostly used in the MM period (Yule 1980a: 192-201). The engraving of these stones is much more difficult and shows greater skills and advanced methods of manufacture.

Materials and Manufacture

What can the characteristics of the materials mentioned above tell us about the manufacture of seals? First of all soft stones and bone/ivory related materials are not particularly difficult to engrave or shape. On the other hand, working with bone and especially ivory, can be problematic, as they can crack and be damaged easily if not carefully handled. Avoiding wastage is of particular significance, when dealing with imported materials. Clay and wood seals present this problem too, but they can easily be obtained. The careful handling of these materials, the hours of labour demanded for the manufacture of seals and the elaborate shapes and designs created on some occasions, probably indicate the presence of specialists from early on, a point discussed in more detail in Chapter 6. Also the acquisition of raw materials from an overseas source probably indicates restricted access to this material, and not a widespread household production procurement.

The introduction of white paste at the end of the pre-palatial period, and the use of hard stones in the proto-palatial, clearly indicate technological advances. White paste is a manufactured material, while hard stones demand the use of advanced technology in order to be worked as we shall see in Chapter 6.

Materials, and Chronology

Sealstone materials have been used generally as an indication of date, some of them being linked to specific periods. First of all Yule used two basic criteria for his typology: shape and material group. His material groups are

ivory, bone, frit/faience, soft and medium hard stone and hard stone, and are discussed in almost every shape class he distinguishes. His conclusions, which apply to nearly all shapes are:

1) Soft stone is used from EMII to MMIII, throughout the pre-palatial and old-palace periods.

2) Ivory and bone are basically used in the pre-palatial period and only few examples of ivory exist from later on, and these come from uncertain contexts, in Malia.

3) Frit/faience examples are attributed to EMIII-MMIA, with one exception of a later example from the MMII Malia workshop.

4) Hard stones are generally related to MMII and III. Some like hard grey stone, lapis lazuli and rock-crystal may have been used from the end of MMIA and MMIB onwards (Yule 1980a: 192-201).

Recently Sbonias (1995: 38-72) presented a different scheme, also based on materials and seal shapes. His typology is more detailed and organised in a different way (see Chapter 4). His conclusions concerning materials are presented in a chronological format:

1) EMII: Soft stone and bone are the materials used in this early period. All the seals from the lower EMI-EMII level of Lebena tholos II, and all the seals from EMIIB Myrtos are made of soft stone, proving that the material was used throughout the period. The bone seals from Lebena tholos IIA are evidence that both materials were used at the same time.

2) EMIII-MMIA (early): Hippo ivory, although known and sporadically used in EMII, is basically introduced in this period. Seals from Mochlos tomb II, dated to EMIIB-EMIII, and Archanes Tholos C (EMIII?) prove the wide use of hippo ivory from EMIII. Some seals made of bone found in these contexts, fall stylistically under the EMII tradition of simpler designs.

3) MMIA (late)-MMIB: In this period a new material appears, the white paste. Soft stone and bone again become fashionable, in new forms and with other stylistic groups. These three are the basic materials of the period. Ivory is again used but only rarely, continuing the tradition of the previous period, as the shapes and designs show (Sbonias 1995: 38-72).

The problem with this scheme is the use of ceramic terms to characterise chronological periods and phases of seal use. EMIII and MMIA especially present problems, and it is very difficult to always distinguish between them, or between the early and the late part of MMIA, even in pottery studies (see Chapter 2). However, the main pattern of material use in each phase, is considered correct by the present author, although the new evidence from Phourni-Archanes will add to this picture. For example, as will be shown, ivory has already been used in phase I (EMII), and is still in use in phase III, contradicting Sbonias' scheme. Bone is also used in phase II, as well as soft stones, although on a very small scale.

It is easy to realise, therefore, how important the dating of the use of materials is, for the interpretation of the socio-economic history of the period. Watrous (1994: 711, 714-715), uses the presence of only "simple" materials like bone and soft stone for seal manufacture in EMII, as part of his case for an

unranked society with no social hierarchy, and no organised contacts with foreign countries. Equally, he argues that the existence of ivory from EMIII along with other luxury items, and the apparent continuation of style in MMIA, suggests that these two periods are one and EMIII does not really exist, stylistically or chronologically (Watrous 1994: 735-736). This view, already discussed, ignores stratigraphic evidence from East Crete, Knossos and possibly Archanes, and is not generally accepted, but is indicative of the importance of using sealstone materials for dating. The new evidence for material use from Archanes indicates that ivory was in use from EMII, undermining Watrous' argument.

Evidence from basic contexts

Phase I: Myrtos Fournou Korifi, and Lebena tholoi II and IIA are the only contexts (beside Archanes) with seals that are securely dated to EMII. The Fournou Korifi seals are all made of soft stone, three of them steatite, one serpentine, one basalt and one calcite (banded tufa), with the source, as Warren claims, the nearby Sarakina valley. Lebena II has a lower level with EMI pottery and eight sealstones made of soft stone (four chlorite-four steatite). Branigan (1970a: 137-139), Warren (1970: 29-35), Pini (1992: 200-205) and other Minoan specialists believe that seals were first made in EMII and that the Lebena context is not a closed one, but extends in EMII. As stylistically these seals are near the Myrtos ones this problem can be solved only by detailed examination of all the pottery, and these sealstones will be considered as EMI-EMII. Tholos IIA also has a lower EMII level with 7 seals -2 are made of soft stone: chlorite and steatite, and 5 are published in the CMS

as Bein, a term used for bone and ivory. Krzyszkowska (1983: 163-169) identifies two of them (CMS IIi 210, CMS IIi 211) as bone, one possibly as boar's tusk, but is not certain about the others, which could be bone, ivory or even boar's tusk. CMS IIi 478 from the area outside tomb II, at Mochlos, was found among EMII pottery sherds (Seager 1912: 109) and is probably made of bone. A seal from Krasi (Marinatos 1929: 123) (CMS IIi Nr 407), probably bone, can also be considered here, as the tholos there is a relatively secure EMI-EMII context (Warren 1970: 30-31).

	Soft stone	Bone	Boar's tusk	Ivo/Bon
Myrtos FK	6	-	-	-
Lebena thol. II	8	-	-	-
Lebena thol. IIA	2	2	1?	2
Mochlos	-	1	-	-
*Krasi	-	1	-	-
Total	16	4	1?	2

*Krasi is basically EMI-EMII

Table 3.1: Numbers of examples of materials from EMI-EMII closed contexts

Some other locations also produced material from EMII onwards but the contexts were not clear or covered also EMIII or even the whole period till MMIA or even MMIB and MMII. Mochlos, provided six more seals made of bone or ivory (CMS IIi 471, 472, 473, 477, HM 787, CMS V 24), which could belong to this early phase or the next one, as they come from contexts reported as EMII-III. Sphoungaras with two seals made of ivory and bone (CMS IIi 469, 470), Maronia with two bone seals (CMS IIi 422, 423) and Krotos

(Vasilakis 1983) with two soft stone seals (HM 2988?, 3015?), complete the picture of possible early seals from reported EMII-III contexts. Aghia Triadha tholos A, Aghios Onouphrios, Kalathiana, Koumasa tholoi A and B, Lebena tholoi I, IB, and III, Marathokephalo, Platanos tholos A and C, Siva, (CMS IIi) Kaloi Limenes (CMS IV) and Moni Odhigitrias (CMS V SIA) in Mesara and Asterousia, and a few others like Trapeza (CMS IIi) in Central and East Crete, are mixed burial contexts with EMII material, and only stylistically (combination of materials, shapes, designs) is one able to distinguish the earlier seals, and that of course in some cases only, based on the closed contexts mentioned earlier (for the chronology of the above sites and references see Chapter 2). Soft stone, bone, boar's tusk and possibly ivory are materials used for these earlier seals, confirming the general picture (examples: CMS IIi Nr 14 from Aghia Triadha, a ring probably made of bone, CMS IIi Nr 11 from Aghia Triadha, probably boar's tusk, CMS IIi Nr 232 from Marathokephalo, probably bone, CMS IIi Nr 264 from Platanos tholos A, probably ivory).

Phase II: The majority of sealstones published in the CMS IIi as pre-palatial belong to this phase. It is the main period regarding sealstone manufacture in most tholoi in Crete. The basic material used is ivory, most probably hippo ivory, coming from Egypt, but there is also bone and boar's tusk. Unfortunately, there are not many closed dated contexts of this phase. The Viannos tombs, dated by Platon to EMIII (see Chapter 2), and Tholos C and Burial Building 19 in Archanes-Phourni, which will be presented later, are the only ones. However, sealstones of this phase have come to light in most of the Mesara tholoi and in other sites in north or east Crete. Aghia Triadha has 82

sealstones published as ivory in the corpus. Some of them are certainly bone and boar's tusk and some could belong to the previous or the next phase, but still the majority of them are made of this foreign material. Some steatite seals in this group look certainly later and belong to the next phase.

Aghios Onouphrios, with the majority of seals made of steatite and of later date, also has two or three examples made of ivory, like CMS IIi 105 and 106 which fall within the EMIII-MMIA stylistic tradition. Kalathiana with 5-6 examples, Koumasa with 15 examples and Lebena with seals from Tholoi IA, IB, II and III, also contribute to this picture of ivory or bone seals. Lebena tholos IIA, upper level, is considered to be a closed MMIA context, but its seals probably fall stylistically in the next phase (MMIA-MMIB).

Marathokephalo, Platanos and Moni Odhigitrias are very important sites for the study of seals in this phase, presenting most of the basic shapes and stylistic groups, basically in hippo ivory. Porti, Siva, and Kaloi Limenes are represented in this tradition by a few ivory or bone seals (see catalogue).

Outside Mesara and the Asterousia mountains, one sees a generally similar picture. Gournes in Central Crete, possibly Mochlos, Palaikastro and Trapeza in East Crete contribute to the number of ivory (bone) seals that belong to this phase, although the numbers are very small (see Sbonias 1995 and CMS IIi).

Phase III: This phase represents the end of the pre-palatial period and the beginning of the first palaces. It seems that a large number of seals from

Mesara, Asterousia and other areas, previously believed to be clearly pre-palatial belong to this transitional phase (see Chapter 2 and Sbonias 1995).

Aghia Triadha has some seals belonging to this phase, like CMS IIi 29, probably ivory, CMS IIi 84 and 85, steatite, CMS IIi 95, white paste. The majority of Aghios Onouphrios seals are made of soft stone of this later phase, as also 20 examples from Koumasa (see CMS IIi Nr 145-158, for example). Platanos tholos B seems to have been basically used in the MMIA-MMIB and MMII periods. Steatite (CMS IIi 284, 285), ivory-bone (CMS IIi 289) and possibly white paste (CMS IIi 283) are the basic materials used. Lebena tholos IIA, upper level, a few examples from Porti (CMS IIi 365, 366, 367), Siva (CMS IIi 374, 375, 376), Moni Odhigitrias (CMS V SIA-Mitsotakis Collection) and Kaloi Limenes (CMS IV 100-113/Metaxas Collection) complete this picture.

Malia and Phaistos are the basic palatial areas of interest in Central Crete with a few examples of the earlier palace glyptic (CMS IIi 409-420 and CMS IIi 423-426 respectively). The style of the two groups is different but the materials are the same, soft stone mostly but also bone or ivory.

Finally Gournia is the site in East Crete best represented in this phase, (for example CMS IIi 467), which is considered to end prior to the Malia workshop and the Phaistos sealings and does not include these two large groups.

Materials and Sites

The association between certain materials and sites may provide useful information about patterns of material use in the island, and this in turn may be

connected with possible production sites. The seals presented in this project's catalogue originate basically from the CMS, with a few more well known pre-palatial seals from other publications added. Therefore, this catalogue is not complete, as small number of pre-palatial seals from preliminary reports, or unpublished, might be missing. However, the great majority of pre-palatial sealstones are included, and more importantly seals from all the basic contexts are present, so that a complete picture can be presented.

The data base created for this reason contains 930 seals from various contexts. The distribution of the most important materials (steatite, bone, ivory, ivory/white paste, ivory/bone (for cases in which the material can not be differentiated), boar's tusk, white paste, chlorite, serpentine (or serpentinite), clay) in the most important sites is shown in Appendix A (Tables 1-10).

Correspondence analysis was applied to this data set in order to investigate any associations between two variables, namely materials and sites. This analysis is often used in archaeology (Moreno-Garcia *et al.* 1996), especially for the study of pottery or faunal remains, but it can also be applied in this case. It displays graphically a two-way table. In this case rows represent materials and columns sites (Greenacre 1984: 3-7, 54). It can reveal more about the data, and structures within the data, than can a single chi-square test for independence of rows and columns (in this case it is obvious *a priori* that materials and sites are not independent). In particular it will give some indication of which materials are particularly associated with which sites, which sites have similar profiles of materials represented (or which are quite distinct) and which materials have similar or distinct geographical distributions. As far

as possible, the data were investigated using two dimensions, though three were considered when necessary, so that other relevant variables were taken into account (for example number of examples, and chronology). The closeness of row or column points in the graphs indicates similar patterns of use, while row and column points at similar angles and distance from the origin (the central point) suggests association between materials and sites (in this case row points represent materials, while column points represent sites -the first are pictured as dots, the second as squares).

As is shown in Appendix B (Graphs 1, 2, 3, and Table 1; for a list of the materials and sites included in the analysis, see Appendix B), there do not appear to be many positive associations between particular sites and materials, at least using this scale. Only chlorite (Row Nr 8) seems to be associated with Lebena (Column Nr. 9), and bone (Row Nr. 2) with Moni Odhigitrias (Column Nr 11). However, we should bear in mind that there are a number of sites with only a small number of seals, where not all materials occur, so the data set is sparse in some places.

For this reason, correspondence analysis was applied to a more restricted set of data. The six most often occurring materials (steatite, bone, ivory, ivory/bone, boar's tusk, white paste), and the seven sites with relatively large numbers of seals (more than 50) were included in this analysis (Aghia Triadha, Koumasa, Platanos, Lebena, Kaloi Limenes, Moni Odhigitrias, Archanes). The result was more encouraging, but again no strongly positive associations can be shown (see Appendix C, Graphs 1, 2, 3 and Table 1). Steatite, ivory and boar's tusk (Row Nrs 1, 3, 5) could be associated with

Koumasa and Platanos (Column Nrs. 2, 3), bone (Row Nr. 2) with Lebena and Moni Odhigitrias (Column Nrs. 4, 6) , and white paste (Row Nr. 6) with Moni Odhigitrias (Column Nr. 6) and perhaps Kaloi Limenes (Column Nr. 5), while ivory/bone seems to occur more often in Kaloi Limenes and Aghia Triadha (see graphs 1, 2, 3 in Appendix C). However, most of these associations (with the exception of white paste and Kaloi Limenes/Moni Odhigitrias) are not strong, and can be attributed to chronological factors (for example bone appears in Lebena more often because in two of the tholoi there are closed dated EMII levels, when bone is one of the major materials).

We can conclude that white paste is the only material that could be connected to one or two sites in the Asterousia (Moni Odhigitrias and Kaloi Limenes). Both these sites are mixed contexts. This, along with the fact that the material appears only in Phase III (see Chapter 2), and seems to exist in small numbers outside the Asterousia mountains, make the association possible, as no chronological restrictions apply. This could indicate the existence of workshop(s) in one or both of these areas, supplying the rest of the sites with seals made of this material (detailed discussion in Chapter 6). The rest of the materials appear in all sites and can not be connected with any one, in particular.

Apart from the associations between sites and materials, the author examined the distribution of materials inside cemeteries (Appendix D: Koumasa Tholoi A and B: Table 1, Platanos Tholoi A and B: Table 2, and Lebena Tholoi I, II, IIA: Table 3) with more than one tholoi. Correspondence analysis showed that, in Koumasa and Platanos the small number of tholoi

(only two with substantial material), the difference in the number of seals from each tholos (for example Platanos A had twenty five seals, while B had nearly eighty)and the chronological difference (Platanos Tholos B is used for a longer period) prevented the identification of any association between materials and particular tholoi (see Appendix E, Tables 1, 2). On the contrary at Lebena, steatite and chlorite appear mostly in tholos II, as well as ivory on a lesser scale, bone in tholos I, and ivory/bone in tholos IIA (Appendix E, Graph 1 and Table 3). However, this does not seem to be of particular significance as ivory and bone appear everywhere, and steatite and chlorite come mostly from the lower level of Tholos II which is dated to EMI-II?. On the other hand the lower level of Tholos IIA is also dated to EMII, and bone predominates. This could be important, especially if the lower level of Tholos II continues in EMII, and the tholoi are used at the same period, as it could mean that the seal owners of each tomb "preferred" a particular material, which could have different social significance (see later discussion and Chapter 10). The study of the Archanes-Phourni cemetery will follow in an attempt to shed light to some of these problems.

Materials in Archanes-Phourni

In the Minoan cemetery of Phourni, Archanes, about 140 seals and sealings came to light, with 130 of them dated to the period EMII-MMII. This large corpus will be examined, in its chronological sequence.

Phase I: Fourteen sealstones from Phourni may be dated to this phase. Eight of them come from the lower level of Tholos E, which is securely dated in EMII, two from the lower level of Tholos C, also mainly dated to EMII, and four more

are stylistically dated, with relative certainty, based on the Tholos E closed context, but also on the new typology by Sbonias (1995). These four seals were found: one south of Burial Building 19, one in the area of the rocks, and the two others in Burial Buildings 5 and 6 respectively.

Beginning with Tholos E, four of the sealstones were made of soft stone, olive-coloured steatite, light brown-coloured steatite, dark coloured steatite and schist (Cat. Nr. 1-4). The first three are comparable to the Myrtos or the Lebena examples, but the fourth is quite unusual as sealstone material.

The other four seals (Cat. Nr. 5-8) form an even more interesting group. The first (Nr. 5, HM 2577) is preserved in perfect condition, something that makes the identification of the material almost impossible. There are no diagnostic features, but it could be bone (Pini, pers. comm.). The second (Nr. 6, HM 2578) is made of bone, and the other two (Nr 7 and 8, HM 2592, 2593) are positively identified as hippopotamus ivory. The first of them is from the tip of the tooth, and as it is broken in the middle one can see the line (commissure) created where dentine meets the pulp cavity.

The two seals from Tholos C (Cat. Nr. 10, HM 2485 and Cat. Nr. 11, HM 2488) are also very interesting. The first is made of bone or ivory, the identification being very difficult because of the perfect preservation of the seal, while the second is made of hippopotamus ivory. The significance of this fact is evident, as it shows that the use of ivory for seals in EMII, at least at Archanes, and the examples from Tholos E are not isolated.

Four more sealstones from the area south of Burial Building 19, Burial Buildings 5 and 6 and the "Area of the Rocks" are made of green steatite (Cat. Nr. 9, 12-14).

	Soft stone	Bone	Ivory	Ivory/bone
Tholos E	4	2?	2	-
Area south of 19	1	-	-	-
Area of the rocks	1	-	-	
BB 5	1	-	-	-
BB 6	1	-	-	-
Tholos C			1	1
Total	8	2	3	1

Table 3.2: Materials from Phase I, Phourni Archanes

Phase I-II: Fourteen more seals from Phourni could be dated to Phase I, but this chronology is problematic, as most of them come from later contexts and stylistically the situation is not as clear as in the previous cases. The first four of these seals come from Tholos C (Cat. Nr. 15-18). Nr. 15 is made of ivory and comes from the lower, mainly EMII, level of the tholos, but stylistically belongs to the next tradition (Ivory/leaves group, see Chapter 5 and Sbonias 1995). Nr. 16, made of bone, presents the opposite problem. It comes from the upper level of the tholos (dated to Phase II, EMIII/MMIA?) but stylistically is closer to the previous tradition. Finally, Nrs. 17 and 18, both made of bone, cannot be

dated with certainty on stratigraphic grounds (Papadatos, pers. comm., 1997), but stylistically belong to the tradition of Phase I.

Two more bone seals from Burial Building 5 (Cat. Nrs. 19, 20) are probably earlier pieces from a later context. The same could be said for two hippopotamus ivory seals from Burial Buildings 6 and 9 (Cat. Nr. 21, 22), two bone seals from the areas between Burial Buildings 8 and 9 (Cat. Nr. 23) and 18 and 19 (Cat. Nr. 26), and four seals probably made of boar's tusk or bone (Cat. Nr. 24, 25, 27, 28) from Burial Buildings 12, 18, and the "Area of the Rocks".

	Bone	Hippo ivory	Boar's tusk	Bone/boar's tusk
Tholos C	3	1		
BB5	2			
BB6		1		
BB9		1		
Betw. BB8 and 9	1			
Betw. BB18 and 19	1			
BB12				1
BB18			1	
Area of Rocks			1	1
Total	7	3	2	2

Table 3.3: Materials from Phase I-II, Phourni-Archanes

It should be noted that the majority of the sealstones of this group could belong to either of the two phases. Whether they are earlier pieces found in

later contexts or represent the continuation of past trends in later periods, is difficult to establish with any certainty. The only safe clues we have come from stratified closed contexts, on the basis of which the rest of the seals are dated.

Phase II: A large number of seals from Phourni can be dated in this phase (Cat. Nr. 29-61) coming from various burial buildings of the cemetery.

The picture that emerges from the examination of the materials is quite clear. The vast majority of the seals are made of hippo ivory, and only few examples of bone and soft stone exist. The case of Burial Building 19, which is securely dated to MMIA (lower level, containing the sealstones), (Maggidis 1994: 22, 30-38) is extremely interesting. There we can observe two examples made of ivory, one of steatite and one of bone, something indicative of the changes that appeared in the next phase (use of bone and steatite again). It clearly shows that the distinction between the two phases is not clear cut, at least where the end of the one and the beginning of the other is concerned. This is also detectable in Tholos C, with two ivory and one bone seal. On the contrary in Burial Buildings 6, 7, 9, 16, and 18 ivory is almost the sole material used in this phase, although we should keep in mind that some of the seals of the previous group (Phase I-II), could belong to this phase, something that would change the picture, as more materials would be present in all the above buildings.

	Soft stone	Bone	Ivory	Boar's tusk	Ivory/ Bone
Tholos C, upper level	-	1	2	-	-
BB 5	-		2	-	-
BB 6	-	-	6	-	1
BB 7	-	-	4	-	-
BB 9	-	-	3	-	-
Tholos E, upper level	-	-	1	-	-
BB 16	-	-	3	-	-
BB 18	-	-	6	-	-
BB 19	1	1	2	-	-
Total	1	2	29		1

Table 3.4: Materials from Phase II, Phourni Archanes

Generally we could say that ivory seals predominate in this period, modelled in various shapes, and engraved with spirals, parades of animals, and leaves. Larger quantities of hippopotamus ivory must have reached the island during this phase, reflecting either an increasing exchange between Crete, Egypt and the Near East or a change in material use. Seals made of this material become fashionable, perhaps because greater social significance was attributed to them.

Phase II-III: Three seals (Cat. Nrs. 62-64) from Burial Buildings 6, 7, and 9 respectively could also belong to the phase II, but the dating is problematic. The first, Nr. 62, is made of bone or hippo ivory and is modelled in the shape of a fly, and engraved with leaves and cross-hatching. The unique shape, along

with the difficulties in the identification of material and the common motif, make the more precise dating of the seal very difficult. Nr 63, is a bone seal in the shape of a dog, but the motif has not been preserved, while Nr. 64 is a bone seal, in the shape two interlaced snakes, with a motif combining lines and deepenings. They could both stylistically belong to Phase II or III.

Phase III: The majority of the sealstones from Phourni are dated in this phase (Cat. Nr. 65-119).

	Soft stone	Other mat. (lap. laz.)	Bone	Ivory	White pieces	B/I	B/BT	BT
BB 3	-	-	-	-	-	2	-	1
BB 5	-	1	1	-	-	-	-	-
BB 6	-	-	4	1	1	-	-	-
BB 7	4	-	4	-	2	-	-	-
BB 9	1	-	5	1	-		-	-
Bet. BB 8 & 9	-	-	4	2	-	-	-	-
Thol.E, upper level	3	-	-	2	2	-	-	1
BB 16	2	-	-	1	1	-	-	-
BB 18	1	-	1	2	-	1	-	1
Bet. BB18 &19	-	-	-	-	-	-	1	-
Tourk ogeit.	-	-	-	-	-	-	-	1
South of C	-	-	1	-	-	-	-	-
Total	11	1	20	9	6	3	1	4

Table 3.5: Materials from Phase III, Phourni Archanes

The picture of this period is not very clear. Soft stone and bone are used again in great quantities, but ivory is still popular, at least in the southern part of the cemetery (Burial Buildings 9, 16, 18 and Tholos E). On the contrary in Tholos B and the burial buildings around it (3, 5, 6, 7) bone and white paste, predominate. Soft stone seems to be equally used in the two parts of the cemetery.

Phase IV: A few sealstones from the cemetery can be dated in this phase, coming mostly from Tholos E and Burial Building 18, which are the main buildings, along with Tholos B, that continue in the first period of the palaces (Cat. Nr 120-128).

	Lead	Soft stone	Hard stones (meteorite, rock crystal, agate, brown stone)	Bronze
BB 5	1	-	-	-
BB 6	-	1	-	-
Area around 6	-	1	-	-
Tholos E, upp. level	-	1	2	1
BB 18	-	-	2	-
Total	1	3	4	1

Table 3.6: Materials from Phase IV, Phourni-Archanes

The number of seals is obviously small but appears to document the beginning of the use of hard stones and metal in the manufacture of seals in Crete.

Clay Sealings: The clay sealings from Archanes are quite distinctive and for that reason are mentioned separately. Two of these (Cat. Nr. 129-130), coming from Phourni Burial Building 18, and Tourkogeitonia, West Section, respectively, are conical with circular bases and stringholes, and are made of red-yellow and yellow-greenish clay respectively. Four more (Cat. Nr. 131 and 133-135) were stamped on handles of burial vessels made of red-yellow clay (pithos? and clay coffin), the last three made from the same seal, on the same coffin. One, made of grey-black clay, comes from the building ground of Aghios Nikolaos, and one more from Tholos B, made of dark brown clay (Cat. Nr. 136), is rectangular and was probably stamped by a later three sided prism. The first two sealings, made of yellow clay, were well baked, and because of their skilful manufacture, it seems possible that they were also worn by people.

Materials, tholoi and burial buildings in the cemetery

Patterns of distribution of materials inside the Phourni cemetery was another point examined by the author. In Appendix F, Tables 1-13, one can see the distribution of materials in most of the tholoi and burial buildings in the Phourni cemetery. Correspondence analysis, applied to this set of data, revealed no strong associations between particular materials and tholoi in the cemetery (Appendix G, Graphs 1, 2, 3 and Table 1). Clay and other materials seem to be associated with Burial Building 5, the area of the rocks and Tholos E upper level, but this association is not very strong. Also steatite seems to be

associated with Tholos E lower level, but this is probably explained in purely chronological terms, as this level is dated to EMII, when steatite is one of the basic seal materials.

It is possible, however, to observe some patterns, if we look in particular phases. For example in Phase I, ivory is only used in Tholoi E and C and not in the few other Burial Buildings from which we have early seals. This could also be explained in terms of chronology, as the two tombs are the earliest in the cemetery, while the other buildings were erected later and early seals found in them were retained from previous generations. Also, in Tholos C there are no soft stone seals from this phase, while a few exist in Tholos E, lower level. On the contrary, in Phase III, this is clearly not the case. Ivory seals were discovered mostly in the southern part of the cemetery, in Tholos E, and Burial Buildings 16 and 18 (Cat. Nrs. 105, 109, 114), and one more is found between Burial Buildings 8 and 9 (Cat. Nr. 97), while only bone and soft stone seals appear in Buildings 3, 5, 6 around the complex of Tholos B. Also white paste appears only in Tholos E and Burial Building 16, as well as Burial Buildings 6 and 7. This could suggest that different groups of seals are represented in different tholoi and burial buildings of the cemetery, but this pattern will be more extensively discussed after the shapes, motifs and stylistic groups of seals have also been examined.

Conclusions

The large number of seals from Phourni gives us the opportunity to contribute to knowledge concerning sealstone use during the whole pre-palatial and the beginning of the proto-palatial periods.

First of all the appearance of ivory from EMII and its continuous use, until at least MMIB is a clear indication of exchange between Crete and Egypt or the Near East (see also Chapter 7). Krzyszkowska characterises these kind of imports as "non-essential", including fine pottery, precious stones, gold, silver and ivory. "It would be extremely difficult to argue that any of these could have been essential to the economy or operation of society such as that on Crete during the pre-palatial period" (Krzyszkowska 1983: 163). However, they could be very important for the "social economy" of the period. With materials like bone and boar's tusk already available and easily accessible, the exchange of hippopotamus ivory, that is considered a luxury material, could be associated with status and prestige. The use of soft stones, bone and boar's tusk gives an idea of the exploitation of local recourses, taking place in the pre-palatial period.

Phourni-Archanes is also very important for the dating of the use of various materials. The picture presented by Yule (1980a) and Sbonias (1995) (see above), can be supplemented and corrected on some points. First, in EMII, soft stone and bone seem generally to be the basic materials used for seals. The new evidence from Tholoi E and C shows us that ivory was also used, and maybe to a larger extent than we thought. With two ivory seals out of eight, in Tholos E, and another two in Tholos C, skilfully engraved, a picture of exchanges of raw materials emerges between Crete, Egypt and the Near East in EMII.

In EMIII and MMIA the use of hippopotamus ivory becomes extensive, and dominates the manufacture of seals, although bone, boar's tusk and soft

stone continue in use, in a small scale. A few elaborate bone seals from Tholos C and other buildings in Phourni show that in a small number of cases bone was still used instead of ivory, to create seals of the same stylistic tradition and of equal, if not of better quality.

Later on, in MMIA and MMIB bone and soft stone become popular again as the examples from Burial Building 7, Burial Building 3 and Tholos E show. White pieces are also present in small numbers in some burial buildings. What is very significant, and actually exceptional for this phase is the presence of ivory in Phourni, in Tholos E, Burial Buildings 9, 16, 18 and between 8 and 9. These buildings are essentially concentrated in the southern part of the cemetery and the ivory seals they contained were very skilfully made, applying new techniques and innovations in manufacture.

Finally in the beginning of the proto-palatial period and in MMII metals like bronze and lead, and hard stones, become popular, but soft stones like steatite and serpentine are still the basic materials.

Summarising the basic information on the chronology of material use we see: 1) Soft stone is used in great quantities in Phase I and III, roughly contemporary with EMII and MMIA-MMIB. In the intermediate phase it appears only scarcely. 2) Bone is widely used in Phase I, seems to decline in Phase II, although some elaborate examples still come to light, and becomes popular again in Phase III. 3) Ivory is used from EMII up to the beginning of the first palaces. It sees its highest point in Phase II, at the end of the pre-palatial, but elaborate examples from EMII and MMIA-MMIB contexts place a question mark over this statement. 4) "White pieces" are predominantly a product of the

later phase III. 5) Hard stones and metals appear as sealstone materials in the same phase but become popular later on.

The study of materials has also given us information on manufacture and craft specialisation. The materials chosen are not very hard to work with, but they are modelled with particular skill, at least in most cases. At the end of the pre-palatial the lathe is introduced for the manufacture of seals (discussed in detail in Chapter 6).

The skill and investment of labour that these seals show, are also an indication of the existence of craft specialists from early on. The elaborate ivory examples from Tholoi E and C at Phourni, dated to EMII, do not demand less skill or hours of work than the later EMIII or MMIA seals. Specialists were possibly operating throughout the pre-palatial period, and this view is supported by the results of the study of other types of material culture, like pottery (Day *et. al.* 1997: 281-287).

Coming to the significance of the choice of materials, one is forced to ask two questions: What were the criteria for this choice and did these particular materials have any special meaning? It seems that colour and hardness are the two basic factors for the Minoan manufacturer and the owner of the seal. Greenish-black steatite and serpentine, bone-boar's tusk and ivory are materials which can be relatively easily worked in such a small scale, they are neither too hard nor too soft, and they create beautiful artifacts to be worn. The ornamental use of the seals should not be overlooked, as it is connected with prestige. The difference in colour between the ivory-bone and steatite seals could be indicative of this. Also the fact that seals were worn, probably

hanging on one's chest or wrist, like a pendant, is on its own an indication of their ornamental importance and meaning, perhaps connected to identity or social position.

Another important factor is the amuletic significance of some materials. In Crete and in other places in Greece today, one can still observe superstitious perceptions relating to some materials. Sealstones are referred to as "galopetres", particular stones believed to "help" mothers with newly born babies to have milk for them. Steatite and serpentine with their soapy surface and green colour could also have been perceived as "prophylactic" materials. Bone, and boar's tusk, all products of animals, could be considered as protective, or even as a means through which the owner possesses particular powers. Also, the sudden increase in the use of ivory in Phase II could demonstrate a belief that this foreign material had special magical-prophylactic powers for its owners.

Phourni provides us also with some useful patterns of material use that may be of interest. For example the use of ivory in Tholoi E and C, in EMII, or the difference between the central and the southern part of the cemetery in the later MMIA-MMIB phase. There we can observe, as we saw above, that only bone and soft stone are used in Tholos B and the burial buildings around it, but ivory is quite common in the southern Tholos E and Burial Buildings 16 and 18. It will be of particular interest to see if this patterning can be associated with particular groups in the community, and it is something that will be considered after the shapes and designs have been examined.

Another important point is the "different" social meaning, possessed by ivory and bone. If we accept that it is difficult today to distinguish between the two materials, in finished artifacts like seals, even after preparation, we can imagine that for the people living at the time they were made, this would be impossible. On the other hand, obtaining ivory from a foreign land was not a simple task and it is logical to consider a special meaning or association of a material not easily available, especially when bone, boar's tusk and steatite could easily be found all over Crete. Was the choice of material a matter of fashion? The patterns of use in the Phourni cemetery mentioned above show that some materials were consciously preferred to others by the people buried in particular tholoi or burial buildings. Perhaps magical powers were attributed to ivory, as a "foreign" material. It is also possible that people were aware of the difference between seals made of ivory or bone, as the owners of these seals could have gained in prestige and social status. This probably caused an intensification of ivory use in Phase II, while at the end of the period soft stones and bone come back to fashion. The reasons for this decline, in a period when exchange with Egypt reaches its peak (Kemp and Merrilles 1980) is unknown. It could be that ivory lost its special meaning and significance, or that it became too expensive to obtain.

The introduction of a manufactured material like white paste at the end of the pre-palatial period may be associated with an increase in the number of seals manufactured, and a more standardised production to meet these needs. The White Pieces may have been seals with particular social importance and associated with higher prestige than seals made from common materials.

Social meaning and significance is an important variable concerning materials. Seals are generally considered to be prestige items used only by some members of the community, and may be connected to some kind of authority or status. The use of ivory strengthens this view, as items and materials available from exchange reflect the power of their owners (Helms 1993: 163-167; Appadurai 1986: 3-63). These items and materials are obtained as a display of prestige and social status, but also play an important role in invigorating and protecting this status. Seals, with their possible multiple use and meaning, may have been considered particularly significant in this respect.

