Craft specialisation, workshops and activity areas in the Aegean from the Neolithic to the end of the protopalatial period

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Craft Specialisation, Workshops and Activity Areas in the Aegean from the Neolithic to the end of the Protopalatial Period.

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Abstract

This thesis examines the theory behind workshops, including craft specialisation, and presents a catalogue of workshops and activity areas in the Aegean from the Neolithic to the end of the Protopalatial period.

No systematic procedure for analysing and classifying workshops has been used or proposed previously. The main aim of this thesis is to develop a method by which loci suggested to be workshops may be analysed, with a view to ascertaining whether this identification is correct. Following on from this, a further objective is to formulate a means of classifying the information to determine the type of working area and the degree of certainty with which it may be called a workshop or activity area. This method will be used in the compilation of the catalogue.

For a comprehensive study of workshops, two main theoretical issues are considered in Volume I. Firstly, the theory of craft specialisation, integral to the study and definition of workshops, is examined. Its definition, features, associated aspects and connection with workshops are researched. Secondly, a theoretical study of the possible varieties of workshops and their likely locations, products, and consumers provides a basis for the following examination of actual loci within the Aegean.

In Volume II a catalogue of working areas in the Aegean is presented, which also includes other craft-related loci: craftsman's graves, hoards and mines. The method for analysis is employed extensively throughout the catalogue to reinterpret areas previously suggested to be workshops or activity areas. New classifications are suggested for many loci. It is concluded that the proposed method is successful in achieving the aims for which it was developed.

This dissertation is the result of my own work and does not include anything that is the outcome of joint research. No material contained in this thesis has previously been submitted for a degree in this or in any other University.

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Abbreviations

Periodicals

AAA	*Athens Annals of Archaeology*
AE	*Archaiologiki Ephemeris*
AJ	*Antiquaries Journal*
AJA	*American Journal of Archaeology*
AM	*Mitteilungen der deutschen archäologischen Instituts: athenische Abteilung*
AmAnt	*American Antiquity*
AmAnth	*American Anthropologist*
AR	*Archaeological Reports* (supplement to *Journal of Hellenic Studies*)
ASAtene	*Annuario della Scuola archeologica di Atene e delle Missioni in Oriente*
BAR	*British Archaeological Reports*
BCH	*Bulletin de Correspondence Hellénique*
BICS	*Bulletin of the Institute of Classical Studies*
BSA	*Annual of the British School of Archaeology at Athens*
CA	*Current Anthropology*
CRAI	*Académie des inscriptions et belles-lettres. Comptes rendus des séances de l'année ...*
Deltion	*Arkhaiologikon Deltion*
Ergon	*To Ergon tis Arkhaiologikis Etaireias*
EtCret	*Études Cretoises*
JAS	*Journal of Archaeological Science*
JFA	*Journal of Field Archaeology*
JHS	*Journal of Hellenic Studies*
JMA	*Journal of Mediterranean Archaeology*
JNES	*Journal of Near Eastern Studies*
JWP	*Journal of World Prehistory*
OJA	*Oxford Journal of Archaeology*
PAE	*Praktika tis en Athenais Arkhaiologikis Etaireias*

PPS	*Proceedings of the Prehistoric Society*
REA	*Research in Economic Anthropology*
SIMA	*Studies in Mediterranean Archaeology*
WA	*World Archaeology*

Others

Palaeo	Palaeolithic
Meso	Mesolithic
EN	Early Neolithic
MN	Middle Neolithic
LN	Late Neolithic
FN	Final Neolithic
Neo	Neolithic
EBA	Early Bronze Age
MBA	Middle Bronze Age
LBA	Late Bronze Age
Myc	Mycenaean
C	Cycladic
H	Helladic
M	Minoan
EH+	Early Helladic onwards
(EH-)MH	Probably MH, but possibly EH-MH
N	North
E	East
S	South
W	West

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Chapter 1. Introduction

1.1 Aims

Of the prehistoric artefacts uncovered in the Aegean, many have captured the interest of the public and scholars alike. While scholars have often concentrated on what the presence of these finds reveals about their contemporary society, less attention has been focused on the circumstances of their production.

The importance of craft specialisation has increasingly been recognised over the last fifty years (Childe (1946), cited in M.T. Stark (1991: 64), Bates and Lees (1977: 825), R. Evans (1978), Benco (1988: 57), Cross (1993: 62-63), Sinopoli (1988: 581), Tosi (1984: 22), etc.). Even so, craft specialisation is rarely studied as a complete subject in itself; it is usually included in discussions about other subjects such as art, trade or social organisation. While these subjects play an integral part in the study of craft specialisation, the various considerations of this topic should be drawn together to form a coherent whole. This was the initial aim of the thesis. It became clear, however, that the small quantity of literature concerning the associated phenomenon of workshops was inadequate in relation to the volume of data to be studied, and that the scope for progress in this area was much greater. There have been few studies focused specifically on Aegean workshops, and no systematic procedure for analysing and classifying workshops has been used or proposed previously. No comprehensive catalogue of Aegean workshops exists; L. Platon's thesis (1988) is concerned with the Neopalatial and Post-palatial periods and concentrates mainly on workshops at Neopalatial Zakro, with additional reviews of other Cretan workshops and some workshops found elsewhere in the Aegean. This leaves a large portion of Greek prehistory effectively unstudied.

There are two principal aims of this thesis. The first is to develop and test an accurate method by which loci suggested to be workshops may be analysed, with a view to ascertaining whether this identification is correct. This method will also involve a means of classifying the information to determine the type of working area and the degree of certainty with which it may be called a workshop or activity area. The

second aim is to compile a catalogue of workshops and activity areas, including other craft-related finds, in the Neolithic to Protopalatial Aegean, applying the method of analysis to apply to loci whose classifications as workshops are debated and to resolve the differences in opinion. It is hoped that the catalogue will assist future research as a source of reference and that the issues arising from this study which are beyond the scope of this work will attract the interest of other researchers and that subsequent studies of workshops will further our understanding of this period of Aegean prehistory.

For a comprehensive study of workshops, there are two main theoretical issues that must be considered. Firstly, the theory of craft specialisation, integral to the study and definition of workshops, is examined regarding its definition, associated aspects and connection with workshops. It is not the purpose here to repeat the debates and attempt to answer all the questions involved in this complex topic; instead, the main issues will be discussed, and definitions used here for the purpose of studying workshops will be specified. Secondly, a theoretical study of workshops is presented, detailing the possible varieties of workshops and their likely locations, products, and consumers.

1.2 Terms of reference

Craftwork is understood here to involve the production of craft goods, commonly referred to in excavation reports as 'small finds', in a delimited working area. Masonry, fresco-painting, food processing and non-productive crafts, such as sailing, are not included.

The definition for craft specialisation used here is: the practice of a craft involving a greater than average amount of time devoted to its practice, whether to attain the necessary skill or to derive subsistence. Technical specialisation involves greater than average skill held by the practitioner, as a result of greater talent, time spent in practice, or possession of knowledge or use of the necessary materials and tools to which access is restricted to a few people. Economic specialisation is defined by the amount of subsistence the practitioner derives from the craft; if all the subsistence is

gained from craftwork, the specialisation may be said to be full-time, whereas subsistence gained in part by the products of craftwork indicates part-time specialisation. A craft specialist may be a technical or an economic specialist, or both. Part of the definition of specialisation depends on the area of distribution of the products, whether for the extended family or the settlement (intra-site specialisation) or regionally (inter-site specialisation). Craft specialisation may be indicated in the archaeological record by a number of factors, one of which is the presence of workshops.

A workshop is a spatially, usually architecturally, defined area reserved for craftwork by a specialist. Two other terms for areas of craftwork are used here: 'activity area' and 'working area'. An activity area is a space, perhaps not architecturally defined, used less frequently than a workshop for craftwork by a non-specialist or a part-time craft specialist. An activity area indicates a less specialised use of space than a workshop; specialised installations will not be present. 'Working area' is a general term encompassing workshops and activity areas; it may be used in cases where the distinction between them is unclear or to refer to all areas of craft production in general. The relationship between craft specialisation and working areas is more complex than the above definitions suggest, and is discussed in more detail in chapters two and three.

1.3 A synopsis of chapters

Various problems were encountered during research. While this thesis cannot presume to answer all the questions that arise, it will present the problems and offer solutions where this is possible. Regarding craft specialisation, the lack of agreed definition and the differences in opinion over the reasons behind its emergence are tackled in Chapter 2. Chapter 3 links the study of craft specialisation with that of workshops, examining their relationship. It emerged during the study of workshops that many problems existed which previously had not been properly analysed by earlier scholars. The absence of agreed definitions has resulted in ambiguous and sometimes incorrect uses of the term 'workshop' which, as a result, has come to hold different connotations for different scholars. Some scholars have perhaps been unaware of

alternative, more appropriate, classifications which might suggest less specialised production. These issues are also included in Chapter 3.

Chapter 4 provides a theoretical examination of the types of workshops that might be encountered. Chapter 5 highlights the lack of an agreed method for the identification of workshops and the lack of consensus regarding which criteria may be used to identify a workshop. Different types of indicators exist for different crafts, which made it difficult to produce a method for the identification of workshops that was universally applicable to all crafts. Such a method was formulated, however, and this is presented and tested in this chapter.