It is clear from this discussion how important the study of materials used for sealstones can be, and how this study can add useful information to our knowledge of seal manufacture and meaning. It is necessary, though, to combine this study with the study of seal-shapes, a subject clearly connected with materials, on grounds of morphology and hardness. The morphological characteristics of tusks, or bones, and the hardness of stones are the first factors taken in account by the seal manufacturer before choosing the shape of the sealstone. An examination of early Cretan shapes with a presentation of the Phourni-Archanes ones, is the subject of the next chapter.

Chapter 4: Shapes

Typology and shape categorisation can provide useful information about the chronology of the seals, whilst foreign shapes betray contacts with other areas, through influence and exchange. Their diversity and elaboration are linked with their social meaning and their standardisation and diversity helps scholars examine aspects such as craft specialisation, and methods of manufacture. Several questions may be raised, regarding the study of seal-shapes and especially their meaning. Was the choice of shape important in any way? Do different shapes represent distinct grades of importance or authority? Do elaborate shapes, like the zoomorphics, possess a distinctive meaning and was there a difference in use? Answers to these questions, though difficult to achieve, are potentially significant for our understanding of the meaning and use of seals in the pre-palatial period.

Shape is a term that refers to the morphological characteristics and the body decoration of the seals, and is often closely related to the material of which the seal is made. For example the morphological characteristics of tusks or the natural hardness of other materials may play an important role in the choice of shape.

In the pre-palatial period soft stones and bone/ivory/boar's tusk are the predominant materials, with white paste and harder stones introduced at the end of the period. Yule distinguishes 34 shape classes (in the pre-palatial and the proto-palatial periods) and divides each one into sub-classes based on the above materials (Yule 1980a: 24-26). Bottles, buttons, conoids, three-sided

prisms, pyramidoids, rings, stamp cylinders and other shapes are divided and examined in ivory, soft stone, hard stone and, when possible, frit/faience categories. Others, like signets, zoomorphs and the miscellaneous shapes are also divided in other shape sub-classes.

Krzyszkowska, examining the seals published in the CMS III, summarises shape classes by material, correcting and supplementing Yule, (concerning bone/ivory and related materials). She distinguishes three groups: in the first the morphological features of the material are preserved or slightly modified, in the second they are largely or wholly obliterated and the third comprises "man-made" white pieces. The first group includes shapes made of bone (arch-incised, concave-convex plates, epomia, simple rings, some hammerheads, hollow cylinders), boar's tusk (some gables, miscellaneous cylinders, "tusks") and hippopotamus ivory (some conoids, pyramidoids, massive rings, plain cylinders, concave cylinders, some zoomorphs, wedges). In the second group one sees the shapes appearing in the same materials, bone (bottles, buttons, conoids, hemi-cylinders, hemi-spheroids, stepped pyramids, stamp signets, hammer-headed seals, squat signets, zoomorphs), boar's tusk (conoids, hammer-headed seals, zoomorphs) and hippopotamus ivory (conoids, rectangular plates, stamp signets, zoomorphs). Finally White Pieces include buttons, bordered discs, half-ovoids, reels, hemi-spheroids, plain-convex-buttons, scarabs/scaraboids, certain zoomorphs and, infrequently, some other shapes (Krzyszkowska 1989: 124). Combining the results of the two studies we can identify the main Minoan seal-shapes found in each material. They can be found in Appendix H, Table 1.

Yule's typology has been proved effective and practical through the years, and his terminology has been used in most studies of seals. In this respect, the presentation of the new material from Phourni-Archanes will also be based on these guidelines, adopting Yule's terms. The study of shapes and chronology will follow, in order to put seal-shapes in their chronological context, and to discuss problems concerning the dating of seals.

Shapes and chronology

Branigan, in his study of pre-palatial Crete, gives an account of seal shapes. According to him EM sealstones were either of the "bottle" variety or pyramidal or conical in shape. In MMIA new shapes, like the flattened cylinders, low buttons and three-sided prisms, joined the others. But although there were standard shapes like the cylinders, the cones or the discs, "the overall variety and the individuality of the sealstones are quite staggering" (Branigan 1993: 72-73). He particularly distinguished the group of zoomorphic and anthropomorphic seals as miniature sculptures. Beside local domestic animals, like ox and pig, creatures of possibly foreign origin, like ape and lion, also appeared (Branigan 1988: 143-144).

Kenna had already distinguished two different glyptic traditions, one from the Mesara with a variety of shapes mostly made of ivory, and one from the North with three-sided prisms its basic element. But the lack of evidence from securely stratified contexts made him, wrongly, date the three-sided prisms in EMIII or even earlier and consider them earlier than the Mesara seals (Kenna 1960: 24-25). Yule, examining some seals from the New York Metropolitan Museum (1980b) changed this perception of the dating of three-

sided prisms, based on the stratified findings from Malia. There, a large number of three-sided prisms were discovered in the workshop that came to light in the remains of the first palace (Dessenne 1957: 693-695; Poursat 1974: 111-114), and according to these most of the three-sided prisms are dated stylistically to MMII and MMIII (Yule 1980b: 104-105).

As noted, Yule (1980a) presented the chronological framework of all the shape categories, based on stratigraphic evidence, where that was available, and on stylistic grounds in the majority of cases.

SHAPES	PERIODS OF USE	SHAPES	PERIODS OF USE
amygdaloids	MMII-LM	signets	EMI?,II-MMIII
arch-incised	EMII-MMIA	buttons	MMIB-MMIII
bottles	EMII-MMII	concave-convex plates	EMII-MMIA
cubes	EMII-MMIA	conoids	EMII-MMII
cushions	MMII-LM	epomia	EMII-MMIA
cylinders	EMII-LM	foliate backs	EMIII-MMIII
discs	EMII-MMIII	gables	EMIII-MMIII
discoids	MMIB-MMIII	half-conoids	MMIB-MMII
hemi-cylinders	EMIII-MMII	half-ovoids	EMIII-MMII
hemi-spheroids	EMIII-MMIA	three-sided prisms	EMIII-MMIII
lentoids	MMII-LM	pyramids	EMII-MMIB
plain-convex buttons	EMIII-MMIA	pyramidoids	MMIA-MMII
four-sided prisms	MMIB-MMII	quatrefoils	EMII-MMIA
reels	EMII-MMIIB	rectangular plates	EMII-MMIA
rings	EMII-LM	stamp cylinders	EMII-MMIB
scarabs	EMIII-MMII	zoomorphic-anthrop.	EMII-LM
scaraboids	EMIII-MMIII	miscellan.	EMII-MMIII

* Yule uses different terminology for some shapes than the one in the CMS

Table 4.1: EM and MM seal-shapes and their periods of use, according to Yule.

Five important points must be kept under consideration, concerning chronology.

1. First nearly all the categories are divided into sub-classes by Yule, based on the material or slight differences in shape (see above). These sub-divisions play an important role in chronology, as they may extend the period of use ascribed to the whole shape class, just because one such type is used for an extended period, after the shape is generally out of fashion. Bottles made of ivory are dated in EMII-MMIA but the ones of soft and hard stones extend the period of use to MMII. Cylinders made of hard stones are used up to LM times, although the shape appears and is primarily used in the pre-palatial period. The same is true for some stamp cylinders. Three-sided prisms are dated by Yule to MMIB-MMIII, based on material from the Malia workshop, but some miscellaneous prisms from Knossos or the Mesara belong stylistically to EMIII-MMIA. Again, scalene triangular pyramidoids are dated up to MMII, while regular pyramidoids are dated only up to MMIB. Ivory and soft stone rings are considered basically pre-palatial, but metal and hard stone as belonging to the LM period. The same applies to scarabs and scaraboids, up to MMIII (for the importance of materials for dating and their chronological sequence see Chapter 3). Zoomorphic and anthropomorphic seals are also divided by the particular animal parts that are modelled (heads, bodies, hooves etc.). Finally signets also cover a wide period in a variety of material and shape sub-classes (Yule 1980a: 24-117).

2. The second point that Yule notes is that shape-material classes fall into two categories: classes that are composed of a few seals, for which we can only

note in which periods particular shapes are represented, and larger classes (twenty or more seals) that can be considered datable. "While some classes, such as the Quatrefoils, are only datable generally within EMII-MMIA, others can be fixed with a greater degree of certainty. In the case of buttons, discoids and large classes of homogeneously shaped seals, the evidence of stratigraphy and/or stylistic considerations coincide to suggest a dating within a limitable time span" (Yule 1980a: 103).

3. A third important point is that, according to Yule, good quality seals are documented in EMIII-MMIA and MMII, but the same should be true for MMIB, although it is not possible to demonstrate this. He considers it possible that many EMIII-MMIA shapes continued in use in MMIB (Yule 1980a: 104).

4. The fourth point is about the chronological development of the different stringhole systems of early Cretan seals. The most common type is the single, horizontal stringhole which occurs throughout the Minoan period. The next most common type is the triangular stringhole, which Yule describes as "a horizontal boring met by two more holes which usually slant down from the top" (Yule 1980a: 104). They are the most elaborate stringholes and occur in the seals of better quality, in EMIII and MMIA, but die out in MMIB. "The string perhaps entered a boring at the top of the seal, was threaded horizontally inside and back up the other slanting hole" (Yule 1980a: 104). A third, less common, type of hole is a horizontal one, met by a vertical. In these "the string perhaps entered vertically, came out horizontally, went around the outside of the seal, back in the other side and out the top. Another possibility is that the

string simply went through the horizontal hole and the vertical one was not used" (Yule 1980a: 104).

5. The quality of workmanship is very good in some shape classes, throughout the period. Carefully shaped seals usually show good quality of engraving, and only in rare cases does the engraving of the seal and the fashioning of the shape differ in quality. These seals of excellent workmanship tend to be morphologically homogenous, especially the later ones made of hard stone (Yule 1980a: 103), but they are not chronologically distinctive.

With all these points in mind, Yule sketches the chronological development of seal shapes and materials. No seal shapes are firmly dated to EMI. Only some small plate signets are assigned to EMI?-EMII. Several shapes, including miscellaneous conoids, some discoids, foot seals, ivory rings, types of signets and some stamp cylinders fall clearly within EMII. Bottles, discs, foliate backs and gables occur in the pre-palatial period and continue until MMII (Yule 1980a: 104-105).

Many more seals come from the EMIII and MMIA periods. The commonest shapes are conoids, types of discs, hemi-spheroids, stamp-cylinders and zoomorphs. Certain conoids and miscellaneous three-sided prisms appear in this period but continue in the proto-palatial period, when four- and three-sided prisms, especially the last, are the most common shapes. Fewer, but more standardised, shapes occur in this period, as a result of the introduction of the fast-turning drill and hard stone (Yule 1980a: 104-105).

Yule's chronology covers the basic points of material and shape development in the pre- and proto-palatial periods in Crete. However, most seal-shapes are considered to cover a long period of time, mainly because some of their material sub-classes continue for longer periods than the main period of use (see point 1 above). Therefore, it could be said that this chronological framework is not descriptive enough for some shape classes.

Recently Sbonias presented a new typology, organised in a different way. His classification is based on shape, material and date. For this reason, some shape classes appear more than once in his typology, in different materials, or even in the same materials but in different periods, and some classes consist only of one or two seals which cannot fit into any of the rest of the categories. He thus distinguishes 75 shape classes, few of which have sub-classes, and they are presented, more or less, chronologically and not alphabetically as were Yule's, (see Appendix I, table 1).

Sbonias' chronology is based on the contexts of the seals (Lebena II and IIA, Archanes Tholos E-lower level, and Myrtos Fournou Korifi for EMII, Archanes, Mochlos, Knossos and Mesara for EMIII, MMIA and for MMIA-MMIB or later), creating these three phases (see Chapter 2), presented above. According to him, in EMII, conoids, stamp cylinders, pyramidoids, rectangular and round plates appear in soft stone, and bottles, rings, buttons, zoomorphic seals, epomia and concave-convex plates in bone. In the next EMIII-MMIA phase, ivory is the predominant material, modelled mostly in stamped cylinders and conoids. Half-cylinders, zoomorphic and anthropomorphic seals, stamp pyramids, massive rings and buttons also appear in ivory. Later on, in MMIA

late/MMIB, discs, bottles, buttons, gables, zoomorphs, scarabs and scaraboids in bone, white paste, soft stone and at the end of the period hard stone, complete this repertoire (Sbonias 1995: 40-63).

This typology has the advantage of presenting the chronological development of seal shapes in a detailed way, so that every shape class is dated within a particular phase. However, it is perhaps over-descriptive, too complex and difficult to use. The same shapes appear in different phases and are categorised as different shape classes, according to their date, thus creating a large number of types. Also, it is heavily based on the dating of the contexts where the seals were found. Taking into account the fact that the majority of these are funerary contexts, covering more than one period of use, with no clear stratigraphy (with the exception of a small number of closed dated contexts), it is clear that such a detailed typology and chronology of shapes can be problematic. For these reasons the presentation of the new shapes from Archanes-Phourni will be organised according to Yule's terminology and shape classes, taking into account Sbonias' scheme, when necessary.

One can conclude that in the pre-palatial period a diversity of forms were created, including stereometric forms such as pyramidal, conoid, hemispherical and discoid, as well as "epomia" and different theriomorphic shapes. This diversity allows only a more general dating, as most shapes appear in successive periods.

It is clear that shapes are important for the dating of seals and indeed for our understanding of the whole pre-palatial period. Watrous (1994) compares the diverse shapes of EMII (conoids, discs, L-shaped, foot-seals,

rings, hammer-headed signets and plate signets) with the more regular repertoire of shapes from EMIII-MMIA (gables, half-ovoids, zoomorphs and three-sided prisms) and draws two important conclusions: "EMII seal carving is relatively simple compared with that in EMIII-MMIA and there is minimal overlap in seal shape...between the two periods" (Watrous 1994: 715). These conclusions became part of broader argument, that there is no social differentiation and ranking in EMII and that EMIII and MMIA are actually one period, with EMIII not existing as a separate phase (Watrous 1994: 714-715, 735-736), but as has already been discussed earlier, this view can not be substantiated (see Chapters 2 and 3). A consideration of the basic contexts of seals, as well as a presentation of the material from Archanes-Phourni, now follows, in an attempt to refine and support the results of Yule's and Sbonias' studies.

Evidence from basic contexts

Phase I: Myrtos Fournou Korifi, the lower levels of Lebena Tholoi II and IIA, and Archanes Tholos E are the closed dated contexts available for this phase. The shapes that appear in Myrtos are: two buttons with tongue shaped handles, a half-spherical, a conoid with pressed body, a conoid with horizontal tightening in the middle and an irregular four sided pyramid, all made of soft stone. In Lebena Tholos II, lower EMI? level, eight seals were found (CMS IIi Nr 195-200 and 202-203), also of soft stone. Two conoids, two four-sided pyramids, a flattened stamp cylinder, a rod and two rectangular plates with tongue-shaped handles are the shapes of these seals. Finally seven seals were found in the lower EMII level of Lebena tholos IIA (CMS IIi Nr 210-216): a

hammer-headed signet with cylindrical body, two rings, a foot seal, a pear-shaped example with zoomorphic handle (two dog-heads), a thick round plate and an anthropomorphic seal (sitting female figure), all made of bone, except the foot seal and the round plate which are made of soft stone. Two more seals come from possible EMII contexts. The seal from Mochlos, from the area outside Tomb II (CMS IIi Nr 478) is a stamp cylinder and the one from Krasi (CMS IIi Nr 407) is again a foot, published as ivory, but possibly made of bone.

MYRTOS	LEBENA II	LEBENA IIa	MOCHLOS	KRASI
buttons, with tongue-shaped handles (2)	rectangular plates with tongue-shaped handles (2)	pear-shaped with zoomorphic handle	stamp cylinder	foot
conoids (2)	conoids (2)	rings (2)		
half-spherical	rod	thick round plate		
four-sided pyramid	four-sided pyramids (2)	hammer-head. signet		
	flattened stamp cylinder	foot		
		anthropomor.		

Table 4.2: Shapes and numbers of examples from Phase I (EMI?-EMII) closed contexts

Examples from other, mixed, contexts, with EMII material (see Chapter Chronology), confirm this picture, with similar shapes appearing:

CMSIIi 471-473 and 477, HM 787, and CMS V 24, from Mochlos, where shapes like discs, cylinders and spools appear
CMS IIi 469, 470 from Sphoungaras in the shapes of a zoomorphic and a hammer-headed seal
two conoids from Krotos (Vasilakis 1983)
CMS IIi 422, 423, a button and a zoomorphic from Maronia
CMS IIi Nr 14, a ring, CMS IIi Nr 11, a half-cylinder and CMS IIi Nr 15, a rod all three from Aghia Triadha tholos A,
CMS IIi Nr 109, a button with handle from Aghios Onouphrios
CMS IIi Nr 143, a rod from Koumasa tholos B
CMS IIi Nr 171, a ring from Lebena tholos Ia
CMS IIi Nr 232 and CMS IIi Nr 266, two epomia from Marathokephalo, and Platanos respectively, a shape probably appearing at the end of this phase
CMS IIi Nr 372, a ring from Porti
CMS V SIA Nrs 226-231, simple conoids with handles made of soft stone, from Mitsotakis Collection (Moni Odhigitrias?)
CMS IV Nr 13, an epomion from Kaloi Limenes

Table 4.3: Examples of seals from Phase I, from mixed contexts.

Phase II: The majority of seals from Mesara and Asterousia belong to this phase. Stamp cylinders, conoids, concave-convex plates, zoomorphic and anthropomorphic seals, stamp pyramids and buttons are the basic shapes.

Aghia Triadha (CMS IIi Nr. 6-123)) presents a variety of shapes: zoomorphic, conical, conical with torsion grooves, stamp cylinders, pyramidal, epomia, half-spherical and buttons. Kalathiana has pyramidal seals, a conoid, a round disc, a gable-shaped plate, a stamp cylinder and zoomorphic seals, confirming this picture (CMS IIi Nrs 123-132). At Koumasa (CMS IIi 133-169) and Lebena (CMS IIi 170-221), in the upper levels of Tholoi II and IIa and in Tholoi I and III, the majority of seals belonging to this phase, Marathokephalo

(CMS IIi 222-240) and Platanos (CMS IIi 241-349) present the same shapes with the previous sites, more or less, with stamp cylinders and zoomorphic seals being the most numerous (see catalogue of seals published in the CMS).

The other two large corpora of seals from Kaloi Limenes and Moni Odhigitrias also include these shapes along with wedge-shaped, tongue-shaped, reduced cylinders, cylinders, horn-shaped and massive rings (CMS IV-Metaxas Collection and CMS V SIA-Chania Museum, Mitsotakis Collection).

Outside the Mesara and Asterousia, a few examples from Gournes, CMS IIi Nrs 396, 398-400 (stamp cylinders, quarter ovoid, half-cylinder, graded pyramid), Trapeza, CMS IIi Nr 435-442 (zoomorphics, pyramidals, conoids, stamp cylinders), Viannos, which is considered as an EMIII context, Mochlos, CMS IIi Nrs 472-474 (stamp cylinders, pear-shaped) and Palaikastro, CMS IIi Nrs 481-482) contribute to the general picture though the numbers are small.

Generally, a great variety of shapes can be noted. Shapes from the earlier phase continue, new ones are created, seals of high quality are manufactured in larger numbers, as the preserved excavated material shows.

Phase III: This phase represents the end of the Pre-palatial and the beginning of the first palaces. As has already been noted, bone and steatite become popular again and white paste appears as a new material, modelled on the same shapes. Scarabs and scaraboids, amygdaloids, spools, cubes, petschafts (types of signets), and three- and four-sided prisms are new shapes, with the last two prevailing later in the proto-palatial period.

Four sided pyramids, conoids, spools, three-sided prisms, pear-shaped seals, buttons made of steatite, scaraboids, gable-shaped plates made of white paste and a few seals made of harder stones, are the shapes which appear at Aghia Triadha. Aghios Onouphrios, with nearly all its seals belonging to this phase, has buttons, pyramids, gable-shaped seals, three-sided prisms and zoomorphic ones made of steatite (CMS IIi Nr 107-113), scarabs and scaraboids made of white paste (CMS IIi Nr 117, 119) and few seals made of onyx (petschaft) and sardonyx (scaraboid), (CMS IIi Nr 121,122). Some steatite-chlorite and white paste seals from Koumasa (e.g. CMS IIi Nrs 145,146,148: three-sided prism, flattened cylinder, cube respectively) and Lebena, from the unstratified Tholoi I and III and the upper levels of Tholoi II and IIa (e.g. CMS IIi Nr 180,189 -scarab and spool-shaped plate) also belong to this phase, as well as the majority of Platanos tholos B seals, modelled in the shame shapes and materials (e.g. CMS IIi Nrs 289, 298, 301, 303, 304 -a gable shaped plate, a bell shaped conoid, a petschaft, a conoid and a round plate). Platanos tholos B also contained an imported Babylonian cylinder (CMS IIi Nr 306) and scarabs (e.g. CMS IIi Nr 332), as well as seals made of harder stones (e.g. CMS IIi Nr 338, 341 -cube and round plate).

A large number of seals from Kaloi Limenes (Metaxas Collection) and Moni Odhigitrias (Mitsotakis Collection) present more or less the same shapes, confirming the picture for Mesara and Asterousia.

Considering the palatial and urban centres, Malia and Phaistos (CMS IIi Nr 409-420/ conoids, plain-convex plates, pear-shaped seals and CMS IIi Nr 423-426/ disc, pyramid and cylindrical seals respectively) are the areas

represented in this phase, and Gournia in East Crete (CMS IIi Nr 467-468/ conoids).

In summary, it can be said that there is no clear line of development in seal shapes of the pre-palatial period. Broadly, we can say that in Phase I irregular pyramidal and prismatic shapes of soft stone, rings and simple conoids made of bone predominate, in Phase II ivory stamp cylinders, conoids and zoomorphs are common; and in Phase III some new shapes (three-sided prisms, petschafts, scarabs) are added to the existing repertoire. However, it is clear that the majority of shapes are used throughout the pre-palatial period, regardless of the changes in material. Zoomorphs and stamp cylinders exist from Phase I and continue until the first palaces and the same is true of conoids, pyramids, and rings. Different materials and different methods of manufacture may be used, but shapes remain essentially unchanged. The remarkable diversity of shapes, already seen in Phase I left little space for many new creations in subsequent phases. Instead we find that traditional shapes are modified and worked in different materials. This enormous variety of shapes in a new craft is striking and clearly demonstrates the creativity and ability of the craftsmen, but also the importance of the artifacts.

Shapes in Archanes-Phourni

Phase I: The eight seals from the lower level of Tholos E (EMIIA) comprise a small but important corpus of seals from a closed dated context. The four seals made of soft stone are modelled in the shapes of a stamp cylinder, a miscellaneous seal (six-sided prism), a three-sided prism and a rectangular plate (Cat. Nr 1-4). The other four are: a zoomorphic example, in the shape of

two interlaced snakes, a button, a conical seal and the handle of a signet seal (hammer-headed) in the shape of a T (Cat. Nr 5-8). The rest of the seals from Phourni that can be dated to EMII on stratigraphic or relatively safe stylistic grounds are: a pyramidal, from the area south of Burial Building 19 (Cat. Nr. 9), a hemi-spheroid from the lower level of Tholos C, as well as a miscellaneous (triangular plate) from the same tholos (Cat. Nrs. 10-11), another pyramidal from the area of the rocks (Cat. Nr. 14), a three-sided gabled shaped seal with rounded edges from Burial Building 5 (Cat. Nr. 12), and a disc from Burial Building 6 (Cat. Nr. 13).

Tholos E, lower level	Area south of Burial Building 19	Tholos C	Area of the rocks	Burial Building 5	Burial Building 6
stamp cylinder	pyramidal	hemi-spherical	pyramidal	gable-shaped	disc
six-sided prism		triangular plate			
rectangul. plate					
zoomorp.					
button					
conical					
signet					

Table 4.4: Shapes from Phase I, Phourni-Archanes.

Along with the irregular pyramidal and prismatic seals made of soft stone, that remind us of those from Myrtos Fournou Korifi, one can note here the existence of well worked shapes. The stamp cylinder, the three-sided prism and the rectangular plate from Tholos E, as well as the gable-shaped and the disc from Burial Buildings 5 and 6 are made of soft stone, quite carefully

worked and the shapes continue much later in the pre-palatial and even into the proto-palatial periods. Additionally the zoomorphic, button-shaped, conical, and signet seals from Tholos E, made of bone-ivory or related materials (see Chapter 3) are of even better quality.

This small corpus of seals from the first phase gives us the opportunity to draw some useful conclusions about the use of shapes:

1) The six-sided prism, the gable-shaped, the disc, made of soft stone, first appear in EMII, although they become popular much later. These shapes, are rare or even non existent in early contexts in the south of the island, and are an indication of a different tradition in Archanes and the north, at least as far as soft stone shapes are concerned.

2) Conical seals and signets, are made of hippopotamus ivory already from this period. The use of hippopotamus ivory in the south is rare in this phase, while in Archanes there are three, perhaps four, examples in a group of 14 seals. Therefore, contacts with the east started from this early phase at least in the north part of the island.

Phase I-II: As has already been discussed in Chapter 2, 15 seals from various contexts in Phourni could stylistically also belong to Phase I, but their chronology is problematic because of their late contexts. The shapes of these seals (Cat. Nr. 15-28) are shown in the following table:

Tholos C	BB5	BB6	BB9	Bet. BB8 & 9	BB12	BB18	Bet. BB18 and 19	Area of rocks
stamp cylinder	stamp cylin.?	flatt.	zoom orph.	plano-conv. button	three-sided prism	zoomor	Hemi-cylinder	(flatt.) stamp cylind.
gable (2)	rect. plate							conoid
stamp cylind.?								

Table 4.5: Shapes and numbers of examples from Phase I-II, Phourni-Archanes

Stamp cylinders constitute the basic shape in this table. If these seals belong to the first phase, this fact clearly indicates that stamp cylinders were introduced and often used earlier than in phase II, when they were the predominant shape. It could also picture the beginning of this trend, as in this case various materials, like bone and ivory are used, while later hippopotamus ivory is almost exclusively used.

Elaborate zoomorphic seals (Cat. Nrs. 22, 25) and conoids are other shapes that appear in this phase and continue later on. The one example of a bone/boar's tusk three-sided prism, from BB12, is unique for the early part of the pre-palatial, as this shape will become popular in the last phase of the period, engraved on all three faces. The example from BB12 is engraved only on the base, as it is used in the early phases.

Phase II: Thirty-three sealstones from Phourni (Cat. Nr. 29-61) can be dated to this phase coming from various Burial Buildings and areas. The examples from Tholos C, dated to EMIII/MMIA? and BB19, dated to MMIA, come from

stratified contexts and help us date the rest of the assemblage. This is also in agreement with evidence from other contexts (see above and Sbonias 1995).

Tholos C	BB 5	BB 6	BB 7	BB 9	Tholos E	BB16	BB18	BB19
buttons (2)	stamp cylind. (2)	stamp cylind. (4)	stamp cylind. (2)	zoomor.	stamp cylinder	pyramid	stamp cylind. (3)	stamp cylind. (2)
stamp cylinder		conoids (2)	zoomor. (1)	stamp cylinder		stamp cylind. (2)	long plate	cylind.
		pyramid	conoid	rectangul. plate			button	conoid
							pyram	

Table 4.6: Shapes and number of examples from Phase II, Phourni-Archanes

It is clear that the stamp cylinder is the dominant shape of the phase, as eighteen of the thirty-three seals in the group are stamp cylinders. Pyramids, conoids, rectangular plates, and buttons are also present. The zoomorphic seals of this phase are quite impressive, in the shapes of a sitting dog (Cat. Nr 41), and a sitting lion? (Cat. Nr 46). All shapes continue from the previous phase, but they are mainly modelled in hippopotamus ivory.

Phase II-III: Three zoomorphic seals from Burial Buildings 6, 7 and 9 could belong to both phases. The first (Cat. Nr. 62), in the shape of a fly, is unique. The lack of parallels, along with the uncertainty as to the material (bone or ivory), make the dating of the seal problematic. Despite its small size, it is carefully modelled in detail, with leaves and lines in an angle engraved on the sealface. The second (Cat. Nr. 63), in the shape of a dog or frog, is made of bone, but the sealface is corroded and no motif can be recognised. Finally the third (Cat. Nr. 64) is in the shape of two interlaced animals, a shape quite

common from phase I in Archanes, but the motif is later, making the dating problematic.

Phase III: The majority of the seals from Phourni belong to this phase (Cat. Nr 65-119).

BB3	BB 5	BB 6	BB 7	BB 9	Bet.BB8 and 9
discoid	rectangul. plate	miscell.	zoomorph	stamp cylinder	three-sided prisms (2)
gable	cylinder	stamp cylinder	unidentif.	anthrop.	hemi-spherical
pyramidal		gable	rectangul. plate	pyramidals (2)	button
		discoid	discoids (2)	scaraboids (2)	gable
		button	gable shaped	three-sided prism	stamp cylinder
		scarab	hemi-cylind. (2)		
			pyramid		
			scarab		

Tholos E	BB 16	BB 18	Bet.18 and 19	South of Th.E	Tourkogeitonia
button	buttons (2)	three-sided prism	three-sided prism	conoid	three-sided prism
conoid	zoomorph.	stamp cylinders (2)			
cylinder	stamp cylinder	(flattened) cylinder			
(flattened) cylinders (2)		hemi-cylinders (2)			
discoid					
stamp cylinder					
gable					

Table 4.7: Shapes and number of examples from Phase III, Phourni-Archanes.

This phase presents a variety of shapes, as well as materials (see chapter on materials). Zoomorphic seals in soft stone, bone and white paste, discoids, scarabs, scaraboids, gables, cylinders, flattened cylinders and hemi-cylinders become popular. The last two shapes especially are modelled with convex sealfaces, as a result of the use of the lathe (see Chapter 6), showing a development from the earlier cylindrical seals. Three-sided prisms become even more popular than in the previous phase, now sometimes with two decorated surfaces, in various materials. Later, three-sided prisms, decorated on the three sides and made of soft stone, become the most popular shape of the Malia Workshop, in the proto-palatial period.

A few seals from this phase should be mentioned separately, as they are modelled in unique shapes. Cat. Nr. 70 is a 14-sided cylinder, with rounded

edges. It has a cylindrical handle with a horizontal stringhole, and 14 sealfaces, three in each of the four sides and one on the base and on the top. The unique shape, along with the hieroglyphic motifs engraved on some of the sealfaces, could mean that this seal had a particular use.

The anthropomorphic sealstone (Cat. Nr. 87), in the shape of a standing woman with a long dress, is another rare shape appearing in Phourni. The hands are joined on the breasts and the head is flat in front, with no manifestation of a nose, and conical at the back. Ears, eyes and mouth are manifested with engravings and depressions. The skirt is decorated with three horizontal parallel grooves, in front and behind. This seal could also have belonged to someone important, regarding social, economic or even religious activities, as it clearly stands out from the rest of the seals.

Finally, two examples of a stamp cylinder (Cat. Nr. 71, 109) should be mentioned, as their sealfaces are in fact covers that open and close and are kept in place with "nails". These seals could have been used as containers for precious substances, like aromatic oils.

Phase IV: A small number of seals (Cat. Nr 120-128)belong to this phase, coming mostly from Burial Building 18 and Tholos E (Cat. Nr 120-128).

BB5	BB 6	Area around 6	Tholos E	BB 18
stamp cylinder	three-sided prism	lenticular	(flattened) cylinder	rectangular plate
			cylinder	(flattened) cylinder
			discoid	
			ring	

Table 4.8: Shapes and numbers of examples from Phase IV, Phourni-Archanes.

The same shapes continue in this phase. Only the lenticular is a new shape. One should notice the first example of a metal seal in Phourni (the bronze ring). Also the three-sided prism (Cat. Nr 121) is stylistically much closer to the Malia Workshop ones, and probably contemporary.

Clay sealings: Two of the clay sealings (Cat. Nr 129-130) from Phourni Burial Building 18 and Tourkogeitonia, are conical with circular bases and stringholes and could also be used as pendants . Four more were stamped on the handles of burial vessels, the last three made from the same seal, on the same coffin (Cat. Nr 131, 133-135). Finally another rectangular sealing was probably stamped by a later three-sided prism (Cat. Nr. 136), and one more from Aghios Nikolaos ,an area inside the village of Archanes (Cat. Nr. 132), was probably three-sided, prismatic, in shape.

Shapes and Manufacture

What can the shapes mentioned above tell us about the manufacture of seals? Firstly, some of them, like the stamp cylinders, are manufactured according to the shape of the tusks or the bones used for their manufacture. However, a large number of seals are modelled in shapes that need long hours of labour and skill for their manufacture. The careful handling of the materials used, the hours of labour demanded for the manufacture of seals and the elaborate seals created in some examples, indicate the presence of specialists from early on (discussion in Chapter 6). The zoomorphic seals are a particularly strong indication of this point, as they present a different quality and quantity of labour.

The introduction of the use of the lathe at the end of the pre-palatial period made the job of the seal manufacturer much easier. Elaborate shapes like the zoomorphs were modelled with every detail and probably less effort in this late stage. The use of new materials, like white paste (and hard stones in the proto-palatial period), clearly indicate these technological advances (for more details see Chapter 6).

The zoomorphic seals

The zoomorphic seals comprise a distinctive group among the pre-palatial seals. They are modelled in the shape of different animals (lions, apes, cattle, pigs, insects), and were found at various sites in the island (see Catalogue). At Archanes fourteen zoomorphic seals have come to light: four in the shape of two interlaced snakes or birds (Cat. Nrs. 5, 22, 25, 64), two in the shape of sitting dogs or frogs (Cat. Nrs. 41, 63), one in the shape of a sitting lion (Cat. Nr. 108), a sitting ape or lion (Cat. Nr. 46), a fly (Cat. Nr. 62), a bull-head (Cat. Nr. 76), two scarabs (Cat. Nrs. 75, 85) and two scaraboids (Cat. Nrs. 90, 91).

The importance of these seals is manifested by their actual shape that imitates animals, their small number in comparison to the whole corpus of seals (ca. 10%), and the skill and amount of labour needed in their manufacture, at least before the lathe was introduced. These three factors indicate that zoomorphic seals had a different meaning or importance than the rest of the seals. It is difficult to determine whether they were used for amuletic-prophylactic, ritual or religious purposes, or were worn as ornaments of prestige and social status. One could speculate endlessly on the significance of

the shapes. For example, representations of living creatures like birds could be connected with beliefs of after life and the perception of the soul like a bird (Marinatos 1993: 29), whilst seals in the shape of scorpions and other insects and human feet, could be prophylactic for their owners. Domestic animal representations could be prophylactic for those animals, while the representation of wild animals could represent their owners' wish to posses powers that characterise these animals (strength, cunning, speed). These aspects are also connected with the social importance of these seals, their small number indicating that only a select few became owners of a zoomorphic seal, and that these seals were used as symbols of status.

Conclusions

The examination of shapes gives us the opportunity to raise some interesting points concerning trade, chronology and seal use during the pre-palatial and the beginning of the proto-palatial period.

Stamp cylinders are one of the basic shapes from EMII and throughout the pre-palatial period. The origin of the shape is probably the east, where cylinders were used from much earlier. Of course in the east the designs of the cylinder seals were engraved on the body and not on the bases, as was the case in Crete. A few examples of cylinders with designs around the body, like the one from Burial Building 19 in Phourni, show that this practice was adopted and Minoan craftsmen were capable of engraving this way, but it never became very popular. This suggests that although the Minoans were receptive to ideas from elsewhere, they adjusted them to their needs and their perceptions of style. Some of these cylinders were imported from the east, for

example the silver and haematite cylinders from Mochlos (dated to EMII), the Babylonian cylinder of Platanos Tholos B, and the Syrian example from Burial Building 5, in Phourni-Archanes, made of lapis lazuli. Also many scarabs from Lebena, Koumasa, Platanos, Moni Odhigitrias, Kaloi Limenes and the two from Phourni, were probably imported from Egypt. The scarabs from Phourni are dated by Warren (Warren 1980: 487-499) to MMIA. All these, along with the use of hippopotamus ivory from EMII onwards, prove contacts between Archanes in particular, and Crete in general, and Egypt and the East (see also Chapter 7).

The seals from Phourni-Archanes also give us useful information on the chronological succession and typology of shapes. In Phase I (EMII), along with the pyramidal, conical and cylindrical shapes we have a gable-shaped seal and a disc, essentially considered as later shapes. Also, as has already been mentioned, the first seals made of hippopotamus ivory, a conoid and a signet, appear in Tholos E. From EMIII (Phase II) stamp cylinders become the basic shapes, along with gables, conoids, and zoomorphic ones. They are mostly made of ivory, but bone also appears. In Phase III (MMIA-MMIB) the same shapes continue, in bone, white paste and soft stone, but ivory stamp cylinders, bigger in size, with concave bases are still made with new techniques and the use of the lathe (see Chapter 6). Scarabs and scaraboids are the new shapes at Archanes, although a few examples may exist from earlier in other areas of Crete (Mesara). In the next Phase, IV, harder materials are used, but still modelled in the same shapes. The lenticular is the only new shape introduced at Phourni.

Shapes also give us indications about the use of seals in this early period. The colour of the materials chosen and the variety of shapes in which they are modelled is an indication of the ornamental significance of sealstones. As seals were worn, probably hanging from the neck, it seems that it was important for the owner to have a visibly "different", or elaborate seal. The great variety of shapes, and especially the zoomorphic seals in the shape of lions, apes, dogs, and snakes emphasise this point.

The amuletic use of seals is another aspect that probably played a role. Shapes like bottles (see Branigan 1988: 96-98), or prisms are considered by some scholars to have an amuletic significance. Kenna believed that all the three-sided prisms of northern Crete had a "prophylactic" meaning (Kenna 1960: 22). Also sealstones in the shape of a foot, presumably showing the talismanic qualities of the more numerous foot amulets, were considered to protect from snakes and scorpions. The zoomorphic seals especially may have possessed an amuletic meaning.

The most important aspect, though, of the use of the seals seems to be the social one. Did different shapes have different meaning and which were the shapes that possessed more importance than others?. The variety of shapes and the fact that they were found in the same contexts make it difficult to give an answer to this question. It is very difficult to show if some shapes, like the stamp cylinders for example, meant a "different" social status for their owner. Maybe the designs played a more important role in that respect. There are though a few shapes, for example the zoomorphs and the exotic shapes like scarabs and cylinders, whose owners probably had a higher social status.

Finally the study of shapes can give us useful information on seal manufacture and craft specialisation. The tools and methods used to create sealstones, the differences between earlier and later examples, and what this tells us about the position of the seal-maker will be discussed in detail in Chapter 6. However, we have already seen that the hours of labour invested and the skill shown, especially in manufacturing particular shapes like the zoomorphic seals, is indicative of the existence of craft specialists from the early pre-palatial.

Chapter 5: Motifs-Decorative Syntax-Style groups

The designs engraved on the sealfaces are usually the most impressive part of the sealstone. On the few centimetres of the main seal surface(s) we can find whole scenes and complex designs, human and animal figures, plant forms, geometric designs and sometimes strange representations that do not fall into any of these categories. Also the designs and their style seem to be the most important aspects connected with the meaning and use of seals. Most scholars trying to discover how sealstones were used and how significant they were in every day life, base their assumptions on interpretations of the designs engraved on their sealfaces. The stamping of seal motifs on clay and the creation of sealings for exchange and control of goods, is a powerful reminder that seal designs were meant to convey "information". Could the designs have been equivalent to a signature? Did they represent some kind of authority, title or status? The study of seal motifs, their decorative syntax and the different style groups will follow in an attempt to give some possible answers to these questions.

Motifs

Yule, examining the designs of the early Cretan seals (1980a: 118-176), presented 58 motifs, dating from EMII to MMIII:

Motifs	**Chronology**	**Motifs**	**Chronology**
1. Men		(griffins)	MMII
(heads)	MMII	(Minoan geni)	MMII-MMIII
(full-length figures)	EMI?-MMIII	(miscellaneous)	MMIB-MMIII
2. Goats		18. Miscellaneous	EMII-MMIII

(heads)	MMIB-MMII	19. Leaves	EMIII-MMIII
(entire bodies)	EMIII-MMIII	20. Petaloid-multiple loops	EMIII-MMII
3. Bulls		21. Lilies	MMIB-MMIII
(bucrania)	MMIB-MMII	22. Branches	MMIB-MMIII
(entire bodies)	MMIB-MMIII	23. Tubular drill ornament	EMII-MMIII
4. Deer		24. Tectonic ornament	MMII-MMIII
(heads)	MMII	25. Cross-hatching	EMII-MMIII
(entire bodies)	EMIII-MMIII	26. Centrally radiating motifs	EMII-MMIII
5. Boars		27. Random scratching	EMI?-MMII
(heads)	MM	28. Stars	MMIB-MMIII
(full-length figures)	EMIII-MMIII	29. Cross with "zwickelfullung"	EMII-MMIII
6. Sheep		30. Hatched triangles	EMIII-MMII
(heads)	MMIII	31. Meandroids/meanders	EMII-MMIB
(full-length figures)	MMII-MMIII	32. Interlace	EMII-MMII
7. Lions		33. Dentate bands	EMIII-MMII
(heads)	MMII	34. Ladder ornament	EMIII-MMIII
(full-length figures)	EMIII-MMII	35. Herringbone ornament	EMII-MMII
8. Dogs and wolves		36. Croix pommetees	MMIB-MMII
(heads)	MMII	37. V-cuts	MMIB-MMII
(full-length figures)	EMIII-MMII	38. Swastikas	EMII-MMII
9. Cats		39. Chip carving	EMI?-EMII
(heads)	MMIB-MMIII	40. Aligned borings	MMIB-MMIII
(full-length figures)	MMII-MMIII	41. Zig-zags	EMIII-MMIII
10.Schematic quadrupeds		42. Parallel lines	EMII-MMIII
(lions/dogs)	MMIB-MMII	43. Simple spirals	MMIA-MMII
(miscellaneous)	EMII-MMII	44. C-hooks/C-spirals	EMII-MMII
11. Birds		45. J-hooks/J-spirals	EMII-MMII

(waterbirds)	MMIB-MMII	46. S-hooks/S-spirals	EMII-MMIII
(owls)	MMII-MMIII	47. Zweipasse	EMIII-MMII
(miscellaneous)	MMIB-MMIII	48. Dreipasse	EMIII-MMII
12. Insects		49. Vierpasse	EMII-MMII
(spiders)	EMIII-MMIII	50. Whirls	EMII-MMIII
(bees/wasps)	EMII-MMII	51. Z-whirls	MMIB-MMII
(scorpions)	EMIII-MMII	52. Ships and boats	EMIII-MMIII
13. Fish	EMIII-MMIII	53. Vessels	MMIB-MMIII
14. Crabs	MMIB-MMIII	54. Double axes	MMIA-MMIII
15. Cuttlefish	MMII-MMIII	55. Landscapes	EMIII-MMIII
16. Whorl shells	MMII-MMIII	56. Scripts	EMIII-MMII
17.Hybrid/fantast. animals		57. Miscellaneous motifs	EMIII-MMI
(sphinxes)	MMII	58.Abstracted/pictorialised	MMIB-MMIII

Table 5.1: EM and MM designs and their periods of use, according to Yule

The motifs are arranged into five general categories:

1) Humans and animals (1-18)

2) Plant forms (19-22)

3) Geometric forms (23-51)

4) Miscellaneous objects and scripts (52-57)

5) Pictorialised and abstract motifs (58)

Summarising Yule's analysis, we can see that in EMII, linear ornament seems to dominate. Cross-hatching, radiating motifs, random scratching and crosses with filling are the motifs appearing most frequently. Meanders, interlace, herringbone, swastikas, chip-carving, parallel lines, hooks, spirals and whirls are other designs that appear in this period. Full-length human figures, and

miscellaneous and schematic quadrupeds are the first examples of representational motifs. In the next phases, EMIII and MMIA, full length figures of a variety of animals (goats, deer, boars, lions, dogs) become popular. Insects and fish are also present. Plant designs like leaves and petaloid loops and geometric motifs of all kinds are also popular, and hieroglyphic writing makes its appearance. After MMIB, concentric drill ornament, hieroglyphic A script, and animal heads are the commonest designs, especially on three sided prisms (Yule 1980a: 118-176).

Yule's chronology is based on the dating of the contexts of the seals. Most of them cover a long period, from EM to MM, as there was a tendency to use the same motifs in different style groups and different periods. We should keep in mind that the same motif was stylistically different in each period, for example animal representations in Phase II (EMIII and MMIA) include mostly parades of different animals walking around the border of the sealface, while in Phase III (MMIA and MMIB) the animals are usually pictured alone, inside a single or double border. Cross-hatching is basically used in Phase I, but a few later examples appear, probably as a continuation of an earlier tradition that was not in fashion any more. Spirals appear from EMII and become popular in Phase II, when meanders and whirls are also present. Finally it should be mentioned that scripts do not start in EMIII, but in MMIA, as the few examples from Archanes-Phourni could not be dated earlier than MMIA. Keeping in mind these points, Yule's chronology covers correctly the history of each motif and comprises a reliable chronological base for the researcher.

However, the role of the motifs is a matter that can not easily be studied. As nearly all pre-palatial seals are recovered from cemetery sites and there is no difference in context, it is very difficult to talk about the importance of particular motifs, especially as most of the seals with the same motifs have differences in details, and are not identical. The fact that we have twelve stylistic seal-groups in the period is indicative of groups of people that were related in some way, living in different areas. However, it is difficult to establish the nature of this relationship, whether it is perhaps ethnic or phyletic, or simply based on exchange between sites.

The choice of the design, whether, for example, it would be linear or representational could have something to do with the social status of the owner, his or her occupation, his or her age and sex. If seals, as generally believed, were personal objects, belonging to particular individuals, motifs could be associated with the identity of the owners. Only a very small number of seals are identical in every detail and this fact underlines their connection with individuals. On the other hand the association of nearly all the seals with a small number of stylistic groups, and the small differences among seals of the same group is probably indicative of group identity and representation. Expressions of individuality took place within these group identities, in most cases, and there are only a few examples of seals that can not be incorporated. In this respect the idea that motifs could represent names is difficult to accept, at least with the perception of names that we have in the present. However the use of seal designs, as expressions of individual status and group identity seems quite possible, within limits.

Decorative Syntax

Matz (1928: 169) was one of the first scholars to study sealstones and analysing them stylistically. He distinguished two types of syntax: zonal decoration and surface decoration, the first based on an analytical attitude to the separate parts of the field, resulting in a division of the surface into a system of zones, and the second representing a natural method of decoration, all over the surface.

This was followed by the studies of other scholars, sometimes in a different field, who discussed decorative syntax as an important factor of decoration. Furumark, studying pottery, introduced the terms tectonic and unity (structural) decoration, meaning exactly the same things as Matz 's zonal and surface decoration, but also talked about the four basic principles of Minoan pottery decoration: torsion, radiation, rapport, and outline (Furumark 1941: 112-116). Walberg tried to relate those principles and designs of the MM ceramics with the syntax of the seals, and argued that the combination of shape and design in seals reveals the same principles one finds in the ceramic decoration of the period (Walberg 1985: 404-405).

The same compositional principles in seal decoration (rotation and rapport) were discussed by Biesantz (1954: 26-40), as characterising Cretan seals, contrasting them with the Helladic and Anatolian principles, while Branigan, in his work on pre-palatial Crete (1970a: 137), noticed the appearance of torsion in EMII glyptic, in contrast with pottery decoration, where this principle appeared later.

A complete picture of the basic principles of the decorative syntax of early Cretan seals was again presented by Yule:

1) Rotation: motifs like loops, hooks and spirals have an inherent rotational principle. Other motifs, even human or animal figures can be presented in a whirl.

2) Radiation: motifs issued from the centre to the periphery. Leaves and radiating motifs are most commonly presented in radiation, in the pre-palatial period.

3) Outline: these compositions follow the edge of the field and one can detect an inner and an outer zone. Designs on stamp cylinders and cones or buttons, like parading lions or leaves, are usually presented this way.

4) Segmentation: fields are divided into two or three zones. The divisions are accentuated by a repetition of parallel lines in each field and by structurally contrasting forms.

5) Rapport: rhythmically arranged patterns which extend uniformly and infinitely both vertically and horizontally. Cross-hatching, meanders and leaves are designs that often appear in this way.

6) Friezes: motifs arranged more or less uniformly in the length of a narrow field. Mostly in the proto-palatial period.

Torsion schemes are also usual in three dimensional compositions. (Yule 1980a: 185-188). Yule's presentation of the principles of syntax on early seals covers every aspect and can be characterised as the most reliable up to now. It

describes all the decorative schemes used in this early part of Minoan manufacture and gives a complete picture of these schemes.

Style groups

Archaeologists use the word "style" in many different ways. Some important points will be mentioned here, covering the two major points of view, as a basis for the consideration of style groups that will follow clearer. Sackett (1977) argues that:

a) style concerns a highly specific and characteristic manner of doing something,

b) this manner is always peculiar to a specific time and place, complementing function,

c) style and function together "exhaust the potential of the variability among artifacts".

He believes that an artifact can be regarded from two contrasting but complementary points of view: an active one, as "a thing that was manufactured and used in a succession of activities that made up daily life in a given cultural setting" (function), and a passive one, "as a signpost or banner advertising the arena in which the roles are being performed, therefore specifying a particular historical context". So any type of artifact is dualistic and can present either a functional or a stylistic aspect (Sackett 1977: 370-371).

These views were challenged by various scholars like Conkey (1990: 5-17), Plog (1978: 144-182, 1990: 61-72), Wiessner and Hodder. Wiessner (1983) produced a quite different definition of style. She used it as the formal

variation in material culture that transmits information about personal and social identity (Wiessner 1983: 256). Style was considered to have an active role in society, working in two ways: as emblemic (material culture has a distinctive referent and transmits a clear message to a defined target population), and as assertive (carrying information supporting individual identity). This way, self or social concepts can be communicated to others, consciously or subconsciously, either by individuals or by groups, and in that respect they can reproduce, disrupt, alter or create social relationships. Similarities and differences are presented and used as means of continuation or change. People compare their ways of making and decorating artifacts with those of others and then imitate, differentiate, ignore or in some ways comment on how aspects of the maker or bearer relate to their own social and personal identities (Wiessner 1984: 193-195; 1985: 161).

Hodder (1990: 44-45) also claimed that function cannot be contrasted with style, as both the social and utilitarian functions of an object have style, and the same can be said of the ideological functions. An individual event can have, or create, style, if it is linked to a general, known way of doing things.

Following these lines, seals of the pre-palatial period will be studied in the context of style groups. These groups have been variously identified based on the material, the syntax, the motifs and in some cases the chronology, of seals. How these style groups can be interpreted and what they can tell us about craft specialisation and social organisation, is closely linked to the above views.

Branigan discussed distinctive styles in seal manufacture beginning in EMII:

a) the geometric style, disciplined and based upon the principle of symmetry, with geometric designs and

b) the free style, which is characterised by representational and/or curvilinear motifs which are cut in a fluid and vigorous style, and which the author regards "as very probably of Syrian inspiration" (Branigan 1988: 139).

The free style continues in EMIII, but the figures are deliberately and carefully placed on the surface and do not wander freely on it. The geometric style is scarce in EMIII and MMIA, replaced by abstract and representational motifs, always engraved with symmetry and balance. Agrimi, lions and scorpions are engraved in pairs, or groups of three, four or even more in a small surface (Branigan 1988: 137-141).

Pini (1981) was the first to mention the term style groups, categorising the seals according to design, shape, material and principles and dating them to particular periods. Accepting the fact that chronology by context can only rarely be achieved, he compared stylistically the designs of seals, establishing some stylistic criteria, according to which a number of seals could be dated in EMIII-MMIA (Pini 1981). Wiencke (1981) suggested a separate group for EMIII-MMIA, consisting of the stamp cylinders with triple boring and designs of lions. Both these scholars also discussed syntax, mentioning torsion, rapport and bordered space. The first "sets up a perpetual motion within the boundaries of space. The second, Rapport, denies the boundaries altogether. The last creates a world within the space and suggests for the first time a third dimension, a deliberately man-made and man-contemplated world" (Wiencke 1981: 254).

A more detailed work was conducted by Yule, categorising seals in style groups, meaning "a specific manner of rendering the motifs, that combined secondary criteria of shape/material combinations, iconography, syntax, carving technique and technical quality" (Yule 1980a: 206). He distinguished seven groups for the pre-palatial period:

1) The chip-cut/small plate Signet group, characterised by the presence of triangular chip-cuts. Date: EMI?-EMII. Usual materials: chlorite and serpentine.

2) The Floating Figures group with sinuous and proportionally elongated representations of human figures, that float in the field. Date: EMII-EMIII. Usual materials: ivory and soft stone.

3) The quatrefoil group, with seals of quatrefoil shape with a deeply carved four-sided spiral (vierpass) as seal motif. Date: EMII-MMIA. Usual materials: soft stones.

4) The parading Lions/Spiral complex: lions or other animals, like goats, or insects, like scorpions, parade inside the outline of the field. Spirals and other related motifs typically decorate the reverse side-faces of the seals. Most of the motifs are arranged in outline, but whirling and rapport also exist. Date: EMIII-MMIA. Usual materials: ivory.

5) The Border/Leaf Complex: characterised by deeply incised borders on the sealfaces decorated with homogeneously executed leaves. Date: EMIII-MMIA. Usual materials: serpentine and frit/faience. Scarabs are common in this style-group, showing probably an Egyptian influence.

6) The Platanos Goat complex, with schematically carved goats with deep V-cutting. Only a few examples from Platanos. Date: MMIA-MMIB. Usual materials: serpentine.

7) The Ladder and Spiral group, with ladder ornament and J- and S- spirals. Date: MMIA-MMIB. Usual materials: middle hard stones (Yule 1980a: 206-212).

In MMII Yule distinguishes seven more style-groups, which are briefly mentioned here: the Malia Workshop Complex, the Malia Workshop Subgroup, the Petaloid/Star Group, the Hieroglyphic Deposit Group, the Drilled Lions Group, the Classical Tectonic Group, the Common Tectonic Group, and the Temple Repository Mannerist Group (Yule 1980a: 213-221).

Yule's categorisation is based on design, syntax, shape and material and basically covers most of the important points, but also presents some problems. Firstly it is over-analytical in some respects. For example the "Quatrefoil" group or the "Platanos Goat" complex have only a few seals and in the author's opinion could be incorporated in other, later groups, like the Spiral, or the Ladder/Spiral groups. Secondly it does not take into account a large number of early seals with simple geometric designs, made of bone/ivory or soft stone. These should comprise different style-groups and not be incorporated in the floating figures group. Thirdly it extends the relative period of use for some groups over a long period (for example the Quatrefoil group from EMII to MMIA) but contracts the period of use of other groups (the Border/Leaf Complex probably continues in MMIB).

Recently, Sbonias (1995: 73-121) presented a new, more detailed typology of seals (see Chapter 4) and distinguished a larger number of style groups for the pre-palatial period, with iconographic elements as the basic criteria, relating each of them to particular region(s) and workshop(s). First he distinguishes three general chronological and material groups, attributing a number of style-groups in each:

(a) Groups of bone and soft stone (EMII-EMIII),

(b) Groups of ivory (EMIII-MMIA early),

(c) Groups of bone, white paste, soft stone (MMIA late-MMIB).

In the first (a) he distinguishes:

1) The Cross-hatching/Bone Complex: this group contains seals made of bone, dating in EMII. Most have cross-hatching as the basic motif but some have other forms of simple linear designs. Seals of this group are found in all the closed-EMII contexts in Crete (Lebena, Myrtos, Archanes). Aghia Triadha and Lebena are, according to Sbonias, the possible areas of a workshop for this group, and the seals found in the other sites of the Mesara, the Asterousia or the North and the East of Crete are possibly imports.

2) Group of soft stone seals with Helladic or Cycladic parallels: this group coincides with Yule's "Chip-cut/Small Plate Signet Group", it is dated in EMI/EMII, earlier than the previous one, and is based on the seals from the lower EMI-II level of Lebena tholos II. The seals of this style-group have chip-cuts/depressions as the main seal design and this motif is found in the Cyclades (CMS XI 5 from Kouphonisia, CMS V 476 from Kea) and in the

Mainland (CMS V 35 from Lerna). These contacts with Cyclades and the Mainland were possibly conducted before the period of the House of the Tiles, because Lerna's sphragistic tradition seems different to the contemporary Minoan one.

3) Plain EMII Soft Stone Group: mostly conical and pyramidal seals, with simple linear motifs. They are dated in EMII and are found in all the closed contexts of the period (Myrtos, Lebena, Archanes) and also in other later contexts (Platanos, Malia, Koumasa). As they are found in the lower level of Lebena tholos II, dated in EMI, they are probably earlier than the seals of Group (1) , the bone seals of the period, but they are still used in Archanes in EMIIA and in Myrtos in EMIIB. Sbonias considers this group as equally continuing in south and north, in contrast to the bone seals group (see above), which replaced the soft-stone group only in some locations in the south.

4) Group of the Epomia-seals: the group consists of bone seals in the shape of epomia and concave-convex plates, with linear designs. Sbonias dates this group at the end of EMII, as stylistically it is between the first bone-seals group (1) and the ivory -seals group of the next EMIII-MMIA phase. The tradition of this group is local in Mesara and Asterousia, with Platanos and Aghia Triadha/Phaistos the two most important workshop sites.

Four more style-groups are attributed by Sbonias in the second (b) general group of ivory seals:

1) Meander/Wavy Band Group: linear wavy lines and meanders are the basic designs of this group, dated in EMIII-MMIA early. This group is mainly found in

south Crete and Aghia Triadha is the likely workshop site, according to Sbonias. The fact that there is a great variation between the designs of the group, maybe shows different functional meaning of the seals belonging to the same tradition.

2) Spiral Group: S-spirals, hooks, and C-spirals are the main designs of this group, with rapport the basic decorative principle. The small number of seals from centres like Archanes or Knossos make it difficult to associate this group with particular areas.

3) Lions-Spiral Group: parades of lions, leaves and spirals, fish and rosettes are the basic elements of this group, which coincides with Yule's "Parading Lions/Spiral Complex". Stylistically it is related to the next "Leaves/Ivory Group", especially the leaf designs of the group. Platanos, Marathokephalo, Moni Odhigitrias in the south, and Archanes in the north are the centres with the most numerous examples.

4) Leaves/Ivory Group: leaf motifs are the main element of this group (part of Yule's Border/Leaf Complex). Material differentiates these seals from others made of white paste and others with hieroglyphs (Archanes Script) that stylistically are not far removed and were put in the same group by Yule. Platanos, Archanes and Moni Odhigitrias seem again the main centres of production for this group.

Finally four more groups belong to the third (c) general group of bone white paste and soft stone seals, of MMIA late-MMIB:

1) Leaves/Bone Group: leaves and spirals, double spirals (zweipasse) and three-sided spirals (dreipasse) are the basic designs of this group, continuing the earlier tradition of the leaves/ivory group. Kaloi Limenes, Moni Odhigitrias and Aghia Triadha in the south, and Archanes in the north are the main centres of this group.

2) Archanes Script Group: various hieroglyphic forms, animals, leaves and spirals make up the main designs of this group. As Grumach has shown (1963-64: 346-384; Grumach and Sakellarakis 1966: 109-114) the difference between the Archanes script and the later hieroglyphic script A and B is only chronological. It is not a different script, although there are stylistic differences (e.g. Grumach and Sakellarakis 1966: 112).Clearly Archanes is the centre of production of this group.

3) Group of the White Pieces: various designs characterise this group (see Sbonias 1995: 113-118) mostly inside a border. Moni Odhigitrias and Kaloi Limenes seem to be the basic centres of this tradition.

4) MMIA/MMIB-Soft Stone Complex: this group stands between the earlier Lerna and Cretan tradition and the later Phaistos motifs of sealings. Spirals, wavy lines, whirls are the main designs of the group, which is present mostly in the south, with Platanos the most likely production centre, and Koumasa a possibility (Sbonias 1995: 118-121).

Stylistically all these groups are often characterised by a border engraved around the main design which usually occupies most of the sealface with no or few filling designs.

Sbonias' categorisation is obviously based on designs, but also on date and material. So designs that appear in different materials are grouped as belonging to different style groups, even if they are stylistically close. This approach, which is also apparent in his typology of shapes, is helpful as far as the chronological sequence of shapes and style-groups is concerned, but also creates an unnecessarily large number of different categories in both these aspects, especially for shapes. For example, groups like "Leaves/Bone" and the "White Pieces" could be incorporated in one, as only material differentiates them. Even so designs like the floating figures in early seals seem to be incorporated in the Lion-Spiral Group, although some are early. Also spirals appear from Phase I, and become popular in Phase II, while seals with the motif of concentric circles do not seem, in some examples, to belong to any style group. The study of the Archanes-Phourni material will be pursued taking into account these observations and having in mind both Yule's and Sbonias' categories (which are created from different perspectives but can both be generally applied to the Early Cretan material). However, the Archanes corpus will be categorised according to Sbonias' system, as his style-groups are more detailed and take into account recent material and developments.

The fact that EMII seals are simpler in stylistic terms and more closely related to one another, than the later EMIII, MMIA, MMIB ones, is considered by Sbonias (1995: 128-133) as evidence of simple social organisation in the early phases of EM, based on household, and more complex organisation in the later phases, with social differentiation and hierarchy in the picture. However, this evidence could be interpreted in a different way. The

homogeneity of early seals could result from closer social control on craftsmen, and less freedom of artistic expression. The choice of simple linear motifs could be a matter of fashion and social meaning of these particular designs in the beginning of the pre-palatial period. We should not forget that a small number of seals, especially from Moni Odhigitrias (e.g. CMS VSA Nr. 243, 245) and Archanes (e.g. Cat. Nr. 5, 6, 7) are very carefully modelled in elaborate shapes (e.g. zoomorphic) and with more complex designs (e.g. spirals), in contrast to Sbonias' view of early seals as poorly made.

As seals were artifacts with functional and social, maybe even religious, significance, style is present in all these aspects and cannot be separated from function. The categorisation in style groups help us to study seal manufacture of the period, but can not tell us much about the functional or social meaning of seals.

The importance of a categorisation like this is significant for another reason, related to the existence of a particular period in pre-palatial Crete. Watrous, comparing the designs of the dated EMII seals and later EMIII-MMIA ones, draws the conclusion that EMII seal carving is relatively simple comparing with that in EMIII-MMIA. He does not accept Yule's chronology of Border/Leaf complex in EMIII-MMIA and believes it was later. Also the difficulty in identifying a clear EMIII style group is used as part of the broader argument for the non-existence of this period (Watrous 1994).

This matter was extensively discussed in Chapter 2, where it was argued that materials, shapes, designs and style groups of seals cannot, in the author's opinion, be used as part of any argument against the existence of a

chronological
"ceramic" phase. Arguments based on the simplicity of seals of EMII in comparison with the later ones, cannot sometimes be justified, as elaborate seals, made of ivory or bone, appear in this period, even with simpler designs.

Evidence from Basic Contexts

A presentation of the basic contexts of the three main stylistic phases of the pre-palatial period, based on Sbonias' work will follow:

Phase I: Myrtos Fournou Korifi (EMIIB), Lebena Tholoi II (EMI, lower level) and IIa (EMII, lower level) and Archanes Tholos E, (EMIIA, lower level), are the basic dated contexts of this phase, along with particular tombs in Mochlos and probably the tholos at Krasi (EMI, EMII?). From the Myrtos seals, two have no design engraved on them, two have simple rough hatching, one square hatching and one has marks engraved with a sharp point. They are very simple and belong to Sbonias' (a) 3) Plain EMII Soft Stone Group. Six of the seals from Lebena tholos II, lower level, belong to the same style-group with designs like hatching (CMS IIi Nr 195, 197), radiated lines (CMS IIi Nr 198), irregular cross-hatching (CMS IIi Nr 199), a cross (CMS IIi Nr 200). The other three belong to the second group of the phase (a) 2) having Cycladic or Helladic origin (CMS IIi Nr 196, 202, 203), with wedge-shaped chip-cuts/depressions and grooves as main design. Five seals from Lebena tholos IIa belong to the first group of the phase (a) 1) the Cross-hatching/Bone Complex and have cross-hatching as major design (CMS IIi Nr 210, 211, 213, 215, 216). The other two (CMS IIi Nr 212, 214) are made of soft stone, have also cross-hatching and simple lines as designs, and belong to (a) 3) style group. Krasi also has a bone/ivory seal with irregular cross-hatching, belonging to the (a) 1)

style-group, as well as Mochlos, whose seal is made of bone and has a cross motif.

Myrtos	Lebena tholos II	Lebena tholos IIa	Krasi	Mochlos
hatching	hatching	hatching	cross-hatching	cross
hatching	hatching	cross-hatching		
square-hatching	radiated lines	cross-hatching		
marks made from a sharp tool	irregular cross-hatching	cross-hatching		
	chip-cuts	cross-hatching		
	chip-cuts	cross-hatching		
	chip-cuts	cross-hatching		
	cross			

Table 5.2: Designs from Phase I (EMI?-EMII) closed contexts

Examples from other contexts with EMII material (see Chapter 2) confirm this picture. Mochlos with motifs like cross-hatching (CMS IIi Nr 471), cross (HM 787), human figures (CMS IIi Nr 473, 477), spirals (CMS IIi Nr 472), Sphoungaras with motifs like human figures and crosses with hatching (CMS IIi Nrs 469, 470) is the one area in Eastern Crete represented in this phase, Maronia with crosses and hatching (CMS IIi 422, 423). Krotos (Vasilakis 1983) with linear motifs and S-spirals (HM 2988? and 3015?), Aghia Triadha,(CMS IIi Nr 11, 13, 14, 15/cross-hatching), Koumasa (CMS IIi Nr 143, 144/hatching and cross-hatching), Lebena Tholos Ia (CMS IIi Nr 171/cross-hatching),

Marathokephalo (CMS IIi Nr 232/cross-hatching) and Platanos (CMS IIi Nr 266/linear motifs), Porti (CMS IIi Nr 364/irregular cross-hatching), Siva (CMS IIi Nr 372/cross-hatching), Moni Odhigitrias (CMSV SIA Mitsotakis Collection),(CMS V SIA Nr 226-235/all with simple linear motifs and hatching) and Kaloi Limenes (Metaxas Collection), (CMS IV Nr 13/linear motif) present a uniform picture of this phase in Mesara and Asterousia.

Two sealings from Palaikastro (HM 4805 and 4814), (Hutchinson *et. al.* 1939/40: 49; Dawkins 1903/4: 198; Warren 1970: 31 and Yule 1980: 9) also come from EMII contexts, with motifs such as hatching and spirals, as well as two from Knossos (Wilson 1984), probably Cycladic, with spirals and concentric circles.

Phase II: The tombs from Mesara and Asterousia are the basic contexts with material from this phase. Wavy-bands, meanders, S-and C-spirals, hooks, parades of animals, insects, leaves, rosettes and geometric designs like whirls, zig-zags, herring-bone and dentate bands are common designs in this phase.

Aghia Triadha has a large number of these designs: meander (e.g. CMS IIi Nr 16, 60, 62), regular cross-hatching (e.g. CMS IIi Nr 20), C-spirals (e.g. CMS IIi Nr 25), S-spirals (e.g. CMS IIi Nr 36,37), leaves (e.g. CMS IIi Nr 44), animals in parade (CMS IIi Nr 51, 52), wavy lines (e.g. CMS IIi Nr 64-65). Kalathiana, with meander, S-spirals, wavy lines, animals and geometric designs (e.g. CMS IIi Nr 123-128) confirms this picture. Koumasa, the majority of whose seals belong to this phase, presents the same designs (e.g. CMS IIi Nr 133-142), as do Lebena, Marathokephalo and Platanos on a lesser scale (e.g. CMS IIi Nr 194, 207/ CMS IIi Nr 222-231/ CMS IIi Nr 241-245, 248-256,

respectively). Kaloi Limenes (e.g. CMS IV Nr 1-5, 34, 41) and Moni Odhigitrias (e.g. CMS V SIA Nr 252, 263, 264, 280) also present the same designs - meanders, lions, leaves, wavy lines, spirals.

Gournes (CMS IIi Nr 396, 398-400/parading animals, spirals, leaves), Trapeza, (CMS IIi Nr 435-442/crossing and wavy lines), Viannos (CMS IIi Nr 445,446/cross-hatching, fish, human figures), Mochlos (CMS IIi Nr 472-474/S-spirals, kynokephaloi, insects), and Palaikastro, (CMS IIi Nr 481,482/goats and lions, regular cross-hatching) are the few sites outside the Mesara that contribute to the general picture.

Phase III: This phase is characterised by the emergence of white paste as a new material. Soft stone and bone become popular again, the designs engraved on them are more or less the same: stylised single animals and figures, linear and architectural designs, circles, leaves, spirals, three- and four-sided spirals (drei and vierpasse), rosettes, usually inside a border, occupy the sealface as main designs. Hieroglyphs also appear for the first time in Archanes.

Four sided spirals (vierpass), linear bands, rosettes, single animals, volutes, spirals, lines and triangles, are all designs which appear in Aghia Triadha (e.g. CMS IIi Nr 82, 84-86, 88-90). Aghios Onouphrios also has the vierpass, C-spirals, sterns, stylised figures, circles and linear designs (e.g. CMS IIi Nr 104, 107-120). A few steatite and white paste seals from Koumasa (e.g. CMS IIi Nr 145, 146, 148/human figures, linear designs) and Lebena (e.g. CMS IIi Nr 181, 189, 190/spiral hooks, whirl with a middle dot, S-spiral in a double border), also belong to this phase, as well as the majority of seals from

Platanos tholos B (e.g. CMS IIi Nr 267, 268, 270, 271, 273, 275, 279, 289/spirals, dentate bands, rosettes, circles, volutes, leaves). Kaloi Limenes (CMS IV) and Moni Odhigitrias (possibly Mitsotakis Collection-CMS V) present a large number of seals with the same designs, confirming the picture for Mesara and Asterousia.

Finally, considering the palatial and urban centres, Malia and Phaistos (CMS IIi Nr 409-420 and 423-426 respectively) are the sites represented in this phase. Spirals, rosettes, depressions, animal figures in Malia, and linear designs in Phaistos consist the iconography of these seals, quite different between the two sites. Gournia (CMS IIi Nr 467, 468) is the only site from East Crete represented in this phase.