Chapter 6 introduces the catalogue and highlights further difficulties encountered in its preparation. Many of the problems involved the inadequate or vague details in the publication of excavations; some authors did not specify the locations or contexts of craft-related finds, others suggested that a locus was a workshop but did not present all the details about it such as the dimensions, a full inventory of its contents or the reason for their diagnosis of the place as a workshop. Sometimes the locus itself was not specified. The inaccurate reporting of other scholars' views or finds also posed problems during research. Many of these problems cannot be resolved here. Nothing can be done about the inadequacy of older excavations; some sites excavated earlier in the century, such as Raphina, have now been built over and at sites left intact one cannot re-excavate to discover where certain craft-related items were originally found. Where it was possible to resolve questions by pursuing references and searching through publication reports, this was done.

Statistics for the numbers, locations and dimensions of working areas, focusing principally on workshops, were compiled and have been included in the appendices. The results of the study of these and the application of the theory discussed in Chapter 4 to archaeological data, are presented in Chapter 7, followed by conclusions about the findings of the study of workshops and the success of the method for workshop identification and classification.

In Volume II a catalogue of working areas in the Aegean is presented, which also includes other craft-related loci: craftsman's graves, hoards and mines. The catalogue entries provide the most extensive discussions of individual sites.[1] The method for analysis, expounded in Chapter 5, is employed extensively throughout the catalogue to reinterpret areas previously suggested to be workshops or activity areas. New classifications are suggested for many loci.

1.4 History of research

Since Childe's (1950) emphasis on craft specialisation as an important component in the development of civilisation, this topic has received increasing attention in archaeological literature. Being a theoretical construct, its definitions and applications have varied and it remains a commonly used term whose interpretation should be resolved. Renfrew's chapters about craft specialisation in The Emergence of Civilisation (Renfrew 1972) and in Theocharis' Neolithic Greece (1973) have received relatively little response compared to other aspects included in his model of societal development. Other scholars who incorporate craft specialisation in models of Aegean development include Halstead (1981; 1989) and Halstead and O'Shea (1982), O'Shea (1981; 1989), Rice (1981, focusing on ceramic production), Branigan (1983), Van Andel and Runnels (1988). Dow's (1985) agricultural model is not specific to any particular area.

Specialisation has been considered by more scholars studying American than Aegean prehistory, including Arnold (1987), Charlton, Nichols and Charlton (1991), Costin (1991) and Cross (1993). Feinman (1986), Hagstrum (1985) and London (1986) focus on the production of ceramics; Mallory (1986), Shafer and Hester (1986; 1991), Spence (1986) and Yerkes (1983) focus on obsidian work. Craft specialisation in other regions has been studied by Fisk and Shand (1970) concentrating on Papua New

[1] Site names have been spelt following the way in which they have been reported or the most commonly used spelling.

Guinea, Stein and Blackman (1993) on Mesopotamia, R. Evans (1978) on the Balkans, Shinde (1991) on India, and Tosi (1984) on Mesopotamia. Research into craft specialisation with reference to a particular craft includes work on pottery in Syria by Blackman, Stein and Vindiver (1993), stone bead production in India by Kenoyer, Vidale and Bhan (1991), pottery and metallurgy in Kebkebiya, Sudan, by Torbert (1985), ceramics and community specialisation in India by M.T. Stark (1991), and pottery in Morocco by Benco (1988).

Brumfiel and Earle (1987), Clark and Parry (1990), Peregrine (1991) and to a large extent Costin (1991) present studies of craft specialisation which are not focused on any region in particular and are presumably intended to be applicable universally. Wailes' (1996) book, a tribute to Childe's work on craft specialisation, assembles studies of specialisation in various regions worldwide. Welbourn's study (1985) focuses on Western Europe, and other research concerning specialisation in relation to particular crafts includes Perlès' (1989; 1990; 1992a; 1992b) and Torrence's (1979; 1986) examination of chipped stone work, primarily obsidian, Runnels' investigation of millstones (1985b), Halstead's (1993) and Miller's (1996) work on Neolithic shell ornament production, and Kalogirou's (1997) study of Neolithic pottery production. Most of these studies concentrate on the Neolithic. Day, Wilson and Kiriatzi (1997) and Knappett (1997) focus on the specialised production of ceramics in Pre- and Protopalatial Crete respectively, while Whitelaw et al. (1997) pay particular attention to pottery production at EM II Myrtos. Evely's (1993) research concerning Minoan craftwork and focusing upon tools and production techniques, includes an examination of the production of sealstones, stone vases, ornaments and architectural features, ivory, bone and shell. Unfortunately the second volume encompassing many more crafts remains unpublished.

The references above represent by no means an exhaustive catalogue of the literature concerned with craft specialisation, but are intended to illustrate the volume of work that has increasingly focused on this subject. The recognition of the importance of craft-related studies for furthering our understanding of Aegean prehistory was

demonstrated by the recent conference 'Techne' held at Philadelphia in 1996, devoted to this subject.

The literature focusing solely on Aegean workshops, especially those in the Neolithic to MBA periods, is less abundant. Evely (1988) and Tournavitou (1988) have written articles concerning the definition and recognition of craftsmen and working areas in the Bronze Age, Evely focusing on Crete. L. Platon's Ph.D. dissertation (Bristol 1988) was the first major work of an appreciable length to be devoted to workshops, but the chronology considered is mainly Neopalatial and Postpalatial and the focus is on Zakro. Other studies have been specific to Crete (Walberg 1981, 1987; MacGillivray 1987; L. Platon 1993), particular sites in Crete (Poursat 1983, 1996; Pelon 1987) and particular workshops (Warren 1967; Younger 1979; Evely 1980). Krzyszkowska (1992a; 1992b) and Evely (1992) examine LBA ivory workshops and Polinger-Foster (1987) presents a study of Minoan faience workshops which are also LBA. The majority of articles concerning workshops may be found in The Function of Minoan Palaces (Hägg and Marinatos 1987) and Techne (Laffineur and Betancourt 1997) which contains a variety of articles concerning workshops for specific crafts from particular eras and sites in the Aegean.

Warren's article in 1967 about the stone workshop at LM Knossos was followed by a dearth of further articles until the 1980's when increased interest was shown, culminating in the 1996 'Techne' conference. A hiatus in the literature for Neolithic to MBA workshops provides the opportunity for original research here.

1.5 The Spatial Setting

The area to be studied will consist of mainland Greece, including Macedonia, the Cyclades, and Crete. The volume of data from these regions was not too great for study within the confines of a thesis; the broad geographical boundaries encompassing the entire Aegean, as its extent is understood by most prehistorians, include the various centres of prime development from the Neolithic to the Middle Bronze Age.

In the catalogue, six regional divisions are made: Macedonia, Thessaly, Central Greece, the Peloponnese, the Cyclades and Crete. Assigning some sites to a region was problematic; Klithi, Epirus (B10), Stratos, Acarnania (C36) and Lefkas (C25) are further west than the geographical boundaries for the six regions taken here. It seemed sensible to include them in the nearest region to the east of them, which in the case of Klithi was Thessaly and for Stratos and Lefkas was Central Greece. Sites in Euboea are included in the region of Central Greece.

For the statistical analyses of the data taken from the catalogue, some of the regions which showed similar development will be combined for greater clarity and to give improved scope for comparison; the following four regional divisions will be used: Macedonia and Thessaly, Central Greece and the Peloponnese, the Cyclades, and Crete. These regions will be compared in terms of their numbers and types of workshops.

Some regions have been more extensively excavated than others, which may present a misleading impression in the statistics. Nearly half the catalogue comprises working areas in Crete, an area which has been intensively studied for a considerable time, though western Crete has received less attention than the rest of the island. Many of the Cycladic islands await detailed study and the mainland contains many inland regions that may yet reveal important sites. Nevertheless, one must use the present data and see what can be learnt from it and which trends emerge.

1.6 Chronology

Although reference will be made to the Palaeolithic and Mesolithic, the periods to be concentrated on will be the Neolithic and Early and Middle Bronze Age. The absolute dating for these periods is still debated; Table 1.1 shows approximations of the chronology for periods in a simplified form.

For a more detailed summary of chronology, see Table 1.2 which combines the opinions of various scholars, including R.L.N. Barber and MacGillivray (1980: 143), Treuil (1989: 112-113), Dickinson (1994: 19) and Manning (1995, figs. 1-2). The

absolute chronology and the contemporaneity of some of the periods is uncertain and no agreement has yet been reached; the limits for periods in the table are not to be taken as distinct boundaries.