All the motifs mentioned above, in the discussion of the three phases, along with materials and chronology, categorise the seals of the period in twelve style groups. For a detailed catalogue of all the published seals belonging to each style group see Sbonias 1995: 74-121.

Style groups and Sites

The association between style groups and sites is very important, as it may show us patterns of sealstone use, and possible production sites. As explained elsewhere (see Chapter 3), the seals presented in this thesis' catalogue originate basically from the CMS. The great majority of pre-palatial sealstones are included, and more importantly seals from all the basic contexts are present, so that a complete picture can be presented.

The data base created for this reason contains 930 seals from various contexts. The distribution of the most important style groups in the most important sites is shown in Appendix J (plates 1-17).

Correspondence analysis was applied to this data set in order to investigate any associations between the two variables particular style groups and sites. The mechanism of this analysis is explained in Chapter 3. Apart from the 12 style groups mentioned above, 6 more groups were included: one for all the seals with Concentric Circles as motif (13), one for the Indistinguishable ones (14), one for the Imported (15), one for Later pieces (16), one for seals that belong to none of the above groups (17) and one for seals belonging to any of the first 12 groups, but were later in date (18), because of the method of manufacture (see Chapter 6). Twenty-one sites (also mentioned in Appendix K) were also included in the analysis. The result shows that there is positive association between certain style groups and sites.

Looking at Graph 1, 2, and 3, and Table 1, one can observe certain groups of association. Style group Nr. 7 (Meander/Wavy Band Group) seems to be associated with sites Nrs. 1 (Aghia Triadha) and 3 (Kalathiana). Style groups Nrs. 2 (Cross-hatching/Bone), 4 (Epomia) and 10 (White Pieces) can be associated with site Nrs. 7 (Porti), 9 (Lebena), 10 (Kaloi Limenes), 11 (Moni Odhigitrias) and 15 (Viannos). Style groups Nrs. 3 (with Cycladic/Helladic Parallels), 11 (Archanes Script), 14 (None/Undistinguishable) and 16 (None/Later) are associated with site Nr. 21 (Archanes). Finally style groups Nrs. 1 (Plain EMII Soft Stone) and 12 (MMIA/MMIB Soft Stone) can be linked

to sites Nrs. 2 (Aghios Onouphrios), 4 (Koumasa), 14 (Knossos) and 20 (other sites), and less with site Nrs. 5 (Platanos), 8 (Siva) and 12 (Trapeza).

Correspondence analysis was also applied to a more restricted set of data, which included the basic 12 style groups and seven sites (for a catalogue of these style groups and sites see Appendix L). The results were clearer, as shown in Appendix L, Graphs 1, 2, 3 and Table 1. Style group Nr 12 (MMIA/MMIB Soft Stone) is clearly associated with sites 2 (Koumasa) and 3 (Platanos). Style group Nr. 10 (White Pieces) is linked to site Nr. 5 (Kaloi Limenes) and 6 (Moni Odhigitrias), and style groups Nrs. 1 (EMII Soft Stone) and 7 (Meander/Wavy Band) to site Nr. 6 (Moni Odhigitrias), in a lesser scale. Style group Nr. 2 (Cross-hatching/Bone), is associated to sites Nrs. 1 (Aghia Triadha) and 4 (Lebena), and Nr. 11 (Archanes Script), 8 (Leaves/Ivory), 6 (Spiral) and possibly 9 (Leaves/Bone) with Nr. 7 (Archanes). The rest of the style groups (4, 5) and particularly 3, do not seem to be associated with particular sites.

We can conclude that there is a positive association between particular style groups and sites. This pattern may be explained in two ways:

Firstly we could talk about possible production sites, specialised in particular style groups, and then distributing their products in other areas. The association of a particular style group with a number of sites could certainly be explained in these terms. For example white pieces might be produced near Kaloi Limenes and/or Moni Odhigitrias, where they exist in large numbers, and then be distributed to other sites, in smaller numbers.

Secondly we should keep in mind that seals of the same style group present stylistic differences, that allow us to consider them as creations of different workshops. This means that seals of the same style group could have been produced in more than one workshops. Also, the association of seals and sites is based only on consumption patterns. It is possible that the production sites were not near the above sites, where the seals were used.

Looking at the distribution of the different style groups in various sites in Crete (Appendix J) we can detect further relationships between sites that are not clearly obvious from the correspondence analysis. For example the Lion-Spiral Group seems to be present in Archanes and Platanos in larger numbers than in other sites, while this is not the case with the Meander/Wavy Band Group which is scarce in these two sites. The same can be observed with regard to the Leaves/Ivory Group which is mostly present at Archanes, Moni Odhigitrias and Platanos and is extremely scarce in other sites. It is possible that this distribution is indicative of phyletic or other relationships between these sites in the pre-palatial or it could just mean that contacts and exchange were more developed between these sites.

Associations between different style groups and particular tombs in cemeteries were also examined. The distribution of style groups in different tombs in Koumasa, Platanos and Lebena is shown in Appendix M, Tables 1-3. Again, correspondence analysis was applied to these cases, and the results are included in Appendix N. Tables 1 (Koumasa) and 2 (Platanos), show that this method can not be used for these two cemeteries, for various reasons. The main ones are that only two tombs are compared in each case, with

different numbers of seals and different chronology. On the contrary, in Lebena, correspondence analysis presented us with useful results (Graph 1, and Table 3). The EMII Soft Stone Group seems to be associated with Tholos II, and the same is true for the Group with Cycladic/Helladic parallels. The Leaves/Bone and MMIA/MMIB Soft Stone groups are associated with Tholos IIA, and the Cross-hatching/Bone Complex (and possibly the Spiral Group) is associated with Tholos I. This could mean that particular groups of people, buried in different tombs, used seals of different style groups during life, and may have had their own manufacturer or sources of seals and materials. The examination of the seals from Archanes-Phourni and their distribution in the different tombs will follow, in an attempt to make the situation clearer.

Motifs and Style groups in Archanes-Phourni

Phase I: Eight seals from the lower level of Tholos E, belong to this phase. Three of them (Cat Nr 1-3), made of steatite, have simple linear designs, such as irregular cross-hatching, cross, and a parallelogram, and belong to Sbonias' "Plain EMII Soft Stone Group". Cat Nr 4 has wedge-shaped chip-cuts/depressions as a design, and belongs to the "Group of soft stone seals with Helladic or Cycladic parallels" group. The other four seals (Cat Nr 5-8) are made of bone and hippopotamus ivory, with cross-hatching, C-spiral and linear rapport as designs, and belong to Sbonias' "Cross-hatching/Bone Complex". The design of Cat Nr 8 is not preserved.

Six more seals from Phourni can be dated in this phase, based on the closed context of Tholos E (Cat Nr 9-14). Two of them, coming from the area south of Burial Building 19 and the Area of the Rocks, are made of soft stone

(Cat. Nr. 9, 14) and are decorated with a simple linear design, and cross-hatching respectively ("Plain EMII Soft Stone Group"). Two more, (Cat. Nrs. 10, 11), from the lower level of Tholos C, are made of bone/ivory and hippo ivory, and decorated with regular cross-hatching and a geometric design respectively (Cross-hatching/Bone Complex). The last two (Nr 12, 13) present the Helladic or Cycladic chip-cuts/depressions ("Group of soft stone seals with Helladic or Cycladic parallels").

Tholos E	Area south of BB 19	Tholos C	Area of rocks	BB 5	BB 6
parallelogram cross	simple linear design	regular cross-hatching	irregular cross-hatching	chip-cuts/ depress.	chip-cuts/depr. (triangular)
irregular cross-hatching		geometric motif			
irregular cross-hatching (3)					
wedge-shaped chip-cuts					
C-spirals					
continuous design/rapp.					

Table 5.3: Designs from Phase I, Phourni-Archanes

What we see here is a rather restricted repertoire, that is in contrast with the use of hippopotamus ivory and the rather elaborate shapes in Phourni (see Chapters 3, 4, Materials and Shapes). The only more complex design is the C-spiral, which is not common, but evidently not unknown in this phase in Mesara. Spirals seem to be more common in this early phase than was

previously thought, as they appear in a number of early contexts (Archanes, Mochlos). Cycladic influence is possible concerning this point, as spirals are quite common in the small number of early Cycladic seals we have, and are a common motif on contemporary Cycladic ceramics.

Phase I-II: Fourteen more seals from Phourni could be dated to Phase I, but this chronology is problematic, as most of them come from later contexts and stylistically the situation is not as clear as in the previous cases.

Tholos C	BB5	BB6	BB9	Bet. BB 8 and 9	BB12	BB18	Bet. BB 18 and 19	Area of Rocks
leaves leaf	cup sink.	cross hatc. irreg. cross-hatc.	hatch.	regul. cross -hatc.	lines, curv. (roset)	regular cross-hatch.	lines, curv.	irreg. cross-hatch. irreg. cross-hatch.
lines in section	cross-hatc.							lines, X-shap.
lines, vertic.								
corners lines, curved								

Table 5.4: Designs from Phase I-II, Phourni-Archanes.

The first four of these seals come from Tholos C (Cat. Nr. 15-18). Nr. 15 is made of ivory and comes from the lower level of the tholos, but stylistically belongs to the next tradition, as it is decorated with leaves on both sealfaces (Leaves/ Ivory Group, see Sbonias 1995: 99-102). Nr. 16, made of bone and

decorated with lines in four sections, presents the opposite problem. It comes from the upper level of the tholos but is stylistically closer to the previous tradition (Cross-hatching/Bone Complex). Finally, Nrs. 17 and 18, both made of bone, are decorated with parallel lines and lines and corners respectively, and can not be dated with certainty on stratigraphic grounds (Papadatos, pers. comm.). Stylistically, they belong to the tradition of Phase I.

Two more bone seals from Burial Building 5 (Cat. Nrs. 19, 20), with cup sinkings and cross-hatching on their sealfaces, are probably earlier pieces from a later context (Group with Cycladic/Helladic parallels?, and Cross-hatching/Bone Complex). The same could be said for two hippopotamus ivory seals, decorated with cross-hatching and hatching respectively, from Burial Buildings 6 and 9 (Cat. Nr. 21, 22), two bone seals from the areas between Burial Buildings 8 and 9 (Cat. Nr. 23) and 18 and 19 (Cat. Nr. 26), with cross-hatching and linear designs, and four seals made of boar's tusk (Cat. Nr. 24, 25, 27, 28) from Burial Buildings 12, 18, and the "Area of the Rocks", which are decorated with curved lines, regular cross-hatching, a linear motif and irregular cross-hatching, respectively.

Phase II: Thirty-three seals from the cemetery (Cat. Nrs. 29-61), that belong to this phase, come from various tholoi and burial buildings. The majority of these seals are made of hippopotamus ivory and according to their design belong to the three main style-groups of this period: the "Lion-Spiral Group" (Yule's "Parading Lions/Spiral Complex"), the "Spiral Group", and the "Leaves/Ivory Group". Seals Cat. Nr 30, 32, 33, 34, 37, 41, 43, 48, 50, 51, 52, 59 belong to

the first group, Cat. Nrs. 35, 36, 42, 44, 45, 47, 58, 60, 61 belong to the second group and Cat. Nrs 29, 31, 39, 40, 46, 49, 53, 54, 57 to the third group.

Tholos C	BB 5	BB 6	BB 7	BB 9	Tholos E	BB 16	BB 18	BB 19
leaf	lions' parade scorpion	leaf wild goats' parade	scorp. (3)	leaf S-spiral, triple	lions' parade spirals	leaves and semi-circles	fish, three geom. design (sun?)	S-spiral spirals and leaves
leaf and line fish, three	quadr. parade of scorp.	S-spirals in whirl leaves in whirl	leaves spirals	leaf and lines		human figure with vessels spiral hooks and depres.	leaves in whirl polygon	lions parade two quadrup (wild goats?)
rosette		S-spirals branch	human figures and anim. C-spirals in whirl	contin. S-spiral		animals spirals	barley? seed and depress. butterfly and triangles	S-spirals
		human figures S-spirals forming a square	C-spirals				concen. bows	C-spirals leaves and S-spirals
		spiral whirl and leaves					striped ellipsis leaves?	
		rosette and leaves					striped leaves	
		curved lines/ leaves						

Table 5.5: Designs from Phase II, Phourni -Archanes

Quadrupeds, lions and wild goats are presented walking around on the edge of the sealface with filling designs in the centre. Scorpions (either one, two or three) dominate the sealface, covering most of it, usually in a row. Spirals and leaves cover the sealfaces in a variety of combinations with lines, triangles, and depressions. Some of the seals have both animal parades and leaves, or spirals and leaves and could belong to more than one style-groups.

Two other interesting points arise in this assemblage. First, the use of bone and steatite in this phase, on rare occasions, and the appearance of two seals (Cat. Nrs 58 and 60) belonging to the "Spiral Group", made of steatite and bone respectively and not ivory. This suggests that Sbonias' chronological sequence of materials can not be applied everywhere and there are exceptions, at least in Phourni-Archanes. Secondly, there do not seem to be any seals of the "Meander/Wavy Band Group" in Archanes (with one exception of later date), in contrast with sites in the Mesara like Aghia Triadha, where this group is present in large numbers. Two of the seals of this phase (Cat. Nr. 55, 56), present linear motifs, with curving lines, are stylistically close to the seals of the "Meander/Wavy Band Group", but they cannot be incorporated in any of the style groups of the phase.

Phase II-III: Three zoomorphic seals with a double leaf and a hatched corner (Cat. Nr. 62), an unrecognisable motif (Cat. Nr. 63), and six circular depressions with two lines (Cat. Nr. 64), respectively, could belong to either of these two phases. There are not enough diagnostic characteristics to help us date them more precisely.

Phase III: The majority of seals from Phourni-Archanes belong to this phase (Cat. Nr 65-119).

BB 3	BB 5	BB 6	BB 7	BB 9	Area bet. BB8 and 9
rosette hierogl.	Syrian priest	quadrupeds human figures plant designs hieroglyphs (all in 14 faces)	vertical and rectangular grooves	fish, three	parallels striped triangles
leaves and depress. hierogl.	human with vessels spirals (on four seal faces)	hieroglyph quadruped	unrecog.	regular cross-hatching	wild goat
spiral leaf		hieroglyp. (three faces)	concentr. circles (on three seal faces)	leaves	quadruped
		hieroglyp. (two faces)	cross and lines	S-spiral and triangles	S-spirals and rosette S-spirals and leaves
		leaves and bows inside a double border	lines, small	leaves	concentric circles (three seal faces)
		Egyptian: pair of tete-beche dogs or goats?	S-spiral hieroglyph	S-spiral	dog
			unrecog.	concent. circles	
			spiral and corners		
			whirl and rosette		
			C-spirals		

Tholos E	BB 16	BB 18	Bet.18 and 19	Sout. of Thol. E	Tourkogeitonia
cross and beams	dots	triangles and grooves	unrecog.	curved lines	S-spiral and leaves
striped triangles	leaves and spirals	dog and cross			
architectur. motif of groups of lines	concentric circles concentric circles	unending spiral 8-shaped design with rosettes			
geometric motif, in zones	concentric circles	crosses, concentric circles and depress. leaves			
double axe schematic rosette		architect.: rosettes and lines			
unending spiral meander		leaves and lines			
S-spiral S-spiral					
linear: triangles and lines inside a border					

Table 5.6: Designs from Phase III, Phourni-Archanes

Some of the seals of this phase that are made of bone (and five examples of hippopotamus ivory, and one of boar's tusk) belong to the "Leaves/Bone Group" (Cat. Nr 67, 83, 88, 89, 90, 91, 93?, 106, 113, 114, 115, 116, 118?, 119) with leaves and spirals as basic designs (Yule's "Border/Leaf Complex"). Also some white pieces belong to the "Group of White Pieces" (Cat. Nr 84, 100, 102, 108), with a variety of designs, many of which are engraved inside a single or double border. A number of seals belong to the "MMIA/MMIB Soft Stone Complex" (Cat. Nr 76, 77, 78, 79, 86, 101, 103, 107, 110, 112) again with a variety of linear motifs -geometric and simple linear, concentric circles, grooves, crosses. Finally some of the seals of this phase belong to the "Archanes Script" style group, with hieroglyphs, leaves, animals and spirals as basic designs. These seals are made of bone/ivory or even steatite (Cat. Nr 65, 66, 70, 71, 72, 73, 81, 94?, 95?, 98?, 104) and the designs are usually inside a single or double border. The three seals with single animals as major design (Nr 94, 95, 98) should be put in this group with caution. Spirals, rosettes, leaves, quadrupeds, plant-designs, and human figures in combination with hieroglyphs like the sistrum, the double axe, vessels and various others geometric ones like striped triangles, elongated sticks? or spears and other combinations of linear motifs, are the basic designs of the new "Archanes Script", which is not literally a script but the first use of hieroglyphic signs carrying some kind of meaning, that became popular later and led to the hieroglyphic script of the Phaistos disc.

A few important points should be noted:

1) Ivory seals that belong to the "Leaves/Bone Group" show that ivory was more in use in this later phase than was previously believed, though it is still a minority material.

2) Seals that belong to the "Leaves/Bone group" and the "Group of White Pieces" have few stylistic differences, and only material differentiates them, so it might be suggested that they compose one style-group.

3) There are two ivory seals that can not be included in any of these groups, and stylistically belong to the previous phase. These seals though are later because their manufacture requires the use of the lathe (Cat Nr 96, 105). They belong to the "Meander/Wavy Band Group" and the "Spiral Group" of the previous phase continuing the previous tradition.

4) The motif of concentric circles becomes very popular in this phase, on seals of all materials, either as a single motif or along with leaves. Seals with concentric circles are included in the "MMIA/MMIB Soft Stone Complex" and in the "Group of White Pieces". There are also four examples in hippopotamus ivory: three (Cat. Nr 106, 113, 114) have concentric circles and leaves, so they are incorporated in the "Leaves/Bone Group". Another (Cat. Nr. 109) has only concentric circles so it is not assigned to any of these groups, as well as Cat. Nr. 92 and 97, made of bone. These seals may have had a different meaning, and compose a separate group.

5) A small number of seals from this phase are made of bone/boar's tusk and are decorated with linear designs, like cross-hatching, which are carefully organised in a "tectonic" way (Cat. Nr 87, 99, 111). These sealstones seem to

continue a tradition of linear designs on bone/ivory that begins in the early stages of EMII and goes on throughout the pre-palatial period until the beginning of the first palaces. They are put in this phase because of stylistic details and because of the context.

6) Three of the seals seem to be of foreign origin (Cat. Nr 69, 75, 85). The first, the Syrian cylinder, has the design of a priest or king, the other two, which are scarabs, have a linear Egyptian design (pair of "tete beche" dogs or goats?) and a C-spiral respectively. The last one may be either a Minoan design or be an import (see Warren 1970).

7) Finally, three more seals (Cat. Nr. 80, 82, 117), are only partly preserved, and their motifs are not recognisable. A combination of material and shape dates them in this phase.

Phase IV (Proto-palatial): A small number of seals belong to this phase, coming mostly from Burial Building 18 and Tholos E (Cat Nr 120-128).

BB 5	BB 6 and around it	Tholos E	BB 18
depressions (leaves?) spiral	quadruped rolling motifs quadruped and S-spiral	architectural: linear design	branches
	lines and dots triangles	architectural: linear design	architectural: linear design
		architectural: linear design	
		architectural: linear design	

Table 5.7: Designs from Phase IV, Phourni-Archanes

These seals are distinctive mostly because of their material, which is mostly hard stone. One (Cat Nr 121) is a three-sided prism that stylistically is close to the Malia workshop examples. Architectural-tectonic motifs become very popular, carefully and elaborately made, creating complex and beautiful designs on hard materials.

Clay sealings: Eight early clay sealings were discovered at Archanes (Cat Nr 129-136). Two of them (Nr 129-130), from Burial Building 18 and Tourkogeitonia, are in the shape of a cone and their designs were two opposite human figures, and four walking lions around two opposite and antithetical human figures respectively. Both designs are stylistically early (Phase II) but the contexts are later, especially for the second one that comes from the palatial building.

Four more sealings were stamped on the handles of burial vessels (Cat. Nr 131, 133-135), the last three made from the same seal on the same coffin. The designs are not recognisable: in the first only a few dots are preserved, in the other three wavy lines in pairs, but only faintly visible. Finally, one more sealing was discovered in Aghios Nikolaos (Cat. Nr. 132), with the motif of the four-sided spiral (vierpass), and one more (Cat. Nr. 136), from Phourni again, probably stamped by a later three-sided prism has an animal to the right, probably a dog, with its head turned back. The seal was naturalistically engraved and the dog is reminiscent of the Malia Workshop animals.

Style groups, tholoi and burial buildings in the cemetery

The distribution of different style groups in the tholoi and burial buildings of Phourni is very important (Appendix O, Tables 1-13), as it could provide us with useful information about patterns of use in the cemetery and different style groups. Correspondence Analysis was applied to this set of data, as shown in Appendix P, Graphs 1, 2, 3 and Table 1. A catalogue of the 12 basic style groups and six more (see page 135), as well as the 13 tholoi, burial buildings and areas of the cemetery are included in this Appendix.

The analysis provides us with some useful and important results. The Soft Stone EMII Group (1) seems to be associated with the lower level of Tholos E, as well as the area of the rocks, and the same is true for the group with Cycladic/Helladic parallels (3). However, this can be explained in chronological terms, as these two groups belong to the first phase, and the seals from these areas are early. Cross-hatching/Bone Complex (2) seems to be associated with Tholos C, although examples appear elsewhere. The Group of White Pieces (9) and the MMIA/MMIB Soft Stone Complex (11) could be linked mostly to Tholos E, upper level, and Burial Buildings 7 and 16, while the Lion/Spiral (4) and the Spiral (5) groups seem to be associated with the above buildings and Burial Building 19. The rest of the style groups and burial buildings present no clear associations. The Archanes Script Group, the Leaves/Bone and Leaves/Ivory groups, the Meander/Wavy Band Group and the None/Concentric Circles Group could be linked to Burial Buildings 3, 6, and 18 as well as the area between 8 and 9. From the rest of the style groups, None/Undistinguishable, None/Imported could be associated with Burial

Building 4 and None/Later and None with Tholos E, upper level, Burial Building 16 and Burial Building 19.

We could conclude that there seem to be certain associations between particular style groups and tholoi or burial buildings. This probably means that particular groups of people, were buried in the different tholoi and buildings, and that each of these groups used seals of a restricted type only. Of course we should not forget that at least a few examples of nearly all style groups appear in all the tholoi and burial buildings. However, only some appear in considerable numbers in every tholos or burial building.

Conclusions

The examination of designs gives us the opportunity to raise interesting points concerning trade, chronology and seal use in this period. The existence of foreign shapes and designs (the Syrian cylinder with the motif of the priest, the two scarabs, one certainly with an Egyptian design) are indicative of contacts between Archanes, and Crete generally, and Egypt and the East. This is supported by the use of a foreign material, like hippopotamus ivory, and the motifs of foreign animals (lions? and apes) that are engraved on seals, or used as models for zoomorphic seals. The ship engraved on a seal from Platanos (CMS IIi Nr. 287) provides further evidence that the art of navigation was already developed (Betts 1973: 325-338) in the pre-palatial period.

A comparison of the Lerna sealings, which have certain Cycladic affinities, with the early Cretan seals shows a difference in perspective. As Wiencke (1981: 255-260) and Schiering (1981: 189-192) showed, the sealings

from Lerna are more related with the later Phaistos sealings than the earlier seals. Meanders and spirals are found of course from EMIII-MMIA, but the whole approach is different: in Lerna the designs are centrally organised, while whirl and rapport characterise the Cretan examples. So, it is not possible to argue a Cretan origin for the Lerna sealings, but contacts between Crete and the Mainland seem to be certain. The seals with Cycladic/Helladic parallels, from Phase I, Cat. Nrs. 4, 7?, 12, 13 and possibly 19, are a strong indication of this point.

The seals from Phourni-Archanes also give us information on the chronological succession and style-group classification of seals. In the first phase the designs are very simple, mostly irregular linear motifs, unlike more elaborate shapes and materials being used and made in this phase. The Archanes seals seem to be integrated in the three main style groups that Sbonias suggested for EMII. In the second phase, quadrupeds in parade, especially lions and wild goats, leaves and spirals, human figures and striped triangles are the basic designs, engraved on hippopotamus ivory seals. The four stylistic groups, presented by Sbonias, are composed only of ivory seals, but bone and steatite are still used in these groups, albeit rarely. Also, seals made of ivory that carry simple linear or geometric designs continue the tradition of the earlier period or extend the period of use for the "Cross-hatching/Bone Complex" in the second phase, using also ivory as material. In the third phase, bone, white paste and soft stone seals with leaves, spirals, and geometric designs respectively dominate the picture. Hieroglyphs and the "Archanes Script" also appear, exclusively in Archanes, the first step for the

later hieroglyphic script. Ivory is still used in this phase, either in the style groups attributed to it, or continuing previous traditions. Seals with geometric designs made of bone, boar's tusk, or hippopotamus ivory are also still found, showing that simple linear designs never disappeared from the repertoire of the seal manufacturer.

The motif of concentric circles becomes very popular in all style groups and could compose a separate group. Also, the stylistic similarities of the "Leaves/Bone Group" and the "Group of White Pieces" show that they could compose one group with the use of both materials. Foreign shapes and designs (scarabs and cylinder) are common in this phase.

What can the study of the designs tell us about the use of seals? First of all, the designs from the simple linear ones to the complex representations of animals and human figures, combined with the shape and the material used, contribute to the role of a seal as ornament, though the small size of the artifacts is indicative of the fact colour and shape played the most important role in this perspective.

The amuletic use of the seals is another important aspect. Designs like scorpions, lions, wild goats, and other quadrupeds, human figures and various plants and leaves could have had a double meaning. Firstly, the designs could be prophylactic for the owner of the seals against scorpion or snake bites, and for the survival of domestic or even wild animals and crops (see Cat Nr 54 with the design of a barley seed). Secondly, the designs could be a way to possess powers characteristic of these animals. In later periods, designs like the scorpion, the wild goat, and symbols like the double axe, sacred horns, animals

and plant symbols, insects, fish, and birds are considered as talismanic (Onassoglou 1985: 82-123; Kenna 1969a: 27), so, an amuletic meaning of earlier examples is a possibility (see Chapter 9).

The most important aspect though of the use of seals seems to be the social one. It is difficult to determine if designs played any particular role in the social usage of sealstones. As has already been discussed, nearly all seals were found in the same funerary context, with nothing to suggest a different social meaning for particular shapes or designs. However the choice of the design could have been important with regard to identity. An anthropological study of remains accompanied by seals, especially when these were found inside clay coffins, could possibly point to some answers in this respect. Also foreign shapes and designs or imported seals from the Cyclades or the Mainland could betray a higher social position for their owners, as prestige items (more detailed discussion in Chapter 10).

Phourni provides us also with some useful patterns of style group use. For example the use of the Plain EMII Soft Stone Group in Tholos E and the Cross-hatching/Bone Complex in C, in EMII, or the use of the Group of White Pieces and the MMIA/MMIB Soft Stone Complex, in Tholos E, upper level and Burial Buildings 7 and 16, later in phase III. Also, the Lion-Spiral and the Spiral Groups seem to be associated with the above buildings and Burial Building 19. The Archanes Script group, the Leaves/Bone and Leaves/Ivory groups could be linked to Burial Buildings 3, 6, and 18 as well as the area between 8 and 9. It would be of particular interest, if this patterning was associated with groups in the community. If we compare these results with patterns of material use

(Chapter 3), it seems possible that different groups of people in the cemetery, used particular types of seals and were buried in different tholoi and burial buildings. The study of the skeletal material from the tholoi (as the one for the material from Tholos C that is already under way) could provide us with more information about these groups. The number of the dead, their sex and age, as well a possible DNA analysis (currently under discussion, again for material from Tholos C), could give us useful information on the contributing groups, concerning families, extended families or larger units like "geni" (see Chapter 10).

Finally designs, along with shapes and materials, give us useful information on seal manufacture and craft specialisation. The detailed engravings of such small surfaces, the impressive naturalistic representations, combined with the time needed for such an accomplishment are indicative of specialists. The comparison of earlier and later examples shows the development of the craft and sometimes demonstrates the use of new tools and techniques.

Chapter 6: Manufacture and Craft Specialisation-Internal Exchange

The variety and the quality of craftsmanship that pre-palatial seals show is impressive. The tools and manufacturing techniques that seal-makers used from EMII to MMIB-MMII, in order to work with different materials like ivory, bone, white paste, soft and hard stones will firstly be discussed in this chapter. Another important issue concerned with manufacture is that of craft specialisation. Is it possible to talk about specialist seal engravers in the pre-palatial period and if so what might have been their status in society? The methods of manufacture give us information on the technology of the period, and reflect the craftsmen's abilities. This, in turn, is relevant to the question of specialists, and the identification of possible workshops. Aspects such as access to materials, exchange of seals between regions and between sites on the island, and the social significance of seals are all clearly connected to the above. With these questions in mind pre-palatial seals, and especially those from Phourni-Archanes, will be examined for the evidence they yield for technology and craft production.

Manufacture

According to Yule a variety of techniques was used to fashion early Cretan seals. Pre-palatial ivory seals show incisions of non-rotary instruments, but for soft stone a drill appears to have been in use, the slow hand-held drill that creates uneven and sometimes eccentric holes (Yule 1980a: 200-201).

Krzyszkowska (1983) discussed the manufacture of the elaborate ivory seals in greater detail. Generally manufacturing methods were simple, involving sectioning and cutting, rather than elaborate carving. The simplest shapes, plain cylinders, hemispheroids and some conoids, are made from hippopotamus incisors. Probably the cementum was removed with abrasion, as the concentric lamellae often correspond closely to the shape of the sealfaces. With more elaborate shapes like signets or rings some shaping or carving was involved but the shape is still close to the original transverse tusk section. This is also true for larger conoids and some zoomorphs, but with some elaborate zoomorphic seals and the fine ivory cylinders, true seal carving is evident. This involved first cutting a rough shape from the block of ivory, then carving the piece in the round, before drilling for stringholes and engraving the sealface(s) and finally smoothing away most, if not all, traces of manufacture with a series of abrasives (Krzyszkowska 1983: 165).

This process is described in more detail by Evely (1993). Soft stone blanks were worked with knives, saws and abrasive blocks and powder to regulate the final contours. Probably the seals originally had crisp angles, obliterated later. Blade and point were used for the excision of these framing lines as the scratching on the sides of the grooves indicates.

Stringholes were worked in a different way. Most have a regular circular section worn by the thread, which has removed the evidence of the tools employed. In many though, it is still evident that two stages were necessary in their creation, working from either end. Whether a bow drill was used, or a hand turned stick, is not certain. Unfinished holes show that the drill had a blunt

and rounded tip, and would need an abrasive powder to be reasonably effective. The fact that most stringholes are worn by the thread is a clear indication that seals were used in everyday life and not as funerary items only.

The motifs were probably sketched with a point, some realistic but some reduced to stylised and abstracted elements. Most are made with straight lines of crisp V or rounded U sections, by a point used in conjunction with an abrasive powder. Curved elements are achieved by a series of connected straight linear cuts, or by "cup sinkings". Some of the latter argue for a rotary action similar to that used to produce the stringhole. Most, however, are irregular and indicate the work of blade and point (Evely 1993: 148).

Ivory and bone seals more or less follow the same process of manufacture, beginning with the detachment of material by flaking or levering, followed by more precise cutting with tools to delineate the required contours. Most of the shapes are evidently segments of a tusk cut down to size (see also Krzyszkowska above), with the occasional appearance of facets to indicate the passage of blade, chisel, saw and abrasive. Even the more angular shapes require the same tools, more skilfully manipulated. Fluting and other linear designs on the exterior are probably engraved by a blade. Perforations, as well as more elaborate suspension loops (e.g. rings), were probably made by a drill. Some irregular holes could have been made by a point, or a thin chisel with chipping and levering out of fragments.

The motif was probably engraved after the flat blank was prepared with a blade, saw and abrasion. Single or grouped lines comprise the simplest compositions, with V and U profiles (blade and abrasive work respectively).

The saw could also be employed. For finer work, when repeated incisions were made or shallow surface scratches, creating complex patterns (e.g. meanders), a knife point or burin was probably used. Curvilinear motifs, on the other hand, were possibly worked with a blade. Finally cup sinkings, worked by drills or blade tips, are made in the same way as the stone ones mentioned above (Evely 1993: 224-227).

As both soft stone (steatite and serpentine), and ivory-bone are not very hard materials (1, 1.5-2, 3-4 on Mohs scale), they are within the power of obsidian and copper to cut, and pumice, quartz, sand or emery to abrade. The knife, the point, the blade, the drill and abrasives were the basic tools used for the creation of seals, along with the saw in the early stages. The particular use of each tool is described above (for more details see Evely 1993: 151-152).

Towards the end of the pre-palatial period, motifs with central dots and concentric circles become popular (see Chapter 5). These seals could not have been engraved with a hand-drill, but require hollow or tubular drills, probably made of metal. Betts dates the tubular drill to MMIB (Betts 1989: 11) and it is certainly used for seals that belong to Phase III (see Chapter 2), and for seals of the Malia workshop (MMII).

At the end of the pre-palatial period the fast wheel is introduced in pottery production. In the same period, innovations in other arts take place and seal-manufacture is not an exception. New materials (white paste) along with older ones are occasionally worked with the bow lathe. As Betts (1989) describes it: "It is not difficult to imagine the stone worker taking the rotating

axle of the potter's wheel, turning it through 90° to the horizontal and rotating it with the same fiddle-bow he had used for the hand-held drill" (Betts 1989: 12).

The lathe had a horizontal spindle supported in a wooden frame between two uprights. Between the uprights various grades of wheels and polishing material could be fitted on the detachable spindle; shaped points and drills might also be attached to the ends of the spindle. Movement of the spindle was provided by a fiddle-bow operated by the apprentice while the craftsman worked the seal onto the various spindle attachments as they turned at high speed (Betts 1989: 12-14).

This process was probably adopted by the Minoans at the end of the pre-palatial period. It probably came from the East (Gorelick and Gwinnett 1979: 24-25; Nissen 1977: 15-23), and became popular in Crete at this time. That of course does not mean that all the seals of this phase are manufactured on the Bow lathe. The older simpler technique is still used for the majority of seals in Phase III, but also for the slightly later seals of the Malia Workshop. Only some elaborate examples are manufactured with the lathe in this early phase (see the Archanes catalogue for examples) and the majority of seals in hard stones from MMIII onwards.

In the Late Bronze Age more workshops have been identified (Younger 1981). Magnifying glasses of rock crystal may have been used to check the progress of the work and short strokes used to sketch the composition before the engraving. Beside these points the rest of the process was probably the

same, taking into account, of course, the manufacturer's greater ability to work with hard stones (Younger 1981: 35-38).