DATE B.C.	PERIOD
300,000	Lower Palaeolithic (Pleistocene)
100,000	Middle Palaeolithic
30,000	Upper Palaeolithic
(By 14,000 the last glaciation had broken up)	
9,000	Mesolithic
7,000	Early Neolithic
5,500	Middle Neolithic
4,500	Late Neolithic
3,700	Final Neolithic
3,000	Early Bronze Age I
2,700	Early Bronze Age II
2,300	Early Bronze Age III
2,000	Middle Bronze Age I
1800	Middle Bronze Age II
1700	Middle Bronze Age III

Table 1.1 A simplified chronology of Aegean prehistory

Date B.C.	Mainland	Crete	Cyclades
3300	FN	FN	FN
3200			
3100			
3000	early	EM IA	EC I
2900	EH I		
2800	late	EM IB	
2700	----------	----------	----------
2600	early	EM IIA	
2500	EH II		EC II
2400	late	---------	
2300	----------	EM IIB	----------
2200		----------	
2100	EH III	EM III	EC III
2000	----------	----------	----------
1900	MH I	MM IA	MC
1800	----------	---------	
1700	MH II	MM IB ---------- MM IIA MM IIB	

Table 1.2 Chronology of the Bronze Age periods considered in this work

Chapter 2. Craft Specialisation

2.1 Definition of craft specialisation

2.1.a Past study

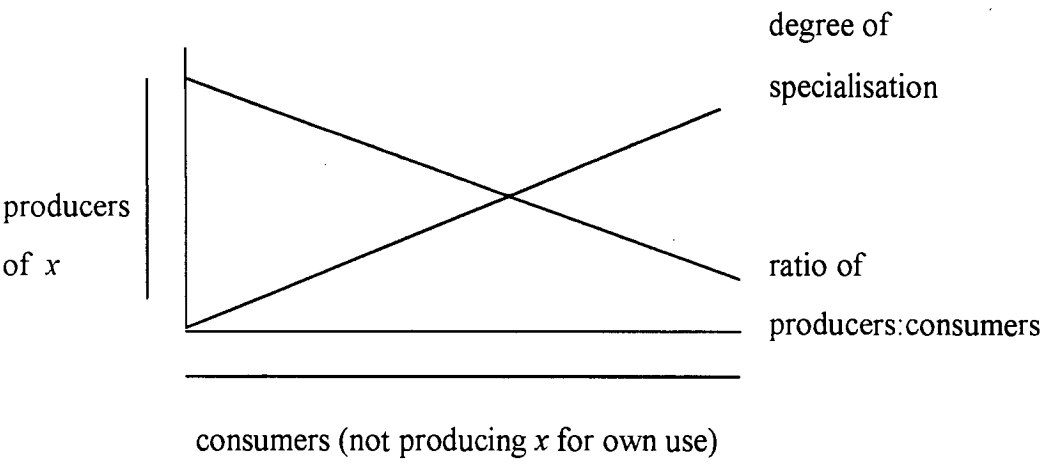
Torrence (1979) and Costin (1991) have complained about the paucity of definition of craft specialisation. The problem is actually not so much a lack of attention to its definition but confusion arising from the term having been defined in so many ways that agreement concerning its meaning becomes a more distant hope with each new interpretation. Conversely, confusion also arises from over-use of the term by scholars not specifying their particular interpretation of its meaning. Rather than posting another attempt to resolve the issue, it is simpler for each scholar to make explicit their understanding of its meaning before embarking on further discussions involving its use.

Costin's attempt at a mathematical definition is that specialisation is where the ratio of consumers to producers is greater than one to one, i.e.

consumers : producers

>1 : 1

A ratio of 1:1 shows generalised non-specialised production (Costin 1991: 21). This could also be expressed in a graph:



While Costin's ratio is applicable in some cases, it is not true for all scenarios; a ratio of two to six consumers for every one producer might be found in household production, the production of utilitarian pottery for the family unit for example. This is not specialisation. The ratio to indicate specialisation should be much greater than >1:1, but to set an arbitrary limit on the number would be unsatisfactory. On the other hand, a consumer might employ one or more craft specialists working part- or full-time in exchange for alimentary products; in this case the ratio 1:1 or 1:>1 would express specialisation. Costin's method is too simplistic.

Other understandings of craft specialisation have been offered previously: economic differentiation and interdependence (Brumfiel and Earle 1987; Costin 1991); a small percentage of the community producing craft goods; withdrawal from some or all subsistence activities and gaining subsistence from exchange (Rice 1981; Rowlands 1971); production of goods for a broader consumer population (Brumfiel and Earle 1987; Perlès 1992a); a way of increasing the efficiency or quality of production (Wason 1994); regularised, permanent perhaps institutionalised production (Costin 1991); social differentiation (Wason 1994); a position or vocation with control of a set of skills not held by most of the community (R. Evans 1978); a craft requiring a long apprenticeship and regular practice (Perlès 1992a); a continuum from household production to full-time commercial production in workshops (Wiencke 1989; Costin 1991). A relatively large amount of time spent doing the activity, some form of compensation, a recognised title, name, or office are part of a definition of specialisation.