The manufacturing methods described above are clearly visible studying the seals from Phourni-Archanes. The earlier seals (Cat. Nr. 1-14) and especially the ones made of soft stone are made with simpler techniques. In the case of some of the ones made of soft stone it can be said that the engraver's tool was not steady (e.g. Cat. Nr. 2, 3, 9) and traces of the blade are visible (Cat. Nr. 1, 2, 3). The bone-ivory seals are more skilfully cut, even though a new material like hippopotamus ivory is used. Again the motifs are rather simple, although this seems to be a matter of choice and not ability, as the shapes are quite elaborate.

In Phase II a higher quality of manufacture may be observed. Though the technique is basically the same, shapes and motifs are more elaborate and no "mistakes" are clearly visible. The later seals from Tholos C, dated to EMIII (MMIA?) (Cat. Nr. 29-31), made of bone and hippopotamus ivory, show development in the new phase (see also Chapter 2), as more complex scenes are presented on the sealfaces. The majority of the seals of this phase (Cat. Nr. 29-61) are made of hippopotamus ivory, carefully cut and engraved with human figures (e.g. Cat Nr. 43), animal parades (e.g. Cat Nrs. 32, 34), spirals and leaves (e.g. Cat Nrs. 36, 42) and other motifs.

The next phase (III) is a phase of innovations. Along with new materials (white paste) the older ones (bone, soft stone and ivory) are worked with more advanced tools. The tubular drill starts being used for motifs with concentric circles or perfectly engraved cup-sinkings (e.g. Cat Nrs. 64, 66, 78, 92). Also

the lathe is used for the first time for seals as a few examples with convex sealfaces, perfectly fashioned and engraved, demonstrate (e.g. Cat Nrs. 66, 79, 81, 96, 104, 105).

How important are these technological details for understanding the organisation of craft production in this period? The manufacturing methods of sealstones in the pre-palatial period are quite simple as far as the technology is concerned, although the elaboration of some earlier pieces betrays considerable skill and labour investment. But the use of the lathe and harder stones in the early proto-palatial period demonstrates a significant development in the technology of the craft, something that could reflect contemporary social developments. Previously advances in technological knowledge have often been considered as being linked to an evolutionary view of socio-economic development. However, the socio-economic role of technology seems to be more complicated (as a source of prestige and power, and definition of identity -see Chapter 10), and available only to some members of the community. This raises the question of craft specialisation and its association with complexity, in the pre-palatial period.

Craft Specialisation

Craft specialisation is a subject extensively discussed by archaeologists and anthropologists. It has been defined as "a differentiated, regularised, permanent, and perhaps institutionalised production system in which producers depend on extra-household exchange relationships at least in part of their livelihood, and consumers depend on them for acquisition of goods they do not produce themselves" (Costin 1991: 4-8), and as "an exclusive activity which a

person or small group perform for long periods demanding economic support for their living from one or several settlements...The decisive factor is not always the actual degree of specialisation but the range and impact of such activities on economic and social organisation. Thus specialisation is defined by social rather than technical means" (Kristiansen 1987: 33).

These definitions agree that craft specialisation is linked to social organisation and complexity. It is associated with developed societies, reflecting complex economic levels, and it is often considered to be a characteristic of economies that are more complex than a household level of production, following a line of evolutionary development.

However, recently, different views have appeared in the literature. Clark and Parry (1990) discuss craft specialisation as a possible cause and not a product of chiefdom/state evolution, and looked for it in societies ranging in complexity from bands to empires. Craft products were considered as containing encoded information and energy and the amount of information was directly linked to the labour and energy invested for the making of goods. The meaning of the goods depends on the context, and in this way craft production becomes a way to maintain or modify reality (Clark and Parry 1990: 295-296).

A discussion of the prevailing views on craft specialisation will follow, in order to make the differences between the two views clear. According to Rice (1991) the causal factors linked with craft specialisation are socio-political (the development of elites and centralized decision making), economic, especially agricultural intensification and competition and ecological/environmental.

Three models have been extensively followed:

a) The commercial development model.

b) The adaptionist model.

c) The political model.

According to the first model, increases in specialisation and exchange are seen as an integral part of economic growth. A growing economy encourages individuals to avail themselves of the efficiencies of specialisation and exchange, and social complexity increases. Jacobs (1984), Renfrew (1972), Parsons and Price (1971) follow this model, which is based on an economic system free of political administration. The individual advantage is the moving force in this process.

The adaptionist model on the other hand is based on different circumstances all together. As Brumfiel and Earle express it "...political elites are assumed to intervene in the economy; in fact, the ability of political leaders to organise a more effective subsistence economy is considered the raison d'etre of powerful leaders. Powerful, centralized leadership is seen as developing in environmental and demographic contexts where effective economic management is either necessary or especially beneficial" (Brumfiel and Earle 1987: 2). The system of redistribution of products is presumed to be connected with the development of both craft specialisation and exchange. As Halstead and O'Shea (1982) have shown development of these two would provide an accumulation of goods and insurance against food shortage. This accumulation of goods could also be used to sponsor craft production (Service

1962: 147-150) so that the elite would also increase their prestige, and that in turn help them retain power.

Finally, according to the third model, local rulers take an important role in organising specialisation, but they themselves are the primary beneficiaries rather than the populations they administer. It is proposed that "political elites consciously and strategically employ specialisation and exchange to create and maintain social inequality, strengthen political coalitions, and fund new institutions of control, often in the face of substantial opposition from those whose well being is reduced by such actions" (Brumfiel and Earle 1987: 3). Control over foreign exchange, particular food sources, and wealth generally, provides the leaders with means to support craft specialists working for them. New and complex technologies are important in this respect, and craft specialists are carefully protected.

These three models link specialisation with social complexity and power on different levels (individuals, elites working for the common good, political rulers), and accept that early, non-developed societies are non-specialised. Attached specialisation in particular (see Clark and Parry 1990: 293; Costin 1991: 11) is certainly supposed to be limited to societies with social stratification. This view is not accepted by Clark because it is based on modern categories, and he is doubtful that they apply to preindustrial contexts (Clark 1995: 273, 278-281). Ideally specialisation should be considered in the social and economic context of the period under study, because its existence is possible in any social group, where some people possess particular skills. These skills allow them or certain people to gain in prestige and power and to

pass certain messages to the community to maintain this prestige, power or identity.

Keeping these differing views in mind, more specific aspects of craft specialisation can be considered. Most discussions about specialists refer to pottery, which is the craft which presents most of evidence. Costin (1986: 368-375; 1991: 3-11), Peacock (1982: 8-9), Van der Leeuw (1984: 722-723) and Rice (1987: 184-186, 1991: 261) have identified a common hierarchy of modes of production:

1) Household production: each household makes the products it requires for its own consumption. There will be little uniformity in technological characteristics, and variation will be determined by idiosyncratic factors (skill, time spent, etc.). Functional distinctions may be apparent but not social ones. No "elite" artifacts exist.

2) Household industry: this is the first step towards craft specialisation. A few skilled artisans that work for profit make particular products. The characteristics of this step are: increased standardisation of types, greater skill in technology and consistency in manufacturing and less variable decorative motifs and styles.

3) Individual workshops: making particular products is the main source of subsistence. Craft production may be practised for only part of the year, but it remains a vital source of income. Unequal distributions of goods will be in evidence. Emerging "elites" control scarce resources and maybe the manufacturing of products.

4) Nucleated workshops or village industry: individual workshops are grouped together to form a more or less tightly clustered industrial complex. Standardised locations of production, indications of mass production, broad distribution of standardised forms and elaboration in decorative aspects are the characteristics of this step.

The problem with this scheme is that it does not accept specialised production in early societies and sees it as a step by step development, particular stages in an evolutionary process. However, early societies that were believed to have been simple in organisation have been proved by recent research more complex than was generally accepted (see later discussion on pre-palatial Crete), thus raising doubts about the validity of these models for studying past societies.

Another problem with these models is that they led to assumptions of craft specialisation in many contexts where the archaeological evidence only showed localisation of production. Muller discussed this problem (1987) and argued that the term specialisation and particularly craft specialist should be reserved for people who engage in activities full-time in order to earn their livelihood, and "site specialisation" should not be confused with "craft specialisation" (Muller 1987: 15). Rice (1991: 262-264) and other scholars dealt with this problem referring to types of specialisation:

1) Site specialisation: involves individual localities or sites having evidence of limited functions or intensive productive activity. Under this heading would fall the common pattern of village or community specialisation, in which different

communities within a region concentrate on the production of a particular kind of good.

2) Resource specialisation: refers to the selective use of particular resources in craft manufacture, such as certain clays or stones that are repeatedly selected for production of certain wares in pottery, or certain sealstones or vases in seal and stone vase manufacture. Control of an essential material could lead to specialisation and the development of a market.

3) Functional or product specialisation: refers to manufacture of a limited number of forms, when individuals or workshops concentrate on the production of one or small number of artifacts.

4) Producer specialisation: is what most people refer to when they speak of craft specialisation. It is defined as production by individuals who are particularly skilled in manufacture.

The identification of specialists is based on a combination of the following criteria: amount of time spent performing the occupation; the proportion of subsistence obtained through the occupation; the existence of a recognised title or special name for the speciality; and the payment of money or giving of a gift in exchange for a product (Rice 1981: 219). As these are very difficult to distinguish archaeologically, the identification of specialisation is mostly based on the existence of some characteristics related to it. Diversity, standardisation, elaboration and skill, and labour investment will be briefly discussed here:

Diversity: is considered to be a characteristic of non-specialists. Such products are assumed to be variable, heterogeneous, and diverse. This variability may exist for any of a number of reasons: imperfect processes of replication, random events in manufacturing, low skill level, conscious decision to produce variety, infrequency of the activity, number of producers involved, lack of strong controls over access to resources or choice of shapes, size, decorative patterns (Rice 1991: 273-277). So high diversity can be related to non-specialists or to a society with many producers and many kinds of products, or with a lack of control of the manufacturers. On the contrary low diversity is mostly related to specialists. The problem with these factors is that many of them can operate in a specialist workshop, applying variability in some or all of its products.

Standardisation: refers to a relative degree of homogeneity or reduction in variability in the characteristics of a craft. Craft products made by intensive specialists are mass produced and tend to be standardised. This reflects economic and social constraints within the production system (Costin and Hagstrum 1995: 622) . However, this again is not always the case, as there are examples of products of specialists which reveal a high degree of variability. It is possible that regulation of access to resources may lead to elaboration, because of the craftsman's advanced skill.

Elaboration and skill: Elaboration may be exhibited in an increase in the number of kinds of goods produced and also in unusual forms, in decorative styles or motifs and in utilisation of new (and possibly rare) raw materials (Rice 1981: 220). It is connected with skill, reflecting the craftsman's experience,

proficiency and talent, positively correlated to the intensity of production. Of course the recognition of technical skill is subjective in part, but it is certainly related to craft specialisation in a household or a workshop level (Costin and Hagstrum 1995: 623).

Labour investment: refers to manufacturing costs, measured by the time required to produce a commodity. As Torrence (1986: 45) and Costin and Hagstrum (1995: 621) claim, the relative investment of labour and the degree of specialisation may be interrelated, as specialised industries are competitive, emphasising efficiency in production. However, the social functions of the commodities produced may affect the labour invested. For example decoration that is time-consuming to apply may be related to important social functions, so the correlations between craft specialisation and labour investment are not always clear (Costin and Hagstrum 1995: 621).

It is clear that criteria such as standardisation, elaboration, skill and labour investment are associated with craft specialisation and are indicative of its presence. However, this does not apply to every situation and the relation between craft specialisation and these criteria is not always certain. Before the situation in pre-palatial Minoan Crete is considered in relation to the points raised above, the temporal and spatial nature of specialisation may be mentioned: Branigan (1983) distinguishes three categories of craft specialists:

a) The itinerant craftsman, who works full-time and earns his livelihood by practising his craft, in several or many different places.

b) The full-time resident craftsman, permanently working in a single location and earning his living from the proceeds of his craft.

c) The part-time resident craftsman, who in addition to his agricultural labour produces craft goods for the community.

Nearly all scholars mentioned above try to identify part- or full- time specialists but it is difficult to define what we mean with these terms. Are full-time specialists identified as the ones who produce craft products through the whole year and do not produce food, or as the ones who have no other economic pursuit even at times when they do not exercise their craft? And how is the environmental/weather factor connected to this situation? For example the weather could play a role in people's decision to exercise a craft for a particular period every year when agricultural activities were hindered. It is difficult to speak of seasonality or full-time employment with archaeological data, and, therefore, it is not possible in most cases to identify full or part time specialists, as what we usually have is only the products of their work.

Another classification of specialists divides them to attached and independent producers. The former create goods for elites, and this production is carried out in isolated workshops near administrative centres or in these centres. The latter on the other hand create products in small workshops, often family run (Rice 1991). Unless we find remains of the actual workshops, this presents the problem of identification in the archaeological record. A reconstruction of the social organisation of a period could be helpful in this direction, but this is not an easy task. It seems easier when we have remains

like palaces that tell us a lot about social complexity, but even in these cases details of organisation remain in the sphere of speculation.

Summarising, we could say that three models linking craft specialisation and social organisation have been developed, the first based on the individual agency, the second accepting elites working for the common good, and the third, politically orientated. In this context modes of craft specialisation from household production to industry and types of specialisation have been identified. The characteristics of specialisation, along with types of specialisation and specialists were also presented. The question is if these characteristics can be seen in craft production and especially seal manufacture in pre-palatial Crete, and which model seems to be substantiated by the evidence. The study of materials, shapes, motifs and style groups of seals in the previous chapters has created a picture of relative complexity, pointing towards the existence of elites in this period. The examination of crafts, workshops and internal exchanges in pre-palatial Crete will follow in an attempt to answer these questions.

Other Crafts in pre-palatial Crete

Pre-palatial Crete is a most interesting case with regard to craft specialisation. There are those who believe that no workshops existed in this period, a view based firstly on the simplicity in the manufacture of various products and secondly on the lack of an elite group, able to sustain craft specialists. In a relatively egalitarian society each household had its own production mechanisms of various goods.

On the contrary, others have claimed that craft specialisation was already evident in the pre-palatial period, but specialists produced for their own community on a small scale. Renfrew (1972: 342), using Myrtos Fournou Korifi as an example, suggested that pottery production was beyond the household level in EBA. Branigan identified six factors which may have stimulated the initial development of craft specialisation:

1) The widespread adoption of metallurgy that provided the craftsmen with new tools.

2) The stimulation by competition. As traditional products in stone, clay and bone were replaced by more desirable, and sometimes more efficient, products in copper and bronze, so craftsmen in these other materials were encouraged to make new products and seek new work.

3) The need to travel overseas to acquire tin and possibly gold and copper, would have led to acquisition of more luxurious or quite simply new materials such as ivory, obsidian, emery and marble.

4) The increasing complexity of techniques used and the increasing proliferation of raw materials and knowledge of their use made it difficult for one man to practice all trades.

5) Agricultural prosperity and increased production must have led to increased demand even for basic manufactured goods.

6) The demand for prestige goods, if we accept that Crete experienced growing social differentiation in the first half of the EBA (Branigan 1983: 23-30).

Until recently, exchanges between various regions of the island during the EBA were also not often considered, and local production was believed to be responsible for craft products. The similarities between artifacts were justified as evidence of a "universal" production system in the island throughout the pre-palatial period. Branigan (1988: 179-180) emphasised the internal exchange of food, raw materials and artifacts within a more advanced social and administrative organisation on a level beyond that generally recognised. Recent work on Early Minoan pottery has added considerably to the evidence for such exchange, demonstrating that extensive exchange of pottery took place from EMI to the end of the pre-palatial period, between different regions in Crete. Although pottery is one of the crafts (along with metallurgy) that presents the opportunity to prove this point with scientific analysis, it is reasonable to assume that along with clay vessels, other artifacts were also moved between regions and were produced in particular site-workshops. Sealstones belonging to particular style-groups could be linked to specific workshop-sites, where they were produced and then distributed in other areas (see later discussion). Of course internal exchanges included other materials. Fish and wheat from coastal and plain villages probably moved further inland, and in return hill villages could provide animals, meat and dairy products, or even timber. Wood and perhaps copper could also have been traded, possibly by people who controlled the sources of these materials (Branigan 1988: 179-180).

What then is the picture we have from various crafts of the pre-palatial period? Obsidian was circulated in the Aegean from at least the Neolithic (see

Chapter 7), with the Cyclades, and particularly Melos the major source. Torrence (1986: 147-154) talks about four possible obsidian workshops in the Early Bronze Age Aegean: one in Phylakopi, one in Aghios Kosmas, and two in Crete, at Malia and Knossos. The workshop at Malia is dated to the pre-palatial period by the associated pottery. The types of waste by-products indicate that all stages of core preparation and blade production took place there, but the quantities of material do not confirm the presence of a workshop. "It would be more appropriate to describe the location at Malia as a blade "working area" or an "activity area" because these terms more accurately describe the behaviour which took place there..." (Torrence 1986: 151).

The same problems arise with the workshop by the Royal Road at Knossos. There the manufacture of cores was the major activity. Cores were partially prepared before they were brought to the room, and were either completely worked until exhausted or were removed to other areas for further use. The quantity of the obsidian, however, was not enough to sustain the idea of a workshop, at least not as large as the one at Phylakopi. The material found in the rooms at Knossos and Malia was possibly produced only in a final blade-making incident, and previous waste was cleared away to a specialised dump, like the one in Phylakopi. Estimating the hours of working for one person in Phylakopi and Knossos, based on the quantity of material found, Torrence claims that they are not enough to support a workshop at Knossos, or a large-scale blade industry at Phylakopi. It is possible that "the knappers responsible for the waste were industrial specialists operating only on a part time basis

within a commercial economy" (Torrence 1986: 157). In other words they were probably part-time workers preparing items for local use and exchange.

Recent excavations at Poros Katsamba, in northern Crete, have brought to light another possible obsidian workshop. Large quantities of obsidian were discovered, prepared for use in the settlement, and this could change considerably the above picture (Dimopoulou 1997: 433-434).

Torrence's views were refuted by Carter (in press), who suggested that blade production took place only at a few sites, and was highly specialised, for a variety of reasons. These reasons include technological knowledge, spatial, hierarchical and functional restrictions (Carter, in press: 4-7). Some obsidian blades probably had a limited practical use as razors (they were easily damaged), but they were mostly social objects, with "meaning", and in some cases were clearly manufactured just for funerary use (Carter, in press: 11).

Stone vase manufacture is another area of interest in this respect. Warren (1969) identified two possible workshop areas at Malia, dated to MMIA, one at Zakros, one at Mochlos and five possible examples at Knossos, all dated to the LM period, but the evidence again is slender (Warren 1969: 161-165). However, stone vases dated to EM, especially from the tombs of Mesara, demonstrate signs of advanced skill in manufacture. The fact that many types of these vases, especially small ones, were probably manufactured for ritual/funerary use (Warren 1969: 166-167), makes it possible that specialists were in operation in this craft from early on. Stone vases were probably luxury items with social "meaning", as they were not intended for every-day use, and the energy and skill needed for their making was considerable. The fact that

only a minority of burials were accompanied by stone vases suggests selective access to these products.

With metallurgy the situation is clearer after Branigan's studies (1968a; 1974). Tracing the origins of Aegean metallurgy from the Late Neolithic, Branigan talks about a "metallurgy explosion" in the Aegean in EBII, when new techniques were adopted and increased skill was shown. Material from Aghia Photia (which is EMI), Platanos, Fournou Korifi, Mochlos, Vasiliki, Lebena and Koumasa was considered to lead to such conclusions. However, the examples from Aghia Photia show that metallurgy was already developed in EMI, probably influenced by the Cyclades, the source of most metals used in Crete according to Stos-Gale (1985). This was also argued by Nakou, who refuted the theory of a metallurgical explosion in EMII, and talked about a change in the depositional patterns of these artifacts in the tombs that demonstrated a picture of advancement (1995: 2, 30-32). From EB2 to MB2 one can see a continuity of techniques but also some changes, because of eastern influence, according to Branigan (Branigan 1974: 122-123). Furthermore, Branigan identified small "local schools" in metallurgy in individual village communities in southern Crete, Aghia Triadha, Platanos and maybe Koumasa in Mesara. "Broadly speaking Aghia Triadha may be said to be more advanced technically than its neighbours, Platanos more standardised and Koumasa lacking in standardisation" (Branigan 1968a: 56). Aghia Photia in the north east and maybe Vasiliki in the south east present also some evidence of local production (Branigan 1968a: 106, 132), while Mochlos, Lebena and Myrtos Pyrgos are other early sites with substantial material. The fact that only a few people

possessed metal objects, along with the considerable energy, skill and labour investment needed for their manufacture, is probably indicative of the social importance of these objects.

The situation in pottery manufacture has been even more extensively discussed as plentiful material has been recovered. Scholars tried to identify craft specialisation from the EN and onwards. Vitelli (1993: 248) claimed that ceramic production in Early and Middle Neolithic is not simple domestic production but that it was practised by a few specialised potters (most probably part-time and female) within the group. These potters did not concentrate on utilitarian production, but probably aimed at vessels with social or symbolic roles. In addition pottery was already exchanged in the Early Neolithic. In the Late Neolithic one can observe "a diversification of functions and domains of integration and use; reinforcement of intra-site part-time specialisation; development of specialised centres of production; and an increased rate of ceramic exchange" (Demoule and Perles 1993: 393).

The situation in the Neolithic seems to be relevant to that of the pre-palatial period. Although many scholars believe that household production is the only source of pottery in pre-palatial Crete (see Dickinson 1994: 95-97), recent studies (Wilson and Day 1994; Day et. al. 1997) have shown that most of the pottery groups assigned to EMI, EMIIA and EMIIB and EMIII were produced in particular regions (especially in the south coast and Mesara, and the East-Ierapetra Isthmus), by a number of workshops. They suggest that EM wares were produced in particular workshops and then circulated all over the island and that pottery production was highly specialised in the Early Bronze

Age. Their results are partly based on a combination of SEM and petrographic analysis and partly on stylistic analysis of particular shapes and wares. These results are indicative of a more complex system of organisation already in EMI.

The craft of seal manufacture

Taking into account the evidence for craft discussed above, an assessment of the situation in seal manufacture will be undertaken, in an attempt to shed more light on craft production, social organisation, and product exchange in the period.

First of all consideration will be given to the existence of craft specialisation in seal manufacture in the pre-palatial period. The characteristics of craft specialisation mentioned above (supra pp. 169-170) are clearly present. Seals were relatively standardised products, as the great majority belong to a small number of stylistic groups (see Chapter 5), and each of these groups has standard characteristics. Another characteristic of specialisation that can be observed from EM-MMI is elaboration. The zoomorphic seals from EMII-MMI are clear examples of this point, as the smallest details are engraved on them, and they sometimes manage to convey the character of the animal (see Chapter 5). This means that the manufacturers of these artifacts had considerable skill and invested substantial amount of time in the cutting, working and engraving of these masterpieces of glyptic. Also, the fact that only a minority of people possessed seals, which in some cases were buried with them, or were used by further generations and then buried with their later owners, suggests they were prestige items with social meaning, a view reinforced by depositions of seals even with secondary burials (see Chapter

10). As the stringholes of the seals are clearly worn in most cases, by the use of a thread, it is certain that seals were used in the everyday life, and the sealings of the period also indicate a practical and significant use of these artifacts. The importance of seals in life and death, along with the skill and labour required for their manufacture are pointers to potentially specialised production from early on. The examination of possible workshops and internal exchanges of seals will follow, in an attempt to give answers to the other questions raised in the previous sections: which types of specialists and specialisation can be identified, which modes of production existed and which social model is substantiated by the evidence?

Specialisation in seal manufacture has been studied by a few scholars during recent decades. Pini (1990a: 126) identified a MMI workshop in Mesara that created the "white pieces", while Yule (1980a: 206-221) identified several style-groups but talked only about the Malia workshop in the proto-palatial period without identifying further earlier workshops.

Sbonias (1995: 73-121), re-examining the pre-palatial material, has created some new style-group categories (see Chapter 5) and assigned some of them to particular workshops. He suggested that the Cross-hatching/Bone Complex is mostly present in Lasithi/East and South Crete (the Mesara with Aghia Triadha, and the Asterousia with Lebena and Moni Odhigitrias the sites with the most numerous examples). The Plain EMII Soft Stone seals are found all over the island and were an early tradition that was replaced in the south by the Cross-hatching/Bone seals. The Group of the Epomia seals is also

assigned to Mesara-Asterousia, and particularly Platanos and Aghia Triadha/Phaistos.

The Meander/Wavy Band Group is assigned to Aghia Triadha and Kalathiana, similarly the Spiral Group (and more generally to Mesara), the Lion-Spiral Group to Platanos, Marathokephalo, Moni Odhigitrias in the south, and Archanes in the north, and the Leaves/Ivory Group to the same areas as the previous one.

Finally the Leaves/Bone Group is mostly present at Kaloi Limenes, Moni Odhigitrias, and Archanes, the Archanes Script Group at Archanes, the Group of White Pieces at Moni Odhigitrias and Kaloi Limenes, and the MMIA/MMIB-Soft Stone Complex at Platanos and Koumasa. So, according to Sbonias, in EMI-EMII soft stone seals are manufactured all over the island, but only in the south (Mesara and Asterousia) and the east do bone seals begin to replace them. In EMIII and early MMIA two groups are assigned to Aghia Triadha, Kalathiana and maybe Koumasa and another two to Platanos, Moni Odhigitrias and Archanes. Finally in MMIA late-MMIB two groups are assigned to Moni Odhigitrias and Kaloi Limenes, one to Archanes and one to Koumasa and Platanos (Sbonias 1995: 73-121).

Of course all the above suggestions are based mainly on the number of sealstones of each group found in each area, as at least a few seals from nearly all style groups are found in nearly all the above mentioned sites. The questions that arise are: first did all these areas have a workshop throughout the pre-palatial period? Secondly, can we convincingly argue for workshops only on the basis of the number of seals discovered on a site (sites with many

seals had workshops while others with a few seals did not)? A few observations will be made related to these points, based on the stylistic comparison of seals between sites with the largest number of seals and the case of Archanes-Phourni will be discussed later.

The study of pre-palatial seals is heavily based on consumption patterns. There is no direct evidence of any pre-palatial production sites in Mesara or the rest of Crete, so any relevant discussion is necessarily centred on the sites where a substantial number of seals were discovered. It is possible that the actual workshops were located elsewhere, whether nearby or distant (see also discussion on pottery, where a similar situation is observable). However, terms like "Platanos workshop" and "Aghia Triadha workshop" will be used, identifying the sites for which a seal group was apparently predominantly produced. In this respect, possible production areas will be suggested, based not only on the number of seals but also on stylistic observations of seals found in these sites.

In the first phase, as has already been said, seals were made of soft stone and bone and are mostly decorated with linear motifs. Most of the seals of these two groups (Soft Stone EMII and Cross-hatching/Bone) have been found in Asterousia (Lebena and Moni Odhigitrias) and Mesara (Aghia Triadha), with small number of examples in the Lasithi area and East Crete (Malia, Sphoungaras, Palaikastro, Maronia) and in Central Crete (Archanes, Krasi, Trapeza). Studying seals from these areas one can draw the following conclusions:

1) The early seals from Lebena and Moni Odhigitrias are stylistically very close (see CMS IIi and CMS V SIA), and made either of soft stone or bone (for example CMS IIi 217 and CMS V SIA 261). Conoid and pyramidal shapes with crude linear designs modelled in soft stone, and rings and stamp seals (signets) with more regular designs made of bone, are common in both these areas in the Asterousia. A workshop in the Asterousia area is very possible, probably working with soft stone, as the number of soft stone seals in this early phase is considerably larger at these two sites than elsewhere (Appendix J, Table 1). The bone seals could be coming from Mesara (see below) or also be manufactured in the Asterousia, as there are several bone seals at Lebena and Moni Odhigitrias (Appendix J, Table 2).

2) The seals of this early phase from Mesara, and particularly Aghia Triadha are mostly made of bone. Along with rings and stamp seals with linear designs, one can also see stamp cylinders without kernels and gable-shaped seals made of boar's tusk (e.g. CMS IIi Nr. 6-15). These may well represent a workshop in Mesara, with Aghia Triadha the site where the largest number of early bone seals in these styles came to light (Appendix J, Table 2).

3) Some Epomia seals from the Metaxas Collection, coming either from Lebena or Kaloi Limenes, from Moni-Odhigitrias, Aghia Triadha, and Platanos, with distinctive lozenge cross-hatching and sometimes with sealface divided in two with a line in the middle, could be the products of either a new workshop at the end of the phase, or a new type produced in one of the existing bone-working workshops (Appendix J, Table 4).

4) A small number of seals from Lasithi and East Crete could have been "imported" from Mesara and Asterousia. Two seals from Palaikastro (CMS IIi Nr. 480 and 482 - stamp cylinders without kernels) are similar to examples from Aghia Triadha, and one ring from Sphoungaras, though very corroded (CMS IIi Nr. 470), is clearly of a type common in the south.

In the second phase the introduction of hippopotamus ivory is a significant characteristic of seal manufacture. The Mesara plain seems to be the production centre in this phase, as all four basic stylistic groups are predominantly found in Aghia Triadha, Kalathiana and to a less extent Koumasa, Platanos and Marathokephalo. The following conclusions can be drawn:

1) The ivory seals of the Meander/Wavy Band Group and the Spiral Group are mostly found in Aghia Triadha and Kalathiana and less at Koumasa (see CMS IIi 36, 37, 39 and 59, 60, 62, 123-125 for examples of these two groups), developing the tradition of the earlier bone seals of the same workshop (Appendix J, Tables 6, 7) .

2) The Lion-Spiral Group and the Leaves/Ivory Group are mostly found in Platanos and Marathokephalo (see CMS IIi 22-228 and 241, 242, 248-253), along with Moni Odhigitrias, probably indicating the existence of a new workshop in Mesara or Asterousia (Appendix J, Tables 5, 8).

3) Other sites in the Asterousia (Lebena, Kaloi Limenes) show a decline in the use of seals at this phase, represented with small numbers of seals from the

four basic groups. Only a few ivory seals of those groups come from Kaloi Limenes or Lebena (Appendix J, Tables 5-8).

Finally in the third phase, some changes seem to take place in seal manufacture. New techniques are applied, bone and soft stone become popular again, along with ivory, and a new material (white paste) is introduced. One can observe:

1) The Asterousia workshop(s) flourish again. A large number of seals of the Leaves/Bone Group, the Group of White Pieces, and the MMIA/MMIB Soft Stone Complex are present at Lebena, Kaloi Limenes and Moni Odhigitrias, indicating one or more workshops in this phase. Whether all the style-groups were manufactured in the area or some were imported is impossible to say (Appendix J, Tables 9, 10, 12).

2) Seals of the Leaves/Bone Group and the Group of White pieces are stylistically close to, and were probably made in, the same workshop, in Asterousia. Examples from Mesara are probably of the same origin.

3) On the contrary soft stone seals seem to be manufactured mostly in Mesara (Platanos?) (Appendix J, Tables 9, 10, 12). Platanos is still the site with the largest number of seals, belonging to the MMIA/MMIB Soft Stone Complex in the majority of cases. Koumasa and Aghios Onouphrios are also represented (Appendix J, Tables 9, 10, 12).

It has to be noted that at least a small number of seals of all groups have been found in all these sites, either showing exchange or imitation of motifs between workshops or even both. It is not possible to establish if each

style group was a product of a different workshop, or if some of them were made in the same workshop. Also, the seals of the same style-group are stylistically close, but not necessarily made in the same workshop. Differences and variations exist and make it difficult to be certain on this point. Concluding, it must be said that the views given above are only suggestions of possible workshop groups and locations, based on stylistic observations and seals distribution. It is not possible to take these ideas further, as none of the materials and curving techniques used are area-specific.

Archanes-Phourni

How does the material from Archanes-Phourni cemetery fit to this picture of production and consumption areas in Asterousia and Mesara? First of all it must be noted that Archanes-Phourni is the only site outside Mesara and Asterousia with a substantial number of sealstones. With 135 seals and sealings from EMII to MMII, it has more seals than Platanos, Moni Odhigitrias, Aghia Triadha and Lebena.

We must remember that in terms of ceramics there is evidence for extensive exchange between the north, the south and the east from EMI to the end of the EM period. Especially in EMI and EMIIA some of the highest quality pottery in north central Crete comes from centres in the south coast and Mesara. Specialised centres of production are also present in EMIII and MMIA. In this context of North-South exchange, could the seals from Archanes-Phourni also be imported from the south, or were they products of a workshop in north Crete?

Mesara and Asterousia are the principal areas of sealstone manufacture and usage from EMI to the end of the pre-palatial period, and even at the beginning of the proto-palatial period. However, Archanes seems to have been an equally important site in this period, as the cemetery of Phourni shows, and seal manufacture especially seems to reflect this importance.

Some of the seals dated to the phase I are roughly pyramidal with simple linear designs or cross-hatching (Cat. Nr. 9, 14), but others are modelled in much more elaborate shapes: a stamp cylinder (Cat. Nr. 1), a six-sided prismatic seal (Cat. Nr. 2), a three-sided prism (Cat. Nr. 3), are all shapes that became popular later and they do not exist, or are very rare, in the south. The motifs are very simple linear motifs mostly cross-hatching. Another early group of seals, however, is very interesting, with regard to specialisation (Cat. Nr. 5-8). Nr. 5 is a zoomorphic seal with simple cross-hatching, probably made of bone. It probably represented two interlaced snakes. Nr. 6, made of bone, had C-spirals as a motif and was in the shape of a button, while Nrs. 7 and 8 were made of hippopotamus ivory. Zoomorphic seals of this phase are also present in Aghia Triadha (CMS IIi Nr. 17, 19, 21, 25), Lebena (CMS IIi Nr. 209, 213), and Kaloi Limenes (CMS IV Nr. 31). However only CMS IIi Nr. 25 and CMS IV Nr. 31 depict probably the same animals as the Archanes seals. Button-shaped seals of this type are not present in Mesara, and C-spirals are not common in this phase (one possible example CMS IIi Nr. 25 could be of ivory). Finally ivory seals are very rare in the south (CMS IIi Nr. 25 is not certainly ivory, and one possible example CMS V SIA Nr. 243 from Mitsotakis collection-Moni Odhigitrias could be later). A further example from Mochlos

could be later (CMS IIi Nr. 471). All these considerations lead the author to believe that there was a workshop at least from EMIIA at Archanes, influenced by the Cyclades and Mainland, and perhaps by the south, but also creating new forms.

Fourteen more seals that possibly belong to this phase (Cat. Nr. 15-28) seem to confirm these results. The four seals from Tholos C (Cat. Nr. 15-18) are modelled in shapes (gables, stamp cylinders) that are very rare in the south in phase I. The others (Cat. Nr. 19-28), all from later contexts, have simple hatching or cross-hatching as the motif, as in the south, but are modelled in shapes that are rare in Mesara or Asterousia (zoomorphs in the shape of interlaced snakes, stamp cylinders -both shapes seem to be much more popular in Archanes than in the whole of the Mesara and Asterousia).