2.1.b Principles of craft specialisation

It is unhelpful and over-simplistic to attach one particular, narrow, meaning to craft specialisation, as some scholars have done, rather than encompassing its many aspects. Some of the above understandings lead on from others; for example a craftsman[1] might hold skills which others do not, producing for a wide customer population which depends on him for products and on whom he depends for his subsistence

[1] The term "craftsman" is used for convenience, and should be understood to cover both genders.

because he does not perform subsistence tasks. Not all the interpretations of specialisation are compatible or merge, however; many relations are not mutual: production on a large scale may correlate with increased efficiency and specialisation whereas specialisation does not necessitate greater efficiency. Three main issues arise from these interpretations of specialisation: subsistence or economic gain, ability and skill, time spent in production. These will be examined below.

Subsistence gain

A craftsman might specialise in the production of goods surplus to personal or household requirements for exchange in return for subsistence or other products, to compensate for time spent on non-subsistence tasks (see *Time* below). This could be in the context of attached production, which is for a patron, or independent production. "Comparative ethnographic data suggests that craft specialization constitutes a common economic alternative to an exclusive reliance on farming strategies, particularly for households that are faced with inadequate access to agricultural resources" (M.T. Stark 1991: 64, citing Netting 1990). Many scholars have defined craft specialisation using only this economic interpretation, which is too narrow a definition (see *Ability and skill*, below).

Ability and skill

Craft specialisation in the sense of possessing greater talent or ability may not necessarily be practised for economic purposes; an amateur specialist might practise a craft for pleasure rather than subsistence, in his spare time. This kind of specialisation may have been present since the Neolithic; life would not have been taken up entirely with subsistence-related tasks and one must not think of prehistory as a time when all actions were motivated by subsistence.

The possession of knowledge of and ability with a craft by a small percentage of society makes the practitioners craft specialists. Potting is believed by Vitelli to have been a skill less commonly held in the Early Neolithic than in the later Neolithic. This means that the progression within the Neolithic was from specialists at the very

beginning to non-specialists by the end of the period when potting was more commonly practised (Vitelli 1993a: 252). Even though the first pots may have been crude efforts, the scanty knowledge of the technology made the task a specialist operation.

Whitelaw (pers. comm. 1996) has expressed a concern for defining the number of practitioners of a craft and the number of non-practitioners required to suggest this kind of specialisation. An actual number could not be specified because this will vary according to the distribution of products: specialisation can consist of an individual specialist producing goods for a site, or all the residents of a community being craft specialists, supplying a region. Instead, a percentage measurement of specialists in the total population where the products were distributed is a more satisfactory method to define specialisation. This would take into account that this type of specialisation is a relative measure of skills held by a proportion of a community. The area of distribution of the products would have to be known, as would the population of this area. Unfortunately, to obtain data for both these factors would take a great deal of research, and current data does not permit such a percentage to be calculated.

Time

The consideration of time follows on from the previous two aspects. An economic specialist will be able to substitute time that would have been spent performing subsistence tasks for craftwork. A purely technical (i.e. not economic) specialist may have spent a significant amount of time gaining the necessary skill and knowledge; having done this, the time spent practising the craft may not necessarily be large. The practitioner of a craft that demands much time for practice and for acquiring the knowledge and skill is predicted to be specialist, both economic and technical; two reasons suggest this, the first being that for the craftsman to be able to afford to spend the time in craftwork rather than subsistence tasks, it must be worth his while, and the second being that only a small percentage of the population can do this or else subsistence needs would not be met.[2]

[2] This, of course, only applies to societies that are not practising labour-saving cultivation methods.

2.1.c Proposed definition of craft specialisation

Therefore the definition for craft specialisation used here is: the practice of a craft involving a greater than average amount of time devoted to its practice, whether to attain the necessary skill or to derive subsistence. Technical specialisation[3] involves greater than average skill held by the practitioner either as a result of greater talent, time spent in practice, or restricted access to knowledge or to the necessary materials and tools. Economic specialisation is defined by the amount of subsistence the practitioner derives from the craft; if all the subsistence is gained from craftwork, the specialisation may be said to be full-time, whereas subsistence gained in part by the products of craftwork indicates part-time specialisation. A craft specialist may be technical or economic, or both. Part of the definition of specialisation depends on the area of distribution of the products, whether for the extended family or the settlement (intra-site specialisation) or regionally (inter-site specialisation).

2.2 Aspects of craft specialisation.

Table 2.1 summarises the inter-relating aspects involved with craft specialisation. Products, production and work area are discussed in detail in chapters four and seven; other aspects integral to a discussion of these, included under the headings of consumer, exchange, transport, and producer, are also considered. One aspect not included in the discussion in the aforementioned chapters is that of itinerant craftsmen because the focus here is upon fixed working areas; it is possible that these areas were used by both sedentary and visiting craftsmen, and Nordquist (1995: 204) suggests that most itinerants would have had a base somewhere. This topic does, however, merit a brief discussion. Most theories[4] of itinerant craftsmen are unsupported by

[3] The terms 'technical specialisation' and 'economic specialisation' were used, but not fully explained, by Perlès (1990).

[4] Perlès' (1989; 1990; 1992a; 1992b) theory of a specialised itinerant group procuring and knapping obsidian blades in the Neolithic Aegean is interesting but is contradicted by Torrence's (1986) study which proposes direct procurement of obsidian in the Neolithic and EBA. R.L.N. Barber (1987: 112) has suggested, with little explanatory reasoning, that EC metallurgy was restricted to a specialist class of skilled workers, perhaps a family group, whose "members may have travelled from one site, or even island, to another to ply their craft". He has also proposed that the EC figurine sculptors were travelling craftsmen because their homes are difficult to locate with certainty (R.L.N. Barber 1987:

hard evidence; the only accepted indication of itinerancy is the 'travelling pithos maker', distinguished by the use of the same cylinder to decorate pithoi at EH II Lerna, Tiryns and Zygouries and a hearth rim also at Tiryns. It is unlikely that items as large, heavy and breakable as pithoi were transported to these sites from a production centre elsewhere[5] and the hearth at Tiryns was fixed in position. Therefore most have concluded that an itinerant potter was involved; Wiencke (1970) envisages a potter travelling with his tools, making pithoi according to the taste of the customers. The possibility that only the cylinder travelled in exchanges between those sites must also be acknowledged.

The role and importance of craft specialisation within society, the type of society and the aspect of exchange can only be included in the discussions in a cursory manner because they are complete topics in themselves, beyond the range of this work. An idea of the importance of craft specialisation in providing information about communities is illustrated by Cross and M.T. Stark:

> "In most instances, archaeologists have linked specialisation to increased efficiency, the formation of social hierarchies, economies of scale, and population growth (Brumfiel and Earle 1987, R. Evans 1978, Torrence 1986)" (Cross 1993: 61).

> "Archaeological theories on the emergence of prehistoric craft specialization emphasize systematic relationships between ecological, demographic and political factors whose interaction leads to population pressure, the need for political control mechanisms, and subsistence intensification" (M.T. Stark 1991: 72).

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129), a suggestion which does not stand up to serious questioning. Stos-Gale (1998) suggests, more convincingly, that early metallurgy would have been most efficient if it was organised into divisions of time or labour and proposes an itinerant group finding and gathering ore from the islands and shipping it to smelting sites. This is supported by slag at various sites containing a combination of ores from different locations.

[5] Rutter (1993: 33, endnote 46) disagrees with this.

ASPECT	VARIATIONS
PRODUCT	raw material: local or exotic skill required for production equipment required standardised or individualised standard of production: high or low quality prestige or utilitarian
PRODUCER	status gender age intensity: occasional, part- or full-time sedentary or itinerant attached or independent
PRODUCTION	intensity scale: individual, group, community type: household production, workshop, etc. efficiency: division of labour, specialised facilities
WORK AREA	type: attached or independent, primary or secondary location: nucleated or dispersed; geographical location[6]
CONSUMER	status: elite or non-elite, patron or 'customer' type of payment
TRANSPORT	necessity type efficiency
EXCHANGE	type: reciprocal, redistribution, barter etc. demand
SOCIETY	role of craft specialisation level of development and organisation structure of society: centralised, hierarchical, egalitarian, etc. traditions and beliefs

Table 2.1 Summary of the aspects of craft specialisation

[6] i.e. distance from sources of raw materials, fuel, water, labour and market.

2.3 The Emergence of craft specialisation

The emergence of craft specialisation was a development about which there can only be hypotheses, since there is no particular way in which it must happen. The problems inherent in attempting to explain the causes of this development are therefore numerous. Human behaviour does not follow strict patterns and individual creativity will always provide exceptions to behavioural norms. Flannery (1968: 85, cited by Renfrew 1972: 27) points out that 'the first pot' will never be found because such developments occur as a result of minor accidental deviations rather than major breakthroughs. Developments can take place in some areas but not in others which have a similar environment; this can be, for example, because of differing ideologies regarding the acceptance of innovations, or because the areas are in contact with different places which supply different ideas and information.[7]

Moreover, "craft specialisation" is a general term, which can include the manufacture of such a diverse array of commodities in the ancient Aegean and has so many implications involved that one cannot expect a single causal factor to explain its rise. Different types of crafts will have become more specialised at different times in different places. Even when one separates a particular type of specialisation in a specific area and time period, as Runnels (1985) has studied Neolithic and Early Bronze Age millstones in Southern Greece, the explanation of its emergence is still hypothetical. Craft specialisation is a complex social phenomenon that is closely tied to other inter-related aspects of a society's economy such as natural and social resources, trade or exchange contacts and the structure of the society. It must not be studied in isolation, therefore, because factors such as these are integral to an examination of it.