The majority of the seals dated to Phase II are made of hippopotamus ivory and belong to three of the main style-groups of the period: the Spiral Group, the Lion-Spiral Group and the Leaves/Ivory Group. Bone (and boar's tusk) are still used, although rarely, and in two cases, one from Tholos C (Cat. Nr. 29) and BB19 (Cat. Nr. 60), the designs belong to the Leaves/Ivory group and the Spiral Group respectively, but the seals are made of bone. Another seal (Cat. Nr. 58) belonging to the Spiral Group is made of steatite and not ivory. All these show that the Archanes workshop followed the general line of development, but also kept the tradition of experimenting with motifs in materials "out of fashion". Of course some seals could be imported from the south. It is, however, striking that no examples of the Meander/Wavy Band Group exist in Phourni, in this phase, but most examples belong to the Lion-

Spiral and the Leaves/Ivory groups, showing a connection perhaps with a workshop at Platanos and Moni Odhigitrias.

In Phase III, it is generally accepted that the Archanes Script Group is a creation of an Archanes workshop, as only a few examples have come to light at other sites (Appendix J, Table 11). As some of its examples are made of hippopotamus ivory and white paste it is clear that hippopotamus ivory is still in use in this phase, although rarely, something that is in agreement with the general picture of contact with Egypt and the Near East at this period (see Chapter 7).

Ivory seals that belong to the Leaves/Bone Group also show that, at least in Archanes, ivory was still used in the third phase (contra Sbonias 1995). Also two ivory seals that cannot be included in any of these groups, and stylistically belong to the previous phase are dated to the third phase because of the method of manufacture that demands the use of the bow lathe. These two seals (Cat Nr. 96, 105) belong to the Spiral Group and the Meander/Wavy Band Group, continuing earlier traditions.

The motif of concentric circles is found on seals that belong to all the style groups of the phase, and also in two examples made of hippopotamus ivory, demonstrating that the craftsperson(s) of the Archanes workshop continued the tradition of experimenting with new motifs in materials not often used.

Seals made of white paste and belonging to the Group of White Pieces, could have been imported from the Asterousia-Moni Odhigitrias workshop, as well as some of the seals from the other groups.

The Archanes workshop probably continued in the next phase (MMII) in the proto-palatial period creating seals made of hard stones with architectural motifs (Cat. Nr. 120-128). An example of a three-sided prism, that is stylistically very close to the Malia workshop, reveals contacts with this site, in MMII.

Summarising, it could be said that the seals from Phourni present a number of stylistic differences from southern seals, in all phases. This probably means that they were products of a local workshop. It is possible that some of them were imported from the south (for example the white pieces), but a local workshop in the region, in contact with both the Cyclades and south Crete, seems to be substantiated by the evidence.

Conclusions

Based on the available body of evidence, it is suggested that pre-palatial seals were the products of particular workshops from their appearance. The standardisation of forms, the elaboration and skill clearly shown in most examples and the substantial labour investment in their manufacture, are strong pointers to specialised production. Each workshop/craftsperson favoured particular materials, to create particular shapes and particular motifs, that belong to a specific stylistic tradition.

It is not a matter of great concern whether the seal engraver was a full- or part-time specialist, furthermore it is not something we can detect

archaeologically in the context of pre-palatial Crete, as we do not have actual production sites. Equally, independent and attached specialists are not observable in this period, as we do not have actual production sites.

At least one type of specialisation may be detected in seal-manufacture: producer specialisation is associated with skill, efficiency and technical competence. The development of these skills, present in seal manufacture, reflects the involvement of a few people only. If detailed stylistic analysis is done, it is possible to observe some seals with particular characteristics, probably made by the same hand. However, the author would hesitate to proceed to such a detailed stylistic analysis for two reasons: firstly because each seal presents its own particular small stylistic details and secondly because the great majority follow the general stylistic characteristics of the style group they belong to. The combination of these two factors makes the identification of hands nearly impossible. Resource specialisation is partly evident, as some materials are preferred in particular workshops, but two or three could be used at the same time in one of them.

Considering now the existence of workshops and exchanges between regions, it could be said that particular style groups could be associated with particular sites. Unfortunately we do not have any direct evidence of seal workshops in EM. However, patterns of consumption, based on the numbers of seals discovered in each site are indicative of these associations between style groups and sites (see above). Most of the workshops of the period seem to have been in south Crete, the Mesara and Asterousia, and Archanes is the only site in the north with evidence of a local (northern Cretan) workshop.

Internal exchange between different regions of the island could have taken place as early as in EMI and until the end of the pre-palatial period. The distribution of different style groups around the island is indicative of some product movement.

Examining the modes of production mentioned in previous sections, it seems that no satisfactory result can be offered from the study of seals in pre-palatial Crete. The existence of workshops and possible exchanges makes it difficult to accept production at a household level, as the organisation of the craft seems to have been more complex. However, it is difficult to say how the craft was organised, if there were workshops in the level of a household industry, individual workshops or a village industry. This step by step organisational development is not apparent in the history of seal manufacture or generally the crafts of pre-palatial Crete, especially as the actual production sites have not been found.

What does this tell us about the social organisation of the period? Pre-palatial society presents a picture of emerging complexity and hierarchy. Craft specialisation and exchange, particularly of prestige products, are generally considered to be evidence for the existence of elites (Helms 1993). Sealstones were items with social significance and meaning during both their owner's lifetime and after their death, possibly playing an important social role as a display of social status. Prestige and perhaps some kind of authority are notions associated with seal owners, who seem to have been a select group and were possibly part of the elite of the period (see Chapter 10). The view that pre-palatial society seems to have been more complex than generally thought,

is upheld by most of the recent studies of the period, regarding pottery, lithics and metallurgy, as discussed briefly above (Day *et. al.* 1997; Carter, in press; Nakou 1996). The association of elites with specialists is difficult to establish, but a connection is likely, given that the products produced by specialists played an important role in the socio-political structures. As Peregrine puts it: "An alternate means for elites to monopolise access to personal ornaments is to use objects that require extremely labour intensive or technologically sophisticated methods to produce. By supporting the craft specialists and production facilities necessary to create these items, elites gain effective control over the items themselves" (Peregrine 1991: 3). If, as Miller says, power is located above all in consumers (Miller 1995), control of craft specialisation is one of the means to acquire it, either by creating products of high social status or by controlling their use and distribution.

Chapter 7: External Exchange

As has already been discussed, seals were possibly exchanged between different sites or areas in Crete, during the pre-palatial period. Were seals coming to Crete also from other parts of the Aegean or the Near East? And if so, what does this tell us about their social significance and meaning in society? Finally what does it say about a society that "imported" prestige items from other countries? Some possible answers to these questions will be offered, based on the study of imported seals, in the context that has been set in the previous chapters.

Exchange has been defined as "the mutual appropriative movement of goods between hands" (Polanyi 1957: 266). This definition includes both the notion of movement-change of location, as well as human interaction. The three models described in the chapter on craft specialisation are also followed where exchange is concerned. In fact, Helms (1993) has linked these two phenomena of exchange and craftsmanship with regard to social organisation and the existence of elites:

1) The commercial development is based on the assumption that exchange is an integral part of the economic growth. Renfrew (1975: 5-24; 1984: 87-105) described it as local and remote interaction within and between early state modules. A growing economy encourages individuals to take part, increasing social complexity, but at the same time with the development of more sophisticated exchange mechanisms, the exchange becomes less embedded, less integrally related to social organisation.

2) On the contrary, according to the adoptionist model, political elites intervene in the economy, controlling craft specialisation and exchange, through the system of redistribution of products. Taking insurance against food or other products shortage, they gain prestige and make their leadership safe.

3) Finally according to the political model elites themselves are regarded as primary beneficiaries of exchange, and not the population. Using exchange to create and maintain social inequality, they, at the same time, increase their political power (Brumfiel and Earle 1987: 1-3).

As we saw in the last chapter, the existence of an increasingly stratified society in the pre-palatial period seems to be in accordance with evidence of craft specialisation and the existence of workshops. Moreover, the study of imported seals, artifacts in general and raw materials, and related contacts with foreign lands can be significant in this respect, as external exchange has been considered as a characteristic of "developed" societies.

Pre-palatial Crete

The number of foreign objects found in Crete and dated to the pre-palatial period have been a subject of discussion by many scholars, as they represent proof of contact with foreign regions during this early period. This picture of exchange will be studied, and particularly the evidence of sealstones, as one way to expand our understanding of social complexity in Early Minoan Crete.

The situation with external exchange is clear, as the artifacts found in Crete, clearly link it with other regions. With the Cyclades in particular there

seem to have been intensive exchanges, while small scale exchanges seem to have taken place with Mainland, the North Aegean islands and Troy. Renfrew (1964: 121; 1972: 196-206) has suggested there was an "International Spirit" in the Aegean, during the second phase of the Early Bronze Age. The Cycladic imports in Crete are numerous (see Karatzali 1996). Obsidian from Melos and Yiali had been coming to Crete since the Early Neolithic period, for the production of razor blades, knives and sickles (Renfrew et al. 1965: 237-238). The studies of Torrence (1986), and Carter (in press; 1994) furthered our knowledge of obsidian working. Torrence dismissed commercial trade in favour of direct access to resources and non-specialist production (Torrence 1986: 219), while Carter has recently argued for a specialised, restricted production at a few sites (Carter, in press: 3-5). Furthermore he has suggested that obsidian had social significance and meaning in the context of Early Bronze Age society (Carter, in press: 7-8 and 11), and for this reason ready made products were probably transported from their production sites to the consumers, so they kept this "otherness" and value (Carter 1994: 136).

Marble figurines were also imported from the Cyclades in EMII, as figurines from Koumasa, Archanes and other sites show (Renfrew 1964: 122; Xanthoudides 1924: 21-24; Sakellarakis 1972b: 335-351; Zervos 1956: 134-140), although there were also locally produced varieties of the Folded Arm Figurine. Stone and clay vases were also exchanged: for example, there are two Cycladic stone pyxides from Aghios Onouphrios, and Cycladic clay bottles and pyxides from Pyrgos (Renfrew 1964: 123 and pl. ΣΤ 3; Xanthoudides 1918b: 144-162 and 1924: 11). Lead isotope studies indicate that copper from

Kythnos and Seriphos (Stos-Gale 1993: 120-127), and silver and lead from Siphnos (Branigan 1968b: 224; Stos-Gale 1985: 365-372; Stos-Gale and Macdonald 1991: 265-271), were also important Minoan imports from the islands.

Recent research in ceramic petrology has amplified this picture. Aghia Photia, a cemetery site in north-east Crete, has been noted for its Cycladic character since its excavation (Davaras 1971). Many fine obsidian blades and clay vases of Cycladic type were among the gravegoods in this cemetery. Day *et. al.* (in press) have now shown petrologically that pottery of Cycladic type, dated to EMI, probably came from the Cyclades, demonstrating a close association between the site and the Cycladic islands. Another pottery assemblage with Cycladic character has come to light at Poros, dated to EMI-EMIIA (Day, Wilson and Dimopoulou, work in progress), providing further proof of intensive contacts between Crete and the Cyclades, in the EMI and II periods.

Silver and copper were also imported to Crete from Attica-Lavrion, probably through the Cyclades (Stos-Gale 1985: 365-372; Stos-Gale 1993: 120-127; Stos-Gale and Macdonald 1991: 265-271). Other Mainland exports to Crete are scarce, however. Warren's discovery of about half a dozen sauceboats, in an EMII level at Knossos (Warren 1972b), and similar sauceboats from the cave at Platyvola (Tzedakis 1967: 505) may be evidence of contacts with the Argolid at this time, although Wilson (1985: 358-359; 1994: 39-40) believes some of the Knossos sauceboats could have been Cycladic.

Strangely, there is only a limited amount of Minoan artifacts in the Cyclades, Mainland and North Aegean. Scholars have argued about small quantities of Minoan pottery sherds at Poliochni (EMII) (Bernabo-Brea 1964: 585), Phylakopi (EMIII and MMI) (Atkinson 1904: 127) and Lerna (MMIA) (Caskey 1964: 38). Foot amulets from Zygouries (Blegen 1928: pl. XX, 3) and Aghios Kosmas (Mylonas 1959: 157-159 and fig. 166) and a bottle seal from Aghios Kosmas may be Minoan. Also, a seal and a sealing from Troy are possibly pre-palatial (Blegen 1950: pl. 408; Schliemann 1880: 601). Finally Kythera was probably colonised by Minoans as early as EMII (Huxley and Coldstream 1966: 28-29; 1972: 275-278). The amount of Minoan material in the site of Kastri is substantial and appears abruptly on a virgin site, indicating a Minoan "settlement colony" on the island (Branigan 1981: 32-33; 1984: 49). Architectural elements, pottery, stone vases, jewellery and metal objects are clearly Minoan from EMII to LMIB. The recent excavation of a Minoan peak sanctuary at Aghios Georgios, on the mountain above the settlement of Kastri, dated to MM and LM, confirm that the Minoans occupied this part of Kythera, probably in order to make contacts with Laconia easier (Sakellarakis 1996).

Egypt and the Levant are the origins of numerous foreign objects discovered in Crete. There are also many items which imitate pieces from these two regions. Evans (1924) referred to points of similarity between Crete and Egypt and talked about an immigration of people from Egypt. This assumption, however, was not accepted later, as the evidence of contact was considered scarce, pointing to an exchange of gifts as souvenirs (as the items found are mostly prestige goods), or a small scale exchange. Branigan,

reviewing the evidence, examined all the categories of objects that were considered imported from Egypt, and concluded that only some thirty stone vases, belonging to the Old Kingdom or the Pre-dynastic period were possible imports in Crete, in EMII. Warren suggested that these vases were imported to Crete in the time of their floruit and not later (Warren 1965; 1969: 105-115), because Old Kingdom and earlier vases were not in use in later ages not even in Egypt itself (Warren 1965: 29). However, only four come from deposits dated to EMII (Knossos, Aghia Triadha, Mochlos), the others coming from mixed ones, dated up to LMIII (Warren 1965: 29-34; Warren and Hankey 1989: 125-127). All the other early Cretan imports from Egypt are dated to MMI-MMII period, including all the scarabs (for collected references of the Egyptian artifacts found in Crete see Pendlebury 1932). This fact, along with the presence of Minoan pottery in Egypt after MMII (Kemp and Merillees 1980), made Branigan conclude that there is no strong evidence of contacts between EBA Crete and Old Kingdom Egypt, and only in MMIA these contacts seem stronger (Branigan 1973: 26-27).

Therefore, it could be said that exchanges between Crete, Egypt started from EMII, mostly concerning prestige goods and raw materials (e. g. a hippopotamus tusk found in Knossos), (Krzyszkowska 1988). However, the evidence is still scarce and it is not possible to talk about a large scale exchange system in the pre-palatial. A small scale one, along with an exchange of prestige items seems to be substantiated by the evidence.

With Syria and the Levant the situation seems slightly different. Syrian daggers from Platanos, Koumasa and Aghia Triadha and various cylinder seals

(that will be discussed later) are evidence for a more intensive contact between Crete and the Levant, at least from MMI. Minoan type objects (a scraper, a votive horn, a pyxis lid) and little Minoan pottery were found at Byblos and Ras Shamra (Branigan 1967: 117-121; Money Coutts 1936: 135-136; Hutchinson 1962: 105) belonging to the end of the pre-palatial period. Also Minoan daggers, a razor and a MMIA bridge-spouted jar were discovered in tombs in Cyprus, probably showing that contacts between Crete and Syria were conducted through Cyprus (Catling and Karageorgis 1960: 126; Branigan 1966b: 123-126). As Branigan puts it, "the relationship between Crete and Syria on the one hand and Egypt and Syria on the other, seems stronger than the direct contact between Egypt and Crete. Egyptian influence in Crete is still difficult to detect, there is little Minoan material getting through to Egypt, but Minoan ideas are reflected in Syria (e.g. the adoption of Minoan foot and hoof amulets)" (Branigan 1973: 23). Two more studies by Cline (1994), for the LBA, and Lambrou-Phillipson (1990), present the evidence of later contacts between the Aegean and the Near East. However, we can not be certain about the mechanisms of these contacts, particularly in the early phases. The small amount of material from the early phases, along with the nature of the imported artifacts (stone vases, scarabs, cylinder seals -mostly prestige items) perhaps suggest that a small scale exchange was involved.

The evidence of sealstones

Seals and sealings are probably the most numerous examples of exchanged items after pottery and stone vases. The EMII Minoan seal from Aghios Kosmas (Mylonas 1959: 157-158 and fig. 166), and the two Cycladic

sealings found in the EMII fill levels below the West Court at Knossos, which are made of non-local fabric and have a general resemblance to EBII Cycladic seal impressions (Wilson 1984: 210-211; 1994: 41; Weingarten 1994: 174-175), reveal early sphragistic contacts between Crete, the Cyclades and Mainland. Seals belonging to the style-group with Cycladic/Helladic parallels support this view (see Chapter 5), as do seals like CMS IIi Nr 196, 202, 203, 456, 463, 429, which are very close to others from Kea (CMS V Nr 476-sealing), Kouphonisia (CMS XI Nr 5), Lerna III (CMS V Nr 35-before the House of the Tiles) and Asine (CMS V Nr 526). Generally it can be said that EMII seems to be the period of stronger contacts and influence.

On the other hand the Lerna sealings (Heath 1958: 119-120; 1969: 512-517) are generally different from pre-palatial motifs, and stand nearer the Phaistos sealings, although there is a large chronological gap between them. Rotation and endless rapport, that so often appear in pre-palatial Crete are scarcely present at Lerna (CMS V). Wavy bands and spirals, that are common in EMIII and MMIA, appear at Lerna (and at Knossos later) but are not very common, and are characterised by different decorative syntax, being "restricted", closed motifs, on the sealface (Sakellariou 1961: 79-87). Matz (1974: 90-95), comparing oriental, Cycladic, Helladic (Lerna) and pre-palatial motifs, concludes that each area developed seal manufacture independently, from the beginning of the Early Bronze Age, but all were in contact with one another. From EMIII onwards the Minoan seal making seems to be flourishing, though, in contrast to the other two Aegean traditions.

Seal exchanges with Egypt and the Levant also seem to start from EMII. The hippopotamus tusk found in EMII levels at Knossos (Krzyszkowska 1988: 123-125) shows that these contacts were not only on the level of artifacts, but raw materials were also part of them. The silver cylinder seal from Mochlos (Seager 1912: 111), coming from an EMII-III context, seems to be of Syrian origin and is dated by Aruz to around 2500 BC (Aruz 1984: 187-188). Another cylinder seal, made of haematite, that came to light at Mochlos, in the new excavations by Davaras and Soles, was also imported from Syria and dated to EMII-MMI, from the related pottery sherds. Seven more oriental cylinder seals found in Crete are dated between 2000-1600 BC (Moller 1980: 86-99). Among them an Old Babylonian cylinder from Platanos Tholos B, and one from "Eastern Crete" are probably dated to the early 19th century, and one from Giophyrakia is slightly later (Bucholz 1967: 153-156; Moller 1980: 85-103).

While cylinder seals are few in number, scarabs and scaraboids are foreign shapes appearing in Crete in large numbers from the end of the pre-palatial period. Some are imported, but many are made in Crete. Yule (1983) mentions about twenty scarabs and scaraboids of Minoan manufacture, mostly belonging to his "Border/Leaf" Complex (Sbonias' Group of White Pieces) (e.g. CMS IIi Nr 1, 117, 118, 154, 332, 402). The Egyptian examples come mostly from the tholoi of Aghia Triadha (A), Aghios Onouphrios, Koumasa A, Platanos, Lebena, Gournes and the cave of Trapeza (e.g. CMS IIi Nr. 95, 119, 120, 180, 201, 204, 238, 267, 283, 395, 405, 434, 498, 499) (for the whole list of scarabs and scaraboids from Crete see Yule 1983). They probably came to Crete from MMIA to MMIII. The three scarabs from Platanos are early, characterised by

Muhly as contemporary to the Old Babylonian period (1975: 81-82). Two of them are dated by Ward (1971: 76, 93; 1981: 71-73) in the first intermediate period, from 2150 to 1950 (MMIA). Additionally, Eggert and Wotzka (1987: 407-413) discuss all the dates proposed for some of the imported scarabs, and none seems to be earlier than MMIA.

Imported sealstones and scarabs must have been a symbol of prestige and status for their owners, as "exotica". If we consider the small number of imported seals in this period, compared to the whole corpus, it seems that the owners of these objects were somehow differentiated from the rest of the seal owners. As seals were artifacts that belonged to only a few people in any case, imported foreign seals added a new dimension to this differentiation, especially as they may have been acquired from distant countries.

Imported seals from Archanes

The number of imported seals (or seals imitating foreign examples) in the Archanes-Phourni cemetery is considerable. Two steatite seals from Burial Buildings 5 and 6 (Cat. Nr. 12, 13) probably come from the Cyclades or Mainland, or imitate seals from this region. The first has wedge-shaped sinkings, recalling the EMI? seals from Lebena tholos II (CMS IIi Nr 202, 203) and has many similarities with a seal from Lerna III (CMS V Nr 35), as well as sealings from the same region (CMS V Nr 134, 137, 139, 145, 148, 149), earlier than the House of the Tiles. The second has triangular sinkings, arranged in a circle around a central point, also recalling a seal from Lebena II (CMS IIi Nr 196 -although in this case there is also a central rosette), with Mainland or Cyclades the most likely source (see also Chapter 5). These seals,

although coming from later contexts, are dated stylistically to Phase I (EMI-EMII).

Another seal from this phase, coming from the lower level of Tholos E (EMIIA), is made of bone, a common Minoan material, and is decorated with C-spirals (Cat. Nr. 6), probably showing Cycladic or Helladic influence, as spirals are rare in Cretan art at this time but common in the Cyclades and Mainland before Lerna IIID (House of the Tiles sealings), to judge from the small number of seals discovered in these areas.

Two more seals from the lower level of Tholos E (Cat. Nr. 7 and 8) are made of hippopotamus ivory, as well as the majority of seals from Phase II, and many seals from phase III (see Chapters 3, 5). Hippopotamus ivory seems to have been imported at Archanes from EMIIA until at least MMIB. The fact that we have hippopotamus ivory in the north of the island in Phase I (see also an EMII hippopotamus ivory tusk from Knossos), is in contrast with the situation in the south, where bone is almost exclusively used for seals in this early phase, and shows that Archanes and north Crete in general, were already obtaining small quantities of raw materials from the Near East in EMII. In Phase II (EMIII-MMIA) this exchange becomes more intensive, with the majority of Cretan seals, in the south and the north, made of hippopotamus ivory. In Phase III (MMIA-MMIB) hippopotamus ivory goes out of fashion again, but is still used in Archanes, where a few examples exist, so the exchange of this material continues, although not so intensively.

Beside ivory as raw material, three foreign seals came to light in the cemetery of Phourni at Archanes. An Old Syrian cylinder made of lapis lazuli,

from Burial Building 5, and two Egyptian scarabs, from Burial Building 6 and 7 (Cat. Nrs 69, 75, 85). One more cylinder made of hippopotamus ivory (Cat. Nr. 61) and two scaraboids (Cat. Nr. 90, 91) are almost certainly Minoan artifacts, imitating the shape of foreign seals, as they easily fit in the style-groups of the period.

The Old Syrian cylinder is made of lapis lazuli and depicts a Syrian figure, of a God or a priest, wearing Syrian dress and turban, and holding a sceptre? or a rod, between decorative triangles and palmettes, that fill a large part of the rest of the surface. Lapis lazuli cylinders are known from several stylistic groups of Syria and Mesopotamia (Porada 1965) and some are also found in the Mainland and Crete. Many lapis lazuli cylinder seals were discovered in Thebes, in the Mycenean palaces, some of which were of earlier date, Early Mesopotamian (2500-1600) (Porada 1965: 173). A larger lapis lazuli cylinder seal was also discovered at Knossos (MMIIB levels). Kenna (1969b: 355-358) discussing the Archanes cylinder, identified a variety of elements -Cretan (triangles), Syrian (figure and dress), Egyptian (palmettes) and Babylonian (solitary figures)- and places the seal at the end of the 19th century and the beginning of the 18th. He considers it possible that it could have been of Minoan origin or made for Minoan use, or by a Syrian influenced by sealstones of the 1st Dynasty of Babylon, where solitary figures occur, as solitary figures with decorative elements, without script or animals, do not usually appear in Syria or Cappadocia. As the engraving has been executed with skill, and this kind of figure and dress is not found at all in Crete, Kenna believed this seal was probably a Syrian artifact, made by an engraver that was

aware of Babylonian, Egyptian, or even Minoan fashion. On these grounds, it is dated to MMIB by Kenna and possibly belongs to the proto-palatial period. At the end of the 19th and the beginning of the 18th century, impressions with mixed Old Babylonian and Old Syrian elements are numerous (Ozguz 1980) and this could be such a seal. The dating of the seal in the 18th century and its Syrian origin were also confirmed by other specialists in sealstones of the Near East (Collon, pers. comm., 1997; Moorey, pers. comm., 1997).

The two scarabs present a much simpler case. They are almost certainly Egyptian, made of "white paste". The first depicts two animals, dogs or goats, arranged antithetically, facing one another. Such linear depictions appear in Ward's periods 2 to 4 (Ward 1978: 20-33 and 37-42), and Warren (1980: 494-495) dates this scarab to the VIth Dynasty, Ward's period 2 (2150-2075), while Eggert and Wotzka (1987: 406-413) claim that it could be slightly later (until 1990 BC.). In any event it is probably contemporary with MMIA-MMIB. The second scarab, with depictions of C-spirals, is probably dated to the 11th Dynasty, and the First Intermediate period (Warren 1980: 494-495; Eggert and Wozka 1987: 411-412).

The three seals from the Near East, along with others imitating foreign shapes and a few examples with Cycladic/Helladic associations, are clear indications of contacts between the inhabitants of Archanes and other sites outside Crete. As seals are considered to be prestige goods (see Chapter 10), it seems possible that these artifacts were important for their owners, helping them maintain their status in society. However, the importation of hippopotamus ivory indicates that not only artifacts, reached Archanes at this

period. Raw materials as well as artifacts were coming to the island from EMII onwards, but this early exchange was on a small scale.

The social importance of these imported artifacts and materials can not be overemphasised. As Helms (1993: 163-167) and Appadurai (1986: 4) have suggested, prestige items play an important role in maintaining their owners' status or furthering their goals. Being the owner of a seal coming from a foreign land must have entailed a great deal of prestige on its own, apart from any practical usage of the seal.

Conclusions

The study of exchange, and particularly that of sealstones, helps us draw the following conclusions:

1) An exchange system between Crete and the Cyclades (and Mainland in a smaller scale) developed from EMI and became more wide-ranging in EMII, involving all types of artifacts (pottery, sealstones, figurines), raw materials (silver, lead, copper) and possibly organic materials, especially from Crete to the Cyclades. These contacts seem to be reduced after EMIII.

2) Trade and exchange with Mainland and the Cyclades seem to have been replaced by increasing contacts with Egypt and the Levant. This trade started in EMII, especially in north Crete, as the hippopotamus ivory from Knossos and Archanes shows, then developed in the next stages (EMIII-MMIA) and became more intensive at the end of the pre-palatial period and later at the time of the first palaces. Beside raw materials, valuable items like cylinders and scarabs reached Crete, probably for people that higher in the social hierarchy.

Strangely the number of ivory seals drops dramatically from the end of the pre-palatial period.

The evidence provided by sealstones and other artifacts concerning exchange, helps us formulate a picture of a more complex and organised pre-palatial society, than is recognised by some scholars (see Cherry 1983; Watrous 1994). Craft specialisation and exchange betray social differentiation and some kind of social hierarchy. Therefore, the existence of elites seems to be substantiated by the evidence. Sealstones were probably items of high social status (see Chapter 10), playing a role in restating and enhancing an individual's prestige. Their study in the economic, religious and social context will follow, in an attempt to complete this picture.

Chapter 8: Economic Organisation and Administration

Economic organisation and administration in the Early and Middle Bronze Age is basically associated with clay sealings. They are irregular lumps of clay used to close objects. While still malleable, these clay lumps were pressed on the object to be secured, a document or a container perhaps, and were then impressed with the sealstone of a person responsible for the contents. When the document or the container were opened the clay sealing was broken, but it was then further kept for security or record purposes and after some time discarded. Sealings are basically found in settlements of palatial character, and their presence is indicative of bureaucracy and organised exchange. Systems of complex economic organisation and administration in prehistory are mainly associated with the existence of script and sealings. Their occurrence in pre-palatial deposits is scarce, although nearly a thousand seals exist from this period, and questions about the organisation of pre-palatial economy are thus difficult to address. Was there organised administration in this period, and if so, was it at the level of the individual, the community or the state? Furthermore, what was the role of sealstones in economic organisation? The connection with the more general question of social organisation and the existence of an elite in EM Crete, is evident, thus making the answer important for our understanding of the period before the palaces.

Sealings were used in Mesopotamia for the protection of products and for administrative purposes from the 5th millennium BC and were constantly in use in much of Western Asia, Asia Minor, and Egypt for the next 4000 years

(Kohlmeyer and Strommenger 1982: 35-42; Van Driel 1983; Magness-Gardiner 1990). These sealings were principally stamped by cylinder seals, that also have a long history in this area (Frankfort 1939; Collon 1987), and sometimes were accompanied by script. Ferioli and Fiandra (1989: 43) give a detailed account of all the eastern sites with sealings from Mesopotamia (e.g. Babylon, Kish, Nippur, Uruk) to Syria and Palestine (e.g. Ugarit, Ebla, Meggido), Turkey (e.g. Arslantepe, Karahoyuk), and Egypt (e.g. Giza, Tell Amarna, Abydos, Uronarti), describing a common use of sealings, throughout the millennia. They include in this catalogue the Mainland and Cretan sites that have produced sealings, discussing a common practice in Mediterranean and eastern areas (see also Ferioli and Fiandra 1990). Nearly all these sites are of palatial character, giving a picture of organised state administration.

Particularly in the third and second millennium, the period that concerns us here, sealing practices in Asia and Egypt were very organised and were usually accompanied by script. The Syrian palaces of Mari, Alalakh and Ugarit of the 2nd millennium, give evidence of a society divided into two sectors, state and private, with the palaces being the centre of state administration. Sealings were used to secure rooms, jars, baskets, bags and boxes for short term security reasons, while sealed or unsealed documents provided long term accountability. Legal and economic texts were usually sealed by cylinder seals in this respect (Magness-Gardiner 1990: 62-63). In Egypt, from the late pre-dynastic to the Early Dynastic period and the Old Kingdom, sealings represent administration which provided for the royal funerary cults, probably related to the provision of goods for the cult (Kaplony 1963; Reisner and Smith 1955).

Later, in the Middle Kingdom, sealings are more related to activities of daily life and civil administration (Reisner 1955). Scarabs and stamp seals begin to replace cylinders, and the sealings they stamp are usually accompanied by hieroglyphic inscriptions. Sealings from the fortresses in Nubia present evidence not only for day to day local administration but also national administration (Smith 1990: 197-214).

The use of sealings in the Aegean Bronze Age

A diachronic survey of sealing use in the Aegean Bronze Age will follow, in an attempt to present a complete picture of sealing practices in this area, which in turn will be helpful for the interpretation of the earlier period, with regard to sealing use. In the Aegean, the corpora of sealings discovered are small in number, covering a period from the Early to the Late Bronze Age. Lerna is alone in producing a large number of sealings in the early period. One hundred and forty three fragments, representing possibly one hundred and twenty four different sealings and bearing impressions of seventy different seals, were discovered in a room of the House of the Tiles. Heath (1958: 86-100 and 117-120) categorised these sealings in five types and presented a stylistic analysis that showed the difference between their impressions and those from the contemporary motifs of Early Cretan seals, something that was also pointed out by Sakellariou (1961) and Wiencke (1974: 158 and 1981: 255-260). The Lerna sealings are generally accepted to represent proof of administration practices in the Early Helladic period, with the House of the Tiles housing the local "authority". A few stamped impressions on clay vessels from Asine (Frodin and Person 1939: 232, 306) and Zygouries (Blegen 1928: 47,

197, 212) confirm this picture for the Mainland. In the Cyclades a small number of Early Bronze Age seal impressions have been discovered on Kea, stamped on hearths and clay vessels (Younger 1974: 164, 172), but no sealings have come to light. In the time of the Mycenean palaces sealings appear again in Pylos, Mycenae, and Thebes, along with Linear B script and clay tablets, presenting a complex administrative system with the palaces as the base for most economic activities (Aravantinos 1984: 42-44, 48).

On the island of Crete, the first large corpus of clay sealings came to light in Phaistos, dated in the time of the first palace (MMII). 6500 clay nodules were found in room 25, apparently used for sealing objects rather than documents. About 10% had secured various identifiable goods, such as jars or rush matting, while 90% sealed either flaring wooden pommels or small wooden cylindrical pegs, wrapped around with cords. These pommels and cylinders projected from the sides of boxes, vessels or doors and were secured by the cords which fastened them (Weingarten 1986: 280). The Phaistos sealings are the most numerous and best documented sealings of the island, because of the studies of Fiandra and Ferioli (1989), who drew several important conclusions. The objects mainly sealed are goods containers lying in the storage rooms, such as baskets, canvas bags, and vases of different dimensions with different kinds of lids made of straw, cloth, leather or other materials. Clay sealings also appear on knobs, latches or other kinds of doors, showing that they were also used to seal doors. Of course this fact does not mean that the primary function of seals is the protection of goods and the prevention of theft, as they were easily broken. They did, however, proved a

violation, and possibly a change in the quantity or quality, of the goods contained in a vessel or room. Thus the main function of sealings is to be found in a legal-administrative level. As Ferioli and Fiandra suggest: "we can ascertain the duties and the bureaucratic authority of the seal' holders; the seals were considered as personal expressions of public and private responsibility...they are a link between economic thought, a basic element for the first social political organisation, and the consequent book-keeping and administrative thought, which is also basic for the accountancy, and the only implement used for the management of economic activity" (Ferioli and Fiandra 1989: 47).

The different stages of the use of sealings are as follows:

1) At the beginning there was a nucleus of shapeless clay pre-arranged to be used as an administrative instrument.

2) When it was placed on the object that had to be controlled, it became a clay sealing.

3) When the seal was impressed, the clay sealing gained a different value. It provided evidence for the relationship between the procedure of closure and the person responsible for that specific function, and involved the presence of the sealholder. This means that an act with considerable legal-administrative value took place. Before its removal, the clay sealing impressed by a seal shows when the storage rooms, containers etc. were closed and that there were no later operations. The authenticity of the contents is protected by the impression of the seal.

4) The clay sealing was taken off, losing its function of guarantee of closure between one operation and another; this possibly means that the quantity of goods contained in a vessel or room has changed.

5) After it was removed, the sealing was kept in the same place in which it was removed and stored in the archives for a period, becoming part of a complex of documents that could reveal a chronological order of operations concerning the contents of a room or vessel (Ferioli and Fiandra 1989: 47-49).

Therefore, according to Ferioli and Fiandra, we can imagine a system of government that is organised on the basis of network controls, and the concentration of power in a single person is avoided. All the officials and administrative sections are controlled and checked, in order to eliminate the possibility of illegal activities, pointing to an advanced form of economic government.