Various models have been proposed which attempt to explain the cause of craft specialisation or which expound its part in socioeconomic change and development. Childe (1950) represents the traditional view, putting forward a wealth-based model

[7] For literature focusing on innovation, see van der Leeuw and Torrence (1989) and P. Lemonnier (ed.) 1993 Technological choices: transformation in material cultures since the Neolithic. London: Routledge.

that vaguely names "society" as the cause behind agricultural surplus that supports craft specialists. Renfrew's (1972) influential theory suggested Mediterranean polyculture lead to specialised farming and surplus production; an emergent elite class organised the exchange of surplus and could support craft specialists producing items of wealth. This, via the 'multiplier effect', led to an increasingly hierarchical society. A major disadvantage of this model is that Greece is taken as a whole, whereas in reality regions have different topography and developmental patterns. Halstead (1982; 1989) and O'Shea (1981; 1982; 1989) propose a model based on the idea of social storage as a risk-buffering device that leads to the development of social differentiation with a redistributive elite. The model does not, however, explain how and when craft specialisation begins, who the producers are and, although it gives a context for specialisation, it assumes it rather than giving the reason *why* it occurs. Rice (1981) attempted to explain the "Evolution of Specialized Pottery Production" as a unilineal systemic process, basing the model on ethnographic evidence. It gives social complexity and differential access to resources as a cause for specialisation but still omits to explain *how* it actually begins. Branigan (1983: 23) proposes "metallurgy as a major stimulant to craft specialization in the third millennium B.C." as well as the growing complexity of techniques. Runnels and Van Andel (1988: 242) use Sherratt's (1981; 1983) secondary products revolution and Halstead's social storage in a model based on the assumption of a "well-developed, pre-existing trade network".

Rice points out that complex phenomena have complex causes and that each case is different. Ultimately there are many ways in which craft specialisation can evolve and no one model can account for all of them. No model can be comprehensive and will tend towards a certain aspect such as redistribution as the main explanatory factor. There are so many integrated factors such as trade and exchange, the type of raw material, complexity of society and the ideology concerning the finished article, to name but a few, that it would be an impossibility to include them all in one model. Moreover, such factors can have opposite effects, as the regulation of access can result in either greater elaboration or standardisation. It is therefore not surprising that there are various different types of models to account for the emergence of something so closely integrated with many other factors in the socio-economic sphere

as craft specialisation. Each model is useful, however, in considering its evolution from a different angle and emphasising different aspects relevant to it. It would be interesting to combine as many different types of model in an attempt to create an explanation with many viewpoints and no particular bias.

Chapter 3. Craft Specialisation and Workshops

3.1 The importance of a study of workshops

When a workshop is found and sufficient information about it is provided, one may reach conclusions about the specialised production of certain products of an individual, workshop or site, which provokes further consideration of why the particular area was specialised at that scale and who the consumers were. The study may reveal information about the exchange links of that site if the product is unusual or if its material can be pinpointed to a particular source. By studying the debris, the efficiency of production can be ascertained. Greater efficiency could indicate a need for economy due to the rarity of the raw material, a competitive exchange environment, and/or a relatively large amount of time spent in production, perhaps because attached specialists were at work. Thus, details may be revealed about a society's political structure, economy and exchange links.

Most of the catalogue focuses on the Neolithic to MBA and it is from this time zone that statistics will be taken. Pre-Neolithic examples are included mainly for interest, as they are rarely discovered. It will be seen that almost half the catalogue consists of examples from Crete. It is probable that this does not reflect reality so much as the more intensive excavation of this region and especially of palace sites such as Mallia, which provides many examples of working areas. Biases may exist, in that excavators would be more aware that working areas would exist at palace sites and focus more on finding them, whereas at other sites they may have had different preoccupations, such as finding areas of habitation or cult practice.

The value of a catalogue of workshops lies not only in its innovative nature and its function as a source of reference but also in the information that it can reveal in the form of patterns and trends. Although biases may occur in the recovery of data pertaining to workshops, statistics