Along with the 6500 sealings found in room 25 at Phaistos, 18 tablets were discovered, with Linear A script, one scelle and five roundels, showing a contextual association of written clay documents, purely impressed clay sealings and inscribed sealings, for the first time (Palaima 1990: 86). This association of clay sealings and script is more evident in the hieroglyphic deposits of Malia and Knossos, which are contemporary or slightly later than the one from Phaistos. Tablets, medallions, cones, nodules and noduli with hieroglyphic signs came to light at Malia and Knossos, showing a closer association of script and sealing practices (Olivier 1990: 18; Poursat 1990a: 28-29). Apart from the script some evolution also in the sealing system has taken place: the crescent-shaped nodules appear in both Malia and Knossos

hieroglyphic deposits giving rise "to a whole future Minoan family of nodules" (Weingarten 1986: 281). At the same time the flat-based nodules appear in the Knossos hieroglyphic deposit, and are in fact the only type of nodule in the later deposit from the Knossos Temple Repository (MMIII).

In the neo-palatial period flat-based nodules are the only type of sealing used. Direct sealing of objects was abandoned, as the nodules were no longer pressed against containers, but were hung instead. A peculiar type of sealing, with no perforation for hanging or any other means of attachment appeared in Knossos (especially in the deposit of the Temple Repository) and in other centres, and are explained as dockets, receipts for work done (Weingarten 1988: 3-4). The same use is possible for roundels, inscribed clay objects, impressed by seals (Hallager 1987: 347, 351; 1990: 130-134). The use of inscribed seals disappeared from sealing administration (Weingarten 1990: 107) but inscribed nodules and roundels become common in this period (Palaima 1990: 93-96).There is a change in emphasis from seals which prove simply that a storeroom or container is intact to sealings which authenticate and have to do with written documents (Linear A tablets in Knossos, Zakros, Aghia Triadha and Chania). Sealings found in different sites, like Aghia Triadha, Gournia, Knossos and Sklavokampos, are very close stylistically, something that led Betts to conclude that they represent some type of correspondence between villas and the central authority of Knossos (Betts 1967: 24-27). As they were made of different "local" clays Betts was led to argue that the sealings were made by the seal of a central official who travelled to these sites.

Origin of the system-Evidence from the Early Bronze Age

The problem that arises, of course, is how the Minoan system developed in the first palace period, what was its origin and what were the reasons for changes in its development during the Minoan period. One of the possibilities is that the sealing system used in the first palace of Phaistos, and visible at Malia and Knossos, was "imported" from the East (see above for the Near Eastern evidence). Weingarten is in favour of this opinion, believing that clay sealings were known earlier in Crete, but their use was rare and sporadic. Based on the small number of sealings known from pre-palatial contexts, and on the fact that sites like Vasiliki turned up no sealings at all, she claims that the burst of administrative activity should be connected with the foundation of the first palaces (first upheaval). The system of sealing administration that we see in Phaistos is an "offshoot" of the widespread sealing system which is found throughout the Near East (Weingarten 1990: 105-107).

In order to evaluate Weingarten's first upheaval, we will review the situation in pre-palatial Crete, and in the Aegean Early Bronze Age in general. As has already been said only one large corpus of sealings has come to light from this period in the Aegean, the one from the House of the Tiles at Lerna. Levi considered these sealings to be of Cretan origin, especially after comparing them with the ones from Phaistos (Levi 1957/58: 190), but these claims were rejected by Heath (1958: 117-120) and Sakellariou (1961), although the sealings from these two sites are stylistically close. These two scholars pointed out the chronological difference between the Lerna and the Phaistos sealings, although accepting the common points between the two

corpora. Sakellariou comparing the Lerna motifs with the ones from Phaistos found similarities and differences and concluded that the first are better in the working of the details and the compositional ability. The geometric syntax of the Lerna sealings and the organisation of the motif around a centre, is evident in Phaistos but it does not reach the stylistic excellence of Lerna, as in many cases this organisation around a centre is not achieved. The centre responsible for the Lerna sealings was, according to Heath (1958: 120), in the Argolid itself, and according to Sakellariou (1961: 86-87) in the Cyclades. Nevertheless, the motifs and style of the Lerna sealings find clear "echoes" in the sealings of proto-palatial Phaistos. In contrast pre-palatial seal motifs, contemporary or slightly later than the ones from Lerna, are different in composition (see Chapter 7, p. 201), as rotation and rapport, and not organisation around a centre, are the basic stylistic elements of the motifs.

Comparing the Lerna motifs with the ones from Kea, one sees the same preference for geometric forms and static designs which focus on the centre of the seal. But Cycladic motifs show a fondness of spirals, while at Lerna double loops and wavy bands are mostly preferred (Heath 1958: 120). All these points indicate that the seals responsible for the Lerna sealings were made locally, although there is strong influence and contacts with the Cyclades. Therefore, Lerna probably had its own administration system (with the East being the source of the original idea), as a way to secure goods and possibly control both local and long distance exchange.

The sealings from Kea also indicate administrative practices in the Cyclades at this Early period. Contacts with the Mainland and Crete are certain

from the Neolithic (obsidian) and throughout the EBI and EBII, as the evidence of raw materials (silver and lead, copper), marble figurines, clay and stone vessels indicate. Two clay sealings discovered in EMIIA levels of the West Court House at Knossos, are made of non-local clay. Wilson (1994: 41) suggested that they may both be of Cycladic origin, as the clay and the motifs show. These sealings are strong indication of a security and/or administrative system operating in the Cyclades for the control of goods.

With this picture of the Cyclades and Mainland Greece in mind, the case of pre-palatial Crete will be discussed. A small number of pre-palatial sealings have come to light, coming from reasonably secure pre-palatial contexts: one from Sphoungaras (Hall 1912: 70), one from Knossos (Hood and Kenna 1973: 103-106), two from Palaikastro (Eccles 1939/40: 49; Warren 1970: 31-33; Sackett and Popham 1965: 304), one from Trypiti (Vasilakis 1986: 85; 1992: 168-169), one from Myrtos (Warren 1972a: 227), one from Pyrgos (Pini 1990b: 36), one certain and two possible ones from Malia (Hue and Pelon 1992: 31-32; Poursat 1980: 192), a stamped loomweight from Chamezi (Eccles 1939/40: 48), three from Chamaleuri, two from Chania, and one from Platyvola cave (Vlasaki and Hallager 1992: 254-267). To this list can be added the two EMII Cycladic sealings from the West Court at Knossos mentioned above (Wilson 1994: 41), and possibly two from Archanes (Cat. Nr. 128, 129). All these are dated from EMII to MMIA (see Vlasaki and Hallager 1992, for a detailed list and dates). Pini adds to this list twelve more sealings from Knossos, two from Palaikastro and one from Phaistos, which come from later contexts, but are impressed by pre-palatial seals (Pini 1990b: 34-35).

The two conical sealings from Archanes are important for two reasons: they are modelled in a very rare shape for sealings and their motifs are certainly pre-palatial. They are both conical, with a stringhole on the top and the motif on the flat, circular base. The first depicts two opposing human figures, facing each other, one of them holding an object, and the second two antithetical human figures in the centre and a parade of four lions around it on the margin, walking anti-clockwise. Both motifs are clearly pre-palatial, dated to phase II (EMIII-MMIA). However, both sealings present a problem. In contrast to what Pini, Vlasaki and Hallager have claimed, they are not found in pre-palatial contexts. The first (Cat. Nr. 129) was found in Burial Building 18, in the proto-palatial rooms (see Chapter 2: Chronology and Sakellarakis and Sakellaraki 1991), and the second (Cat. Nr. 130) in the "Palace" of Tourkogeitonia, as a stray find. Burial Building 18 of course had many seals of Phase II and Phase III, probably retained as older heirlooms, and possibly the same could be the case for the two conical sealings.

It is evident from the above discussion that the use of sealings was not unknown in pre-palatial Crete. The evidence is steadily accumulating, although no large corpus of sealings has come to light. This could be related to the fact that only a few settlements from this period have been excavated up to date. However, the use of sealings attested in various areas of Crete (northcentral, west), is indicative of a more widespread use than generally believed.

Script

Considering now the evidence of script, the first hieroglyphic seals, written archival documents in hieroglyphs, sealings impressed with hieroglyphic

seals and inscribed sealings appear in the old palace period (Phaistos sealings, Knossos hieroglyphic deposit, Malia hieroglyphic deposit). The relationship between inscriptions on hieroglyphic seals and those on written archival documents is evident for three reasons, according to Olivier (1990: 18):

1) Seal impressions executed from hieroglyphic seals were found together with written archival documents both at Knossos and Malia.

2) The script (and probably the language) is the same in the two sets of documents.

3) Similar sign groups, containing from two to four signs, are found in the two different classes of documents.

Putting aside the decorative element of these seals, Olivier claims that some seals and the symbols on them present syllabic value and could be used as script. Signs found on sealstones and clay tablets are evidence for that. Therefore we might assume that these seals along with the written documents played a role in the administrative system.

The close connection between the two activities is also mentioned by Kenna (1962; 1963: 1-6). Taking as examples Mesopotamia and Egypt he claims that writing seems to have emerged from a pictographic use related to the motifs of the earlier seals. "Certainly in the early dynasties, formal similarities between pictographs and motifs can be observed, while later, script is found on seals and sealings not only as adjunct to other forms and then part

of the motif, but still rather later in some cases, as the motif itself" (Kenna 1962: 3).

Could this be the case in Crete with pre-palatial seals and hieroglyphic script? Branigan (1969a: 13-19) comparing some basic groups of the Phaistos sealings motifs with pre-palatial ones claims that the first were derived from the second. Designs used in the palatial era, as represented in Phaistos, could be traced back to EMIII/MMIA, according to Branigan, or even EMII. The persistence of these symbols shows that "they did indeed possess a standard and recognised meaning which changed little during the course of some six or seven centuries. In the case of seals and sealings at least, the designs and their meanings during the early palatial period would seem to have a recognisable Minoan ancestry" (Branigan 1969a: 15). So the script of the early palatial seals was either introduced or developed in the island during EMII. The same is true for many of the hieroglyphic signs, like the star, the cross, flowers and others, suggesting that the new script was in fact a mixture of old and new signs and symbols (Branigan 1969a: 17-18).

The eight hieroglyphic seals from Archanes, with hieroglyphs or combinations of hieroglyphs with other motifs (animals and plants, geometric motifs), along with some others that belong to the Archanes script group, with representations of animals (see Chapter 5) are very important in this respect. First of all they are all dated to Phase III, and are earlier than the first hieroglyphic script from Malia or Knossos, probably developing at the end of the pre-palatial period. Four of them (Cat. Nr. 65, 66, 71, 81) have the sign of the sistrum, something that brings to mind the sistrum that came to light in

Burial Building 9 in Phourni (Sakellarakis and Sakellaraki 1991). One has a double axe (Cat. Nr. 104), Evans's sign Nr. 36 (Evans 1909). Three more, all coming from Burial Building 6, present a combination of signs. Cat. Nr. 72, a three-sided gable made of bone, has the signs of the sepia (cuttlefish), Evans's Nr. 60, and a double axe (36), on one side, a flying bird? and a lance? on the other, and a sepia (cuttlefish) (60), a hand with stretched fingers (Evans's Nr 10), and a spouted vessel for libations (Evans's Nr 40) on the third. The second one (Cat. Nr. 73), a disc made of bone, has again a double axe (36), a sepia (cuttlefish) (60) and a holly branch (Evans's Nr 100) on one side, and a sepia (cuttlefish) (60), a spouted vessel (40) and a small sitting bird (Evans's Nr 80) on the other. Finally Cat. Nr. 70, is a fourteen-sided seal made of bone, with hieroglyphs in some faces, sometimes combined with other animal, plant, and geometric motifs. The sistrum is also present here, along with various "geometric" signs (fish?, palm tree?), that can not be recognised.

The first signs of a script on the seals of this phase could be significant regarding control and administration mechanisms. Unfortunately we do not have any sealings with hieroglyphic signs from this early period. However, the fact that seals were engraved with one, two or more hieroglyphs could be indicative of administrative use, as in later periods (see previous discussion).

Discussion

Based on the evidence of pre-palatial sealing practices and script many scholars have expressed different opinions to those of Weingarten's on the economic organisation of the period before the first palaces. Pini suggested that seals were used for some kind of administrative purpose during the pre-

palatial period, but also remained in use for a considerable time after their manufacture. Before the sealings of the House of the Tiles were discovered, the situation on the Mainland was worse than in Crete, as there were neither sealings nor seals found in large numbers. The hypothesis of the existence of administration should not be entirely dependent on the quantity of sealings found. According to Pini, we should not assume that one sealing from an excavated site is evidence for securing private/personal property and more than ten or fifty from another site is evidence for an official administrative control of goods. Also, it seems unlikely that all the pre-palatial seals first served a different purpose (e.g. perhaps worn as talismans) and that their use changed to an administrative one in MMII, almost 200 years after they had been made. As seals existed in Crete from EMII onwards, there is no reason to believe that their use for sealing purposes only started much later (Pini 1990b: 37).

Wiener (1990), comparing the evidence for settlement size, complexity and trade in EMIII and MMIA Crete with EHII Lerna, suggests that Crete should also have made administrative use of the large number of seals it produced. The level of social complexity and exchange in Crete in EMII-MMIA appears, according to Wiener, to be greater than in EHII Lerna, and so would be the need for an identification and organised recording system. Wiener also suggests that the scarcity of evidence for a sealing system during EMII-MMIA, could be a result of the accidents of recovery. If the Lerna sealings had not been discovered we could not be certain of the existence of any administrative system in EHII. He presents six factors relevant to this point:

1) The factor of chance in site selection and area of excavation.

2) The precise circumstance of a destruction. For example, if the room collapses before the fire starts, and it is raining, sealings, tablets, and frescoes may be lost.

3) The amount of rebuilding at a site. The construction of the first palace in Knossos and Phaistos destroyed most of the evidence of earlier occupation.

4) Destruction by fire is by far the most likely to preserve evidence of widespread seal use, tablets or frescoes. Accordingly the archaeological record may reveal not the time of the first appearance of an administrative system, but rather the first major fire destruction after the first use.

5) The concentration of sealing administration in small areas until after the LMIB destructions.

6) The character of the excavation itself, the skill and diligence of the excavator, trench masters and workmen. Of course many early excavations were badly run by today's standards. Accordingly we should remain sceptical about the argument *ex silentio* regarding the absence of an administrative sealing system in Crete before MMII (Wiener 1990: 237-238).

Vlasaki and Hallager point out another problem with the pre-palatial sealing corpus. Of the twenty-one sealings, only eleven are true sealings, with the other ten stamping pottery, loom weights or spindle whorls. These last, according to Poursat (1990b: 55), suggest some sort of control and organisation of production, but other interpretations are possible. They could be decorations or potter's marks or evidence for administration within a

community. From the other eleven sealings two from Archanes and one from Sphoungaras are of the same type (conoid with stringhole) and motif on the base. The other eight are of different types, but only one from Chania has string marks, on the outside of the sealing (Vlasaki and Hallager 1992: 269), a fact that could be significant in terms of continuation and development, as later sealings have string marks on the inside. For the rest of the sealings it is not possible to say how they were attached to objects, so their primary function could be to identify ownership and authority, in some other way without being attached to objects. Generally, as Vlasaki and Hallager conclude, the material seems to favour the idea that administration of production, trade, and storage were needed in pre-palatial Crete, and seals were a vital instrument in this administration, as in later times (Vlasaki and Hallager 1992: 270).

Palaima emphasised the absence of substantial evidence from the pre-palatial period, but he gives more weight to the Myrtos sealing, because it conforms to the same sort of practice as the Phaistos Room 25 sealings and because "it is hard to imagine that the individual who had the impulse to guarantee the integrity of a storage room in one instance would not repeat this process on some other occasion. Nonetheless, even if this singleton multiplied, it would not advance us beyond the stage of possibly idiosyncratic and sporadic local practices. There is nothing like the relatively uniform systems that are attested in the proto-palatial period. Of course there is no writing *per se* either: even the "Arkhanes" script is confined to hieroglyphic-like characters on seals" (Palaima 1990: 85-86). This view, however, is based on the small number of known sealings, which should not be the basic factor. The fact that

the number of sealings increases with new excavations (Vlasaki and Hallager 1992: 270), the contextual evidence from the period, as presented in previous chapters, along with the large number of seals, are indications of a more complex system than idiosyncratic and sporadic use of sealings.

Conclusions

Keeping in mind these various interpretations, one should try to put the evidence of pre-palatial sealing practices and script in the general context of the period. As far as Phase I is concerned, we have already seen in previous chapters the existence of specialised production of sealstones, metal objects and pottery, as well as intensive exchange between different regions of the island (see Chapter 6). In addition overseas contacts, primarily with the Cyclades and Mainland, and to a less extent with Egypt and the east are evident in this period (see Chapter 7). The existence of sealings in this early phase (Myrtos, Trypiti?, Knossos, Platyvola, Chania?), in combination with the evidence for craft specialisation and long distance exchange indicate an increasingly complex economic organisation. Whether the use of sealings was introduced for security reasons, or as a way to identify ownership or authority, or even as the first stages of an administrative system, is hard to define, but they do point to a relative complexity of function. It is also possible that both individual and communal transactions were conducted in this general framework.

In the next phases (II and III) exchange with Egypt and the East intensifies, internal exchanges continue, and specialised production of artifacts reaches new heights with the use of new materials, techniques and tools (see

Chapters 6 and 7). In this period, along with a small number of sealings (Sphoungaras, Archanes, Palaikastro, Knossos, Pyrgos, Malia, Chamezi, Chamaleuri, Chania) we have the first appearance of script signs on seals from Archanes-Phourni, most of which are also found later in the hieroglyphic deposits. The use of new ways of control and administration, indicate more centralized organisation of economic transactions, without excluding individual use of the system. Can we speak of more powerful and prestigious elites in the second and third phase? Were the palaces a more impressive manifestation of this power and prestige at the end of the pre-palatial period?

There was certainly a long tradition of sealing use before the system of the first palace period was developed. The idea may have been initially adopted from the East, but it was incorporated into the Minoan socio-economic system. People in the pre-palatial period used sealings in a way that served their own needs, and these ideas were reflected in later periods. The "Cycladic" sealings from Knossos and the sealings from Lerna clearly confirm that sealing systems were in use from the Early Bronze Age in various parts of the Aegean. As Crete was in close contact with both these areas, it is difficult to believe that the use of sealings was unknown in Crete or used only for individual transactions.

Social differentiation and inequality are evident in most of the cemeteries of the period (see Chapters 1 and 10). This along with the evidence of internal and external exchange, craft specialisation and technological advances are clear indications of an increasingly stratified society. The use of sealings and script (in the later stages of the pre-palatial), must have been associated with

the emerging elites. Recognising that earlier seals were still in use in later times, means identifying a continuity of usage. Of course changes in the manner or the intensity of use are possible, but continuity and tradition are factors that cannot be ignored. Therefore a system of economic organisation in the pre-palatial period is substantiated by the evidence, probably simpler than that of the first palace of Phaistos. How this system worked and was organised is something we could understand only after more sealings and more pre-palatial settlements come to light, hopefully more extensive than Vasiliki and Myrtos, which are our basic source of information about this period. Then maybe the appearance of the palaces at the end of the pre-palatial period, could be seen as possibly a more impressive manifestation of the power and prestige, that were already "accumulated" in earlier phases.

Chapter 9: The amuletic significance of seals

Amulets and amuletic seals

Having considered the seals from an administrative point of view, they should also be examined in connection to belief systems. Evidence for religious activity is rather scarce in EBA Crete. One of its manifestations are the amulets, mostly carved in stone but also in clay or metal. They are either anthropomorphic (torsos or feet) or zoomorphic (bulls, fish, birds), but some are simply small tablets of stone. It is possible that they were considered to protect the owner or give him/her particular powers (Branigan 1993: 71-72). As Kenna says, an amulet in antiquity was held to be a sympathetic preservative against sickness and misfortune, or an aid to fertility and strength- an object whose shape or substance was thought to impart beneficial effects to the owner. The shape seems often to have been copied from nature or perhaps by chance or through some association later forgotten, a shape or some kind of material or a certain combination of both was thought to possess or to have acquired some special potency. For example foot amulets were probably thought to offer protection from snakes or scorpions (Kenna 1960: 5).

These interpretations are based partly on the actual shape of the amulets and partly on ethnographic observations. We should not forget that ethnographic parallels should be used with caution, as beliefs and ritual practices are often particular to certain human groups, even among tribes of the same area, and can sometimes differ even among members of the same tribe (Ucko 1969). It is possible, however, that particular artifacts were

considered to have had prophylactic powers, bearing in mind their shape, their deposition among funerary goods, and observations of ethnographic examples of such use. According to Ucko only the combination of ethnographic and archaeological evidence could offer possible explanations of funerary material remains. As a way to "narrow down the range of possible alternatives, it becomes necessary to focus in detail on the archaeological data which exists" (Ucko 1969: 264).

If we accept the use of amulets in pre-palatial Crete, it seems possible that at least some sealstones served also as amulets and the two functions may have been closely associated. As we have seen in Chapter 4, various seal-shapes have been considered to be amuletic (see p. 107) .

The basic criteria for the identification of amuletic seals are: the shape (zoomorphic, anthropomorphic), and the design (representations of animals like the agrimi, the snake, the bird and the scorpion, or motifs with ritual value in Minoan life like the double axe and the scraper). The shapes and designs that can be considered to be amuletic are rather scarce and do not appear in large numbers.

Shapes with possible amuletic functions were the zoomorphic ones. These seals were found along with more functional shapes in funerary contexts, and were engraved with motifs characteristic of the phases they belong to. What distinguishes them is their shape and their representation of animals.

Fourteen zoomorphic seals have come to light in the cemetery of Phourni, at Archanes, modelled in various animal shapes like dogs, lions and insects (see p. 107) (Cat. Nr. 5, 22, 25, 41, 46, 62, 63, 64, 75, 76, 85, 90, 91, 108). They are made of various materials (bone, hippopotamus ivory, white paste, steatite) and are engraved with the usual motifs (cross-hatching and other linear designs, leaves, scorpions, spirals).

Many zoomorphic seals were also discovered in other sites, and mostly in the Mesara and Asterousia tholoi:

scarabs, imported or made in Crete (Yule 1983) (e.g. CMS IIi 95, 119, 120, 267, 283, 117, 118, 154)
scaraboids (CMS IIi 99, 238)
interlaced animals (CMS IIi 25, CMS IV 31, 28, CMS V SIA 282)
sitting apes (CMS IIi 20, 249, CMS V SIA 302, 303, 435)
lions (CMS IIi 114, 130, CMS V SIA 221)
cows (CMS IIi 253)
ducks (CMS IV 5)
other unrecognisable animals (CMS IIi 357, CMS IV 29, CMS V SIA 222, 223)
animal heads (lions?) (CMS IIi 16, 17, 18, 19, 469, CMS IV 30, CMS V SIA 304)
pig-heads (CMS IIi 294)
bottles or other shapes with animal heads as handles on the top (CMS IIi 21, 281, 436, 437)
birds (CMS IIi 112, 133, 438 -doves)

Table 9.1: Zoomorphic shapes in pre-palatial Crete

Most of the zoomorphic seals are very well made, "miniature sculptures in their own right" (Branigan 1988: 142). They present a variety of animals, domestic and wild, and creatures that probably were not native to Crete (lions, apes). The quality of engraving is excellent, with realistic representations of

limbs and muscles, and even more importantly with an ability to communicate something of the character of the animal (Branigan 1988: 143-144).

The meaning and importance of these seals could be connected with these characteristics. The representation of domestic animals could have had prophylactic meaning for these animals, important for the nutrition of their owners, or could have been connected with particular characteristics. The use of wild animals as models could also be connected with some of their attributes, for example cunning, strength, or speed. Shapes like snakes could be related to ritual beliefs, which were to become crystallised around the cult of the Snake Goddess. Certainly the small number of zoomorphic seals in comparison with the total number of seals, their actual shape, and the labour invested for their manufacture indicate a special meaning of these artifacts.

The same could be said about the anthropomorphic seals of this period. Two steatite (CMS IIi 277, 416), and a debatable one made of ivory (CMS IV 4D), are the only pre-palatial seals modelled as human figures. Another from the Giamalakis Collection could also be dated to this period (CM 1). Four seals are in the shape of a foot (AGD I1 1, CMS IIi 212, 407, CMS X 32, and two more are shaped as human heads (CMS IV 97, 18D). To these can be added the anthropomorphic seal from Phourni-Archanes (Cat. Nr 87), made of bone. A standing woman is dressed with a long dress, ending in collar medicis, with hands joined on the breasts. The head is flat in front, with no manifestation of nose, two swellings for ears, asymmetrical eyes, manifested with small holes, and an elliptical line for mouth. Hands, waist and skirt are plastically represented and the skirt is decorated with three horizontal parallel grooves on

both sides. The sealface is on the base, with regular cross-hatching inside a border.

Foot and human figure amulets are well known in this period (Branigan 1970c; 1993: 71), so the seals in these shapes possibly possessed the same meaning. Feet could be considered as prophylactic from snake or scorpion bites, while heads or human figures could be connected with cult or religious figures. Whether they were amongst the first representations of deities is possible but unlikely. There is no difference in the treatment and deposition of these particular seals which were found amongst many others, accompanying the dead.

Some of the designs could also be explained in amuletic terms. The repetition of a certain combination of what appeared to be highly specialised forms, showed that these motifs, clearly different in character from other seals, might have been different in purpose or function (Kenna 1969a: 26). Onassoglou and Kenna, examining the talismanic seals of the Neo-palatial period mention designs like the scorpion, the wild goat (agrimi), religious symbols like the double axe, sacral horns, generally animal and plant symbols, insects, fish, birds (Onassoglou 1985: 82-123; Kenna 1969a: 27). All these symbols first appeared in the pre-palatial period, and it is possible they had such religious-amuletic character from early on.

Kenna defined the talisman as a more effective kind of amulet. "The potency of a talisman, however, would appear to be due more to specific characteristics which, capable of formal description, are extraneous to the material and shape of the object. Talismanic character seems then to be less

inherent than amuletic character. It would seem to be the result of a more conscious and deliberate attempt to impart magical power to an object by the formal addition of some symbol or sign" (Kenna 1960: 1). The snake, which is found on a seal from Platanos (CMS IIi 305), could be indicative of an amuletic-talismanic use, or even ritual dimensions, from this early period. The same could be said for the wild goat (agrimi) (Branigan 1988: 111-112). Although talismanic seals played an important role in the later period, we cannot be sure that all of these designs had religious connotations in the pre-palatial period, but it is clear that at least some symbols that were later used in the hieroglyphic script seem to originate from objects with religious connotations in the EBA. Hieroglyphic signs like 18, 12 and 36, the scraper, the single and the double axe, represent items which in the pre-palatial period had a symbolic or ritual significance. The scraper was used practically, maybe to remove paint from the face and body, paint that may well have been applied for ritual purposes, possibly of a funerary nature (Branigan 1965: 81-83). On the other hand, the single and the double axe seem to have had limited practical use, at least in Crete, and were regarded as objects of ritual significance. The double axe especially could also be worn as amulet (Branigan 1966a: 115-117), or as a sealstone (CMS V SIA 310) and was used as a sign already in the Archanes script (Cat. Nr. 70?, 72, 73, 104). It is in this phase at the end of the pre-palatial period that more "religious" symbols are perhaps used on seals.

Conclusions

We can conclude that particular seal shapes and motifs seem to have possessed amuletic significance for their owners. Shapes like the zoomorphic

and the anthropomorphic ones, as well as motifs such as scorpions, snakes, double axes, present in small numbers, seem to have had particular significance. In Appendix Q a discussion of the evidence of funerary rituals and communal religion in this period is presented in an attempt to link them with sealstone use. Unfortunately the evidence for religious activities in the pre-palatial is fragmentary, and in regard to sealstones clearly speculative, as only certain shapes and icongraphic motifs present possible links to religious activities. However, the evidence increases and a more organised and complex picture of religious activities emerges. This can be important in the context of a relative complexity of the pre-palatial society that we saw in the previous chapters, and makes a discussion of the social organisation of the period significant.

Chapter 10: The social role of sealstones

Most of the recent discussion on the use of seals in pre-palatial and proto-palatial Crete has concentrated on their sphragistic-economic significance. Large numbers of sealings found mainly in Phaistos, Monastiraki and Malia and a lesser number in Knossos and other sites have created great interest in economic organisation and the administration of the first palaces. Using the evidence of sealstones of the pre-palatial period, comparisons have been made with palatial seals and sealings in order to reveal information about the possible origins of the palatial system. Although Renfrew (1972: 386-390) assumed the seals in the tombs were indicative of a particular status (head of the family) in order to calculate numbers of dead in the tombs, and Blasingham (1983) discussed their social significance in the context of the Mesara tholoi, it can be said that this aspect of sealstone use generally has been overlooked.

Body Counts

One of the aims of this study is to examine sealstones as social items in EM and MM contexts, in other words before and shortly after the foundation of the palaces, based mainly on the material that came to light in the cemetery Phourni of Archanes, but also on evidence from the Mesara tholoi. The number of seals in comparison to the number of bodies, patterns of seal use in cemeteries and specific aspects of their utilisation will be examined, in order to offer some evidence on the social meaning of seals, differentiation and social organisation of this period in Crete.

If we accept the assumption that sealstones are connected with particular individuals, the question of which and how many people possessed seals arises. This is clearly connected with the number of seals in comparison with the number of buried individuals in each tomb, estimations of the size of the contributing population to a tomb, and the social status of the people who possessed seals.

These are all difficult points to establish. Skeletal material from the tombs is scarce, poorly preserved and little studied. In addition the effects of ancient and modern looting and damage provide further obstacles. Furthermore, one should not forget that the tholos and house tombs of the period were used and re-used over a long period, with several cleanings taking place, and that funerary practices were probably multi-stage, with at least primary and secondary burials, deposition of goods and possibly subsequent libations and other ceremonies (see Branigan 1993: 61-80, 119-141). Despite these difficulties scholars have proposed different social groups as contributing populations to the tombs. Glotz (1921) believed that they were used by an entire tribe. Clan groups have been favoured by Bintliff (1977: 83-84), Hood (1971:140), Hutchinson (1962: 233), Warren (1972a: 267) and Branigan (1970b: 128-129). Whitelaw put the argument for a nuclear family usage (1983: 334-335) and was followed by Cherry (1984: 31). In order to come to a conclusion one must decide on three very important factors: 1) how many corpses would a nuclear family contribute to a family tomb in a century, 2) how long is the period of time over which the burials were made, and 3) what is the total number of burials made in the tomb (Branigan 1993: 82).

The first of these factors is the easiest to estimate. It is widely accepted that a nuclear family would yield about 20 corpses per century, including children. This is largely based on observations and historical records of mortality in peasant societies (Bintliff 1977: 83).

The second point is much more complicated. The dating of the tombs in relative and calendar terms is very difficult. The paucity of diagnostic finds in several tombs, the uncertainty of dating some of the less diagnostic material, the declining usage in later phases, at least in some cases, make it difficult to establish the period of use in terms of relative chronology. But even if that is achieved, the translation of the relative dates into calendar years is even more difficult. The correction of the C-14 dates with the tree-ring calibrated chronology led to a review of Aegean Bronze Age chronology recently by Warren (1996) and Manning (1994a), and before that by Warren and Hankey (1989), expanding the time span of the Early Minoan period (3500-2000 BC, according to Warren and Hankey, 3100-2000 according to Manning) (see Chapter 2). Whilst accepting the general validity of the tree-ring calibration of C-14 dates, some scholars do not accept the present calibrated chronology for the Aegean Bronze Age and believe that EMI can not be placed before 2800 BC and MMIA not later than 1900 BC (Branigan 1987: 300-301). One can easily understand the complications that these variations create for the estimation of the contributing populations to the tombs. The expansion of the length of time reduces the number of burials per century and ultimately therefore the size of the contributing population to each tomb.

Finally the third factor, the estimation of the number of the dead in a tomb, is also a hazardous undertaking. The information from the excavation of the tombs is usually inadequate. Xanthoudides talked about hundreds or even thousands of burials in the Mesara tholoi (1924: 134). Halbherr estimated a total of about 250 burials in Aghia Triadha A (1905: 31). Alexiou recorded about ten burials to the square meter in Lebena I, which would mean a total of 200 burials in this tholos (Alexiou 1960: 225; Daux 1959: 743). For Myrsini a figure of less than a hundred was given (Daux 1960: 821) and for Vorou A about 55-60 (Marinatos 1931: 152, 167). These estimations by the excavators are usually controversial and uncertain. Therefore attempts have been made to calculate the number of burials by other means. Branigan (1970b: 129) suggested that the evidence from Vorou indicated that two or three clay conical cups were used at each funerary service, and that the thousand cups at Kamilari I might therefore indicate about 400-500 burials. A similar number of cups was found in the Aghia Kyriaki tholos, so one might make a similar estimate for that tomb (Blackman and Branigan 1982: 40). Also an alternative calculation was proposed in the Aghia Kyriaki report (Blackman and Branigan 1982: 55) identifying a typical funerary assemblage of jug, bowl and two to four cups, resulting in an estimated number of burials c. 320-370. We should keep in mind that the whole calculation is based on the assumption that groups of two or three conical cups at Vorou are each the product of a single burial, and that a jug and bowl were used at each funerary ceremony, throughout the period of use, and this should be examined in connection with the dating of the pottery used, as some of the pottery could belong to different periods. For

example conical cups for individual use were introduced at the later stages of the pre-palatial. Also, some of the pottery could have been left in the tomb during rituals (e.g. libations, see Appendix Q).

Whitelaw, adopting Renfrew's proposal (1972: 386-390) that each male occupant (head of the nuclear family) may originally have been buried with a single dagger or sealstone, multiplied the number of daggers/sealstones by a factor of five (for the remaining members of the family) and proposed the body counts for Mesara and other tombs on this basis (Whitelaw 1983: 334-335), claiming they were family tombs. This argument is based on a number of assumptions. It is assumed that the persons buried with a dagger or seal were the male occupants-heads of the nuclear family, and that all of these high-ranked people were always buried with either a dagger or seal. Beginning with the assumption that seals or daggers were owned by the heads of nuclear families, multiplying by 5 would certainly lead to a family usage of the tombs.

Finally Branigan (1987: 301-308) used alternative methods to estimate the size of the cemetery populations. Using as test cases Lebena I and Vorou A, with estimated number of burials, according to the excavators of 200 and 55-65 respectively, he proceeded with alternative calculations, each based on different assumptions. Some of the calculations assume that the calibrated C-14 chronology is correct and the range within each calculation represents the maximum and mean periods of usage. Other calculations assume the historical chronology is correct, and again the range reflects maximum and mean periods of usage. Also, some calculations assume 20 bodies, contributed by a nuclear family during a century, others 16 and others 12. The results of these

calculations are groups of estimated numbers of dead and numbers of nuclear families, from which Branigan chooses some as more probable than others. The results suggest that each tomb in the Mesara was probably used by at least two or three nuclear families and only a few tombs might have served a single nuclear family.

Of course we must keep in mind several important points concerning these calculations:

1) Most of the tombs were looted both in ancient and modern times. Xanthoudides mentions modern looting of Kalathiana, Koumasa and Platanos, referring to "knives of copper", daggers and seals. He was also convinced that most of the tholoi in Mesara had been largely looted in antiquity.

2) It is possible that the nature of deposited grave-goods changed through time and even if the head of each family was buried with a dagger and seal, we are not certain that this practice was maintained throughout the lifetime of a tomb, especially when they were used for many centuries.

3) Sealstones and daggers were probably not equally available to the contributing population throughout the period of use. For example copper and bronze work was much more freely available in EMII than in EMI (Branigan 1974: 105) and the use of seals at all in EMI is debatable.

4) If seals and daggers are prestige goods and symbols of status or rank, we do not know if the rank or status in question was the head of a nuclear family, the head of a small clan or extended family, or the head of a larger social group.

5) The level of burial activity was not maintained at the same rate throughout a tomb's period of use. MMIB and MMII material from the Mesara tholoi is small. It is also possible that the earlier burials are lost, through cleaning operations in the tombs.

6) It may be that some elements of the community were excluded from burial in the tholos tombs, although at present the tholoi are the only widespread form of burial place known in the EBA Mesara.

7) There is no evidence as to the age, or status required of an individual for a dagger or seal to be part of the burial assemblage.

8) There is no evidence as to which sex, or both, owned seals during this period.

To sum up, attempts to calculate the number of dead in the tholoi have presented us with useful but uncertain results. We still lack reliable information about the cemetery populations and there are problems associating the estimated number of burials with grave goods, and the status of people buried with them.

In this respect Phourni-Archanes is one of the most important Minoan cemeteries in Crete, particularly because stratified contexts in the cemetery and the most accurate body counts for any tholoi could contribute towards answers to some of the questions raised above. The study of the tholoi and the house tombs could offer firm evidence of the contributing population in each period and therefore give us new information on social organisation as well as the association of the dead with various types of material culture.

Burial Building 19 offers an opportunity in this respect, as its clear stratigraphy gives us the opportunity to draw some positive conclusions concerning these matters. The lower level of the house tomb is securely dated to MMIA, while the upper level is dated to MMIB and MMIIA. The estimation of the number of dead as at least 193 burials during the 300-400 years of the tomb, leads to the conclusion that it was probably used by three nuclear families of five individuals or an extended family of ten to fifteen, according to Bintliff's principle that was mentioned above. The four seals were discovered in the lower MMIA level, which also contributed 122 skulls (Maggidis 1994: 30-37). Therefore in this period of around two hundred years only one sealstone per generation, or even per two generations, was used, probably by the head of these families (one seal for every fifty years). Of course we should keep in mind that Burial Building 19 is quite small comparing to other buildings in the cemetery, so these numbers should be treated with caution until we have results from other contexts. Also the ancient cleaning and possible looting operations for this primary burial deposit should be taken into account. However the importance of this case is evident.

The new evidence on the stratigraphy and dating of Tholos C (Papadatos, pers. comm., 1997), along with the study of the anthropological material, could bring to light interesting information for the number of dead in each period, in comparison to the number of sealstones, their association with various artifacts, their sex and age. 45 burials are mentioned by the excavator, but this number will be considerably higher after the study of the skeletal material has finished (Triantafyllou, pers. comm., 1997). The importance of that

is evident for the calculation of the contributing population and the basic social unit. Also, as we have nine seals from the tomb, this study could reveal the proportion of people that possessed seals.

Moving to other contexts in Phourni, the numbers of burials in some tholoi and burial buildings are mentioned by the excavator (Sakellarakis and Sakellaraki 1991: 71, 104, 106, 126).

	Nr.of burials	Nr. of seals	Prop. of people with seals
Tholos E, up. lev.	56	12	1 in 5
BB5	103	7	1 in 15
BB6	196	17	1 in12
BB16	41	7	1 in 6

Table 10.1: Number of burials and seals from various tholoi and burial buildings at Archanes-Phourni

If these numbers are compared to the number of seals from these buildings it seems that we have one seal every five-six people, or one every twelve to fifteen. These numbers correspond to a nuclear family, or two to three families. However, some considerations must be taken into account before such an interpretation: firstly, the skeletal material of these buildings has not been studied, so the numbers of the dead from each building will probably rise, as is the case with Tholos C (see above). Secondly, these calculations are roughly based on the number of skulls found. As skulls were mainly preserved after several cleanings of the tholoi and burial buildings, their number represents mainly secondary deposits. In any case, some of these buildings could have

mainly been used as ossuaries. Finally, we should keep in mind that skeletal material from the tholoi and burial buildings was cleaned and thrown away, as the evidence of the area of the rocks clearly demonstrates, and that these contexts are relatively mixed, covering more than one period, in some cases. Consequently, the number of burials in these burial buildings may have been considerably higher, and this would change the association between numbers of burials and sealstones.

Another important point can be made concerning Burial Building 19 (Maggidis 1994). At the southwest corner of the lower level, a large flagstone was laid horizontally on the floor, probably to receive ritual offerings and libations; 24 skulls were deposited around this area. Two sealstones, among other offerings, were discovered with these sculls, indicating that these artifacts followed their owners even in secondary burials. Their presence allows us to assume that they were considered as prestige goods and valuables. The other two seals from Burial Building 19 were also found among a group of skulls.

Leaving Burial Building 19 we can turn to some other patterns concerning sealstone use and deposition in the cemetery. As Correspondence Analysis has shown (see Chapter 5) it is possible to observe some patterns of sealstone use in the cemetery, concerning certain style groups and tholoi or burial buildings (Appendix P) (see pp. 150-151). These patterns allow us to conclude that there seem to be certain associations between particular style groups and tholoi or burial buildings. This probably means that particular groups of people were buried in each of the different tholoi and buildings, and that these groups each used seals of a limited and distinctive range of types.

The use of similar shapes and motifs for these seals may indicate relationships among some of these people, but it does not contradict the individual character of the seals. A number of seals from Phourni-Archanes could be associated with particular individuals, or at least a number of individuals. Cat. Nrs. 41 and 43, discovered in BB7, could positively be associated with 14 skulls. Cat. Nr. 76 and 79, from BB7-Tholos B Complex, were among the funerary offerings of one burial each. Cat. Nrs. 82 and 136 (sealing) could be associated with six skulls (BB7), and Cat. Nr. 84 with three surface burials. Finally Cat. Nr. 65 (BB3), was among the personal belongings of two burials, while five seals from BB9, Cat. Nr. 87-91, belonged to one skeleton. This evidence, available for the first time in the context of a Minoan cemetery, clearly suggests that seals belonged to particular individuals, and followed them in the tombs as funerary offerings after death.

Furthermore, these individuals were probably adults. In the upper level of BB19, dated to MMIB, 76 children burials were found. It is interesting that no sealstones have come to light from this level, indicating that these artifacts belonged to adults only. Also, all the individual burials that could be associated with seals, were adult burials, providing further evidence of this point.

The personal relationship between a sealstone and its owner is clearly depicted by a piece of evidence from Phourni. On a piece of a clay coffin, from Burial Building 5, three identical stamped sealings were found, all three around handles. Unfortunately the depictions are not clear and therefore can not be associated with any designs known from other finds in the cemetery and especially from Burial Building 5. However, it appears that the seal of one of

the dead buried in this coffin was used to stamp it, probably as a way of showing his/her (group?) identity, emphasising his/her status in society and stating his/her ownership of the coffin. Since the impressions were obviously made while the clay was soft, this coffin must have been made for a particular individual, and the secondary burial of others probably took place later.

Another interesting point that could be raised is the finding of clearly earlier sealstones in later contexts. Several seals from various burial buildings dated from Phase II onwards could belong to Phase I (Cat. Nrs. 15-28). Burial Building 18 especially, dated to the proto-palatial period, provides good examples of this. Some of the sealstones found in MMII levels are certainly of the pre-palatial period (Cat. Nr. 25, 52-57), demonstrating a continuation of use from generation to generation, at least in some cases. Unfortunately we can only speculate about the reasons and circumstances of this practice. Maybe it was a way to honour an important ancestor, or to exploit their prestige, or perhaps some sealstones were passed to the next generation under particular circumstances, for example when their owners were not buried in the cemetery. Whatever the case, it is obvious that these particular artifacts had some kind of long-term value, in order to be passed from one generation to the other, and this made the descendants of their original owners keep them, sometimes for several generations.

One should also remember that even among the sealstones themselves, there are some small groups that can be singled out as special. The zoomorphic ones clearly present such a case (see also Chapters 4 and 9). They comprise less than 10% of the total number of seals, both in Archanes

and generally in pre-palatial Crete. They were modelled in the shapes of various animals, domestic and wild (see Table 9.1, p. 231). Animals are also engraved on the sealfaces, for example goats and scorpions. Zoomorphic seals were found along with the rest, in the same contexts, but possibly had amuletic and prophylactic meaning, as discussed in the previous chapters. What concerns us here though is their significance, concerning status and social position. Their scarcity, along with the fact that they were very carefully modelled in most cases, therefore demanding much labour investment in their manufacture, are possibly indications of the prestigious position of their owners, which was probably displayed and strengthened by the possession of items like these seals (see later discussion).

A Question of Style - Seals as Symbols

Style is involved in all types of archaeological analysis, creating and defining artifact or even culture types. That is why many debates in the archaeological literature are over the use of style in analysis and interpretation. Scholars argue about its passive or active role in the society, and its use by archaeologists and ethnographers as means to understand past or even present societies.

Style is a very important aspect in the study of seals of the pre-palatial period. Their categorisation in style groups plays an important role not only for chronological reasons, but also as a way to reveal patterns of use and associations between sites and/or burial structures inside a particular cemetery. Therefore, a discussion of the use of style in archaeology will follow,

in order to show why it is essential for our understanding of the sealstones and generally the pre-palatial period.

New Archaeology employed the concept of style as a method to render analogies between present and prehistoric societies (Hill 1970; Longacre 1970). However, the participation or active role of artifacts was not emphasised. Material culture was seen as an adaptive component of a functioning cultural system. Stylistic patternings in artifacts and materials were conceived as cultural products that comprise codes for us to read (Conkey 1990: 5-8). This is clearly presented in Sackett's work. According to him (1977) an artifact should be regarded from two contrasting, but complementary, points of view. The first is function, in which it is perceived "as a thing that was manufactured and in turn used in a succession of activities that made up daily life in a given cultural setting" (Sackett 1977: 370). This means that objects operate not simply in the material realm of technology and economics, but also in the societal and ideological realms. '...even the seemingly most banal types of utilitarian objects may contribute towards structuring networks of social interaction..." (Sackett 1977: 370). Artifacts have also a passive voice, that connotes style. It works as a "...signpost or banner advertising the arena in which the roles are being performed" (Sackett 1977: 370). In archaeology, it can be diagnostic of a particular context, in terms of identifying it from the presence of particular stylistic features. This duality of function and style could be applied to whole assemblages and combinations of artifacts and not only to individual objects.

Later Sackett named this duality the "isochrestic perspective of style" (Sackett 1982; 1985). According to this view, people choose one of the isochrestic options to do things, because they are members of a social-ethnic group, and in that way social relations and function are related. Material culture presents patterns of isochrestic variation that are socially bounded and could be regarded characteristic of ethnicity or social distinction, and that is perceived as style, a passive voice that defines these societies but does not play an active role in their making. Even if messages are transmitted through style, this happens unconsciously (Sackett 1985: 157-158).

Sackett's concept of style was rejected by many scholars, including Wiessner (1983; 1984; 1985), Hodder (1990: 44-45), Conkey (1990) and Plog (1970; 1978; 1990: 61-72). They used style as a way to transmit information about personal and social identity (see Chapter 5, pp. 119-120).

Various ethnographic studies were conducted, to demonstrate this point. Wiessner studied the Kalahari San, especially projectile points and other artifacts and their use as symbols in the community. She examined stylistic variability in all the levels of social organisation, concluding that projectile points were used as emblems in the individual and group level, assisting personal and social identification (Wiessner 1983: 257-259, 269-271; 1984: 215-225). The same conclusions were reached by Hodder in his study of the Baringo area in Kenya, and the use of material culture. Several aspects were discussed: dress was used as a way to conform to the tribe people lived in, pottery operated as means to maintain boundaries between tribes, calabashes were decorated by young women as a method to disrupt social order, spears

were used by young men as a way to challenge the authority of older men. Clearly, material culture operated as means of communicating numerous messages, individually and within groups, maintaining or disrupting the social order (Hodder 1982a: 13-74). Elsewhere Hodder expressed these views more cogently: "...objects and activities actively represent and act back upon society. Within a particular ideology, the constructed world can be used to legitimise the social order. Equally, material symbols can be used covertly to disrupt established relations of dominance....symbolic structures are in a continual state of reinterpretation and change in relation to the practices of daily life" (Hodder 1982b: 10).

This fact is also reflected in our society. A discussion of bottles that hold alcoholic beverages is presented by Miller (1982), claiming that: "An inspection of this material would reveal patterns in the variability that may be related both to bottles as a referential system standing for their contents, but also to their place as an autonomous system of meaning employing hierarchy, contrast and gradation" (Miller 1982: 23).

The same ideas were discussed by numerous scholars in the last decades. (e.g. Bourdieu (1977), Tilley (1982), Braithwaite (1982), Shanks and Tilley (1982; 1987a; 1987b), leading to a consensus, that material culture is a communicative medium involved in social practice and can be used for transforming, storing or preserving social information. It can also act in relation to that practice.

During the pre-palatial and proto-palatial period of Minoan Crete, style is a very important aspect for the interpretation of sealstone use and significance.

As is evident from previous chapters, it is possible to identify some common stylistic patterns in different sites. Sbonias (1995) gives a clear picture of these associations between sites. For example, in phase II, the existence of seals of particular groups, (like the Lion-Spiral Group), in large numbers in Archanes, Moni Odhigitrias and Platanos reveals a relationship between these sites.

Social organisation in pre-palatial Crete has been considered until recently as simple and more or less egalitarian. However, recent developments in the study of this early period have led in a different direction. The study of pottery manufacture and exchange systems, as well as new evidence on metallurgy and lithic production, are indicative of more advanced social and economic systems in this period, with intensive movement of goods around the island. This picture contrasts with the revolutionary model and poses many questions about the social organisation of the period. Could the evidence from sealstones offer any possible answers?

Sealstones, as has already been argued, were probably prestige items, owned by few people in the community. Their presence in different sites and the relationship they seem to demonstrate between particular sites, at least where seals themselves are concerned (see Chapter 6), as well as varying patterns within a single cemetery, seem to indicate neither gift nor commodity exchange, but something in between. That means that they were probably not exchanged in large numbers for other goods, but also that their acquisition was a positive choice rather than a "passive" gift exchange. Sealstones were probably social items, used as symbols with political importance, and their

owners probably obtained them for particular reasons, practical and ideological.

Prestige goods are considered to have social life by Appadurai (1986). Through the analysis of their forms and uses, we can interpret the human transactions and calculations "that enliven things" (Appadurai 1986: 4). They obtain value from their political importance, signify relations of privilege and social control. In this respect it is the consumption of these goods that is eminently social and active (Appadurai 1986, see also Miller 1995). Consumption and demand are used as a way not only to send messages but also to receive them as well. They are determined by social and economic forces, on the one hand, but on the other, they manipulate, these forces. The same meaning is given artifacts by many other scholars like Kopytoff (1986), Davenport (1986) and Renfrew (1986), based on various ethnoarchaelogical case studies. Renfrew, especially, basing his conclusions on the study of a prehistoric cemetery in Varna, talks about prestige goods with "value of another kind" (Renfrew 1986: 159), a value that is regarded as intrinsic within a given cultural context.

Primitive valuables also have political roles in some of the aboriginal economies of the present. Dalton (1977) discusses the situation in New Guinea, claiming that such valuables were not a means of commercial exchange, but were transacted in political and social ways, "such as compensation, bridewealth, and war alliance formation" (Dalton 1977: 198).

Political power is related to the exchange of prestige goods by a number of scholars (e.g. Gamble 1979: 129-131; Carneiro 1981: 60-61). Friedman and

Rowlands claim that control over the production or importation of such goods becomes a direct means of economic control. "...(in the tribal system) the accumulation of prestige goods is a function of agricultural output and its conversion into feasts. Here (in more advanced societies) prestige goods production is independent of agricultural production, and represents an autonomous economic sector" (Friedman and Rowlands 1977: 222).

Who were the people that gained in prestige through this practice? Helms, using various ethnographic examples, argues that the very acts of skilled crafting and of long distance acquisition are important precisely because "they channel and concentrate (such) energy. Consequently, the individuals who do this crafting or who acquire such goods become associated with, perhaps filled with, this same power" (Helms 1993: 9). Therefore, skilled artisans themselves or elite patrons for whom they work become vehicles for moral qualities and for the political ideology of a society, and acquire political authority. Various ethnographic examples demonstrate this point (Helms 1993: 70-74).

The act of acquisition in its own right conveys and expresses prestige, whether we talk about skilled crafting or long-distance acquisition. That is why in many cases people who acquire special items may be granted leadership roles and authority (see Helms 1993: 163-167). As we have seen, sealstones in the pre-palatial period probably played a role as prestige goods, therefore people who acquired and possessed them, very likely constituted an elite and perhaps held political authority.

The meaning of sealstones

We suggest that sealstones were prestige items that played an important role for their owners' during life. In this respect, sealstones must have been personal items belonging to particular individuals. The fact that they were deposited with their owners in the tombs after death points to the same conclusion, as does the fact that nearly all of them are unique in the small details and no exactly identical seals exist. However, the large majority of pre-palatial seals belong to a restricted number of style groups (see Chapter 5), with the seals that belong to the same group having similar motifs and characteristics. Is this in contradiction to the individuality of the artifacts and how can it be explained in the context of pre-palatial Crete?

Although we believe sealstones were highly personal items, they were probably not used as an individual signature or a name, but rather as a way to express personal status that emerged from group identity. Perhaps the leaders of each group in a community possessed a seal that showed both group identity and personal position and status, being used in various activities (e.g. economic-administrative, religious). The fact that we have a small number of stylistic groups, each with seals with similar characteristics, during the pre-palatial period, is indicative of groups of people that had something in common, although they lived in different settlements and areas in the island. The nature of these common elements can only be conjectured; it could be phyletic or political, but it could equally be based on exchange and contact. How these groups and wider relationships are translated in terms of social organisation will be discussed in the next section.

Social Organisation in pre-palatial Crete

Several tholoi in the Asterousia mountains, the Ayiofarango valley and others like Lebena seem to demonstrate a picture of an unranked, egalitarian society. Few items of wealth exist and the buried individuals seem more or less to have been of equal wealth. Whitelaw's analysis of the situation of the EM settlement of Myrtos, seems to confirm this picture (1983). He observes six individual clusters, "recurring modules of roughly the same activity, composition and size. These modules or households, appear to be the basic organisational units within the community" (Whitelaw 1983: 332). Calculations suggest a group of between four and six individuals for each household, a social unit equated with the nuclear family. "The small range of variability in both the quantity and the quality of the material remains from each cluster (though complicated by factors of preservation) presents no evidence indicative of the differential status of any of the households within the settlement...in terms of day-to-day activities each (cluster) was independent" (Whitelaw 1983: 333).

This egalitarian picture though is not universal for Crete, as Whitelaw admits (1983: 337-339). First, several tholoi or groups of tholoi, like A. Triadha, Koumasa or Platanos present many pieces of wealth and display -gold work, bronze work, stone vases, sealstones- and more especially the products of long distance trade, even from the early periods (EMII) of the pre-palatial times. Furthermore there appear to be differences of wealth and prestige between the tholoi of a single community in some cases. Evidence of craft specialisation, exchange and possibly rituals outside the tombs are also indicative of societies, in which there was a degree of social differentiation by wealth. Phourni-

Archanes with the rich EMIII/MMIA? Tholos C, Mochlos with the great differences in the wealth of offerings, in the structural elaboration of the tombs, and with the dominant position of two particularly rich groups of tombs within the cemetery, Knossos and Malia with substantial EMI, EMII and MMIA, EMIII deposits that suggest fairly large populations, with necessary complex forms of social organisation, reaffirm this picture outside Mesara. What can we tell then about the social organisation of the pre-palatial period? Is it possible that the two models co-existed even inside the same area, such as Mesara?

The recent studies on the ceramic, lithic and metal production (see above) of the period bring to light new evidence on the exchange and use of these artifacts by populations around the island, and envisage formally organised and socially developed societies. Prestige items like sealstones, pendants, amulets, figurines and pieces of jewellery add to this picture. The evidence from seal deposition in Archanes-Phourni examined above seems to be in agreement with the above picture. Social distinction is evident in the use and deposition of seals and other burial goods. Therefore it seems possible that Crete presented a more complex picture in the pre-palatial period than is widely accepted. The existence of elites, at least in a number of communities, seems certain and this presages the emergence of political power and authority. The absence of monumental buildings like the later palaces, and generally the scarcity of excavated settlement sites prevents us from speculating further about the nature and form of this organisation. It is highly possible, however, that pre-palatial society was a hierarchical and complex

society, already, with many characteristics of the later "advanced" palatial period.

Chapter 11: Discussion and Conclusions

The seals from Archanes-Phourni comprise an important group of material for several reasons. It is the largest corpus of pre-palatial seals that has come to light from a single site and it comes from northern Crete, whereas all the other large seal corpora were discovered in the south. Furthermore, the cemetery of Phourni, with its many tholoi and burial buildings, offers the possibility of interesting patterns of distribution within a single cemetery. As the cemetery was excavated in the seventies and eighties, the excavation and recording techniques used offer the opportunity for the first time to study seals from well-recorded and dated contexts.

For all these reasons, this study of the sealstones from Archanes-Phourni, in the context of the other large corpora from Mesara and Asterousia, has produced many new insights into sealstone use and manufacture, as well as the economic and social organisation of the period in question. The principal points to emerge may be summarised as follows, under these two headings:

Seal Use

1) Using the Phourni-Archanes assemblage we have been able to clarify the periods of use of various materials used for sealstone manufacture. Soft stone is mostly used in Phase I and III, roughly contemporary with EMII and MMIA-MMIB, but it is scarce in the intermediate phase. Bone too is widely used in Phase I, seems to decline in Phase II, and then becomes popular again in Phase III. Ivory is used from EMII up to the beginning of the first palaces. It is at its zenith in Phase II, at the end of the pre-palatial, but some elaborate

examples from MMIA-MMIB contexts reveal the error of Sbonias' view that ivory was no longer used for seals in this period. "White pieces" are mainly produced in the third phase, when hard stones and metals appear as sealstone materials for the first time, although they only become popular later.

The dramatic increase in the use of ivory in Phase II, when it is the dominant material used for sealstones, requires some explanation. It clearly became "fashionable", but bearing in mind the difficulty of distinguishing between bone and ivory, even on close inspection, its popularity must have been due to factors other than its physical appearance. One possibility is that this exotic material was reputed or believed to possess magical or talismanic qualities. Another is that as a new and exotic material it had a high prestige value. In communities like those from which most of these seals come, the acquisition and ownership of such a material would have been common knowledge, even if it was visually little different to local bone. Why it went out of fashion in Phase III (MMIA-MMIB) also demands explanation, particularly as contacts with the east Mediterranean were increasing at this time and it is unlikely therefore that the supply of the material was cut off at source. If its popularity in Phase II was due to supposed magical qualities, then perhaps belief in its powers waned. On the other hand, if it was indeed a material with high prestige value, it may be that its use was now restricted to a small segment of the population -the newly emerged palatial elite- who effectively controlled its availability. The fact that a small number of elaborate ivory seals appear at Phourni in this phase, might support this interpretation.

2) The seals from Phourni-Archanes also provide some further resolution of the chronological succession and typology of shapes. In Phase I, along with the pyramidal, conical and cylindrical shapes we also have a gable-shaped seal and a disc, previously considered as later shapes. The first seals made of hippopotamus ivory, a conoid and a signet, appear in Tholos E. From EMIII (Phase II) stamp cylinders become the dominant shape, along with smaller numbers of gables, conoids, and zoomorphs. In Phase III (MMIA-MMIB) the same shapes continue, but in different materials and bigger ivory stamp cylinders, with concave bases, are made using new techniques related to the introduction of the lathe. Scarabs and scaraboids are new shapes at Archanes in this phase. In the next phase, IV, the repertoire remains unchanged at Phourni, except for the introduction of the lenticular sealstone.

3) Regarding the style-group chronological succession and classification we can see the following picture. In the first phase the designs are very simple, mostly irregular linear motifs, in contrast to the more elaborate shapes being made and used in this phase. The Archanes seals can be integrated into the three main style groups that Sbonias suggested for EMII. In the second phase, quadrupeds in parade, especially lions and wild goats, leaves and spirals, human figures and striped triangles are the basic designs, engraved on hippopotamus ivory seals. The four stylistic groups, as presented by Sbonias, are composed only of ivory seals, but the Archanes assemblage demonstrates that bone and steatite are still used in these groups, albeit rarely. Also, seals made of ivory that carry simple linear or geometric designs continue the tradition of the earlier period or extend the period of use for the "Cross-

hatching/Bone Complex" into the second phase. In the third phase, bone, white paste and soft stone seals with leaves, spirals, and geometric designs respectively dominate the picture. Hieroglyphs and the Archanes Script also appear, exclusively at Archanes, the first step towards the later hieroglyphic script. Seals with geometric designs (made of bone, boar's tusk, or hippopotamus ivory) are also still found, showing that simple linear designs never disappeared from the repertoire of the seal manufacturer. The motif of concentric circles becomes very popular in all style groups in Phase III and could compose a separate group.

4) Phourni provides us also with varying patterns of both material and style group use that are of interest. For example, in Phase I, the use of soft stone in Tholos E and its absence in Tholos C may be significant in this respect. In Phase III, we observe that only bone and soft stone are used in Tholos B and the burial buildings around it, whilst ivory is common in the southern Tholos E and Burial Buildings 16 and 18. With regard to style-groups we can see, in Phase I the use of the plain EMII Soft Stone Group in Tholos E, lower stratum, and the Cross-hatching/Bone Complex in Tholos C, and the use of the Group of White Pieces and the MMIA/MMIB Soft Stone Complex, in Tholos E, upper stratum and Burial Buildings 7 and 16, in Phase III. Also, the Lion-Spiral and the Spiral Groups seem to be associated with the above buildings and Burial Building 19. The Archanes Script group, the Leaves/Bone and Leaves/Ivory groups could be linked to Burial Buildings 3, 6, and 18 as well as the area between 8 and 9. It is possible that these varying distributions of styles and materials reflect their selective use by different groups in the

community represented in the cemetery. Further prospects on identifying and understanding the nature of such burial groups will depend on detailed study of the skeletal material from the tombs and in particular on the potential of DNA analysis (currently under consideration for the skeletal material of Tholos C).

Economic and Social relationships and organisation

5) The distribution of materials and style groups between pre-palatial sites in both southern and northern Crete was also examined to see whether specific materials or styles could be linked with particular sites, and to discover possible relationships between sites. Correspondence analysis was used with the following results: As far as materials are concerned, no strongly positive associations can be shown (see Appendix C, graphs 1, 2, 3 and table 1). Steatite, ivory and boar's tusk present some association with Koumasa and Platanos, bone with Lebena and Moni Odhigitrias, and white paste with Moni Odhigitrias and maybe Kaloi Limenes, while the undifferentiated ivory/bone seems to occur more often in Kaloi Limenes and Aghia Triadha. However, most of these associations, with the exception of white paste and Kaloi Limenes/Moni Odhigitrias, are not strong, and some can be attributed to chronological factors (for example bone appears in Lebena more often because in two of the tholoi there are closed dated EMII levels, when bone is a major material).

Therefore white paste is the only material that could be connected to one or two specific sites in the Asterousia, notably the adjacent sites of Moni Odhigitrias and Kaloi Limenes. Both these sites are mixed contexts, covering EMI-MMIA. This, along with the fact that the material appears only in phase III,

and seems to exist in small numbers outside the Asterousia mountains, make the association plausible. This could indicate the existence of workshop(s) in the vicinity of the Ayiofarango, supplying other sites with small numbers of seals made of this material.

In contrast the situation with style groups was more encouraging. The MMIA/MMIB Soft Stone Complex is clearly associated with Koumasa and Platanos, the Group of White Pieces is linked to Kaloi Limenes and Moni Odhigitrias, while the Plain EMII Soft Stone Group and the Meander/Wavy Band Group are associated with Moni Odhigitrias and to a lesser extent with Aghia Triadha and Lendas. The Cross-hatching/Bone Complex, and possibly the Leaves/Bone group are associated with both Aghia Triadha and Lebena, and the Archanes Script Group, as well as the Leaves/Ivory Group and the Spiral Group, with Archanes.

It seems that there is a positive association between particular style groups and sites, although we must recognise that these associations are based only on consumption patterns. Nevertheless, we could envisage production sites, specialising in particular style groups, which distributed most of their products locally and in small quantities in other areas. For example white pieces may have been produced in the Asterousia, and then been distributed to other sites. Of course, we should keep in mind that seals of the same style group sometimes present stylistic differences and could have been creations of different workshops. That is, some seals of the same style group could have been produced in more than one workshop.

6) Looking at the distribution of the different style groups in various sites in Crete we can detect further relationships between sites, which are not clearly obvious from the correspondence analysis, and particularly between Archanes and two sites in southern Crete. For example the Lion-Spiral Group seems to be present at Archanes and Platanos in larger numbers than at other sites, whilst the Meander/Wavy Band Group is scarce at these two sites. Similarly, the Leaves/Ivory group is well represented at Archanes, Moni Odhigitrias and Platanos but is extremely scarce at other sites. It is possible that these distributions are indicative of phyletic or other relationships between these sites in the pre-palatial, or that contacts and exchange were more developed between these sites than others. There is a context in which close relationships of this kind might be placed. Internal exchange in this period is attested in ceramic production including the movement of Mesara produced pottery to north-central Crete, and we should remember that the founding monuments of the Phourni cemetery are two tholoi of Mesara type.

7) The advanced skill, the considerable labour investment for the creation of seals, and the standardisation of forms are strong indications of specialised production. These characteristics, in combination with patterns of use in different sites and patterns of use inside the cemetery of Phourni, suggest the existence of particular workshops/specialists working for particular sites or even particular groups of people inside the same community. Especially at Archanes, the existence of a style group that is almost exclusive to this site (Archanes Script Group), as well as the stylistic differences (in all phases) that many of the seals present compared with ones from other sites,

are strong indications of the existence of a workshop in this area from an early date.

8) The seals from Archanes-Phourni with Cycladic/Helladic parallels, along with evidence from other types of material culture (figurines, obsidian blades) and raw materials (silver, copper, marble) suggest that there was a lively exchange system between Archanes and the Cyclades in EMI-II. On the other hand, the appearance of ivory from EMII and its continuous use, until at least MMIB also confirms contacts between Archanes and Egypt or the Near East. As bone and boar's tusk were already easily available, the exchange of hippopotamus ivory, which is "foreign", scarce and requires considerable investment of energy to acquire, could be associated with status and prestige. The origin of the stamp cylinders, one of the basic shapes throughout the pre-palatial period is probably the east, where cylinders were used from much earlier, engraved on the body and not on the bases. A few examples of cylinders with designs around the body, (e.g. Burial Building 19), show that this practice was adopted in Crete but never became popular. Some cylinders were actually imported from the east, including the Syrian example of lapis lazuli from Burial Building 5. Scaraboid sealstones of MMIA include imported Egyptian examples.

9) The sealings from Archanes are a welcome addition to the small corpus of sealings from the pre-palatial period in Crete. The scarcity of pre-palatial sealings contrasts with the large corpus of contemporary sealstones. Whether the discrepancy is entirely the result of chances of preservation or whether it reflects a usage which did not involve the retaining of sealings in the

same way they were stored at Lerna is uncertain. Nevertheless there is sufficient evidence to show that there was a long tradition of sealing use before the administrative system of the first palace period was developed. The practice may have been acquired from the East, but was incorporated into the Minoan socio-economic system. People in the pre-palatial period used sealings in a way that served their own needs, and these ideas were probably reflected in later periods. The Cycladic sealings from Knossos and Kea, and the many sealings from Lerna clearly confirm that sealing systems were in use from the Early Bronze Age elsewhere in the Aegean.

The appearance of sealings in EMII (Myrtos, Trypiti, Knossos, Platyvola, Chania?), may indicate a new aspect of economic organisation. Whether the use of sealings was for security reasons, or to identify ownership or authority, and whether it represents the first stages of an administrative system, is hard to define, but still a relative complexity of function is evident. It is also possible that both individual and communal transactions were conducted in this general frame. In the later pre-palatial, along with a small number of sealings (Sphoungaras, Archanes, Palaikastro, Knossos, Pyrgos, Malia, Khamezi, Khamaleuri, Chania) we have the first appearance of script signs on seals from Archanes-Phourni. Most of these signs are also found later in the hieroglyphic deposits. The use of new methods of control and administration, indicate more centralised organisation of economic transactions, without excluding individual use of the system.

10) The zoomorphic and anthropomorphic seals from Archanes are indications of an amuletic meaning possessed by particular seals. The use of

animals as models, motifs such as scorpions, wild goats and other representations of animals, the small number of these seals and ethnographic parallels are the basic criteria of an amuletic character. Along with figurines and various specialised pottery vessels (e. g. rhytons), amulets and amuletic seals provide important evidence of *personal* religious beliefs and activities in the pre-palatial. Communal funerary and non-funerary practices from the Mesara cemeteries, and the existence and use of Open-Air shrines and some peak sanctuaries already in the pre-palatial provide evidence of *communal* religious practices. Within the general context of significant developments in exchange, economic organisation, manufacture and technology, it seems possible that communal religion was practised in the pre-palatial period.

11) The study of the Archanes-Phourni seals offers some possible insights into the social significance of these artifacts. Sealstones were used by a very small percentage of the population. The case of Burial Building 19 in Phourni, or even Tholos C, has provided us with information from closed dated contexts, allowing us to compare the number of the dead with the number of the seals. It appears that only one seal per one or even two generations was deposited in many burial buildings and that tombs and burial buildings probably accommodated two to three nuclear families or an extended family. We suggest therefore that seals were prestige items used probably by the heads of these extended families. Whether they were buried with their owners or passed to the next generation they seem to have possessed special meaning and were clearly associated with individuals. In this respect it is particularly notable

that in some cases seals were removed and deposited with the bones of their owners in secondary burials (e. g. in Burial Building 19).

The find-context of the Archanes sealstones also provides evidence of both their individual and group character and use. A number of them can be associated with particular burials, which, when the skeletal data is published will enable us to say more about the age and sex of their owners. At the same time the vast majority of sealstones belong to a small number of stylistic groups, distributed in various tholoi and burial buildings in the cemetery. The patterns of distribution have shown association between specific style groups, tholoi and burial buildings, probably demonstrating a relationship between the owners of seals of the same style group (group identity).

If the evidence from this study of sealstones is considered in combination with the results of recent research on pre-palatial pottery, lithics and metallurgy, a more complex picture for the pre-palatial period emerges than previously believed. Craft specialisation, technological advances in various crafts, movement of goods inside the island, imported artifacts and raw materials from the Cyclades, the Mainland, Egypt and the Near East, and evidence of economic organisation and the beginning of an administrative system, all point to an increasingly complex society. The study of the sealstones of the period has clearly shown that some people were certainly differentiated in life and also in death, and that sealstones were personal items associated with status and prestige, and probably therefore with power and authority.

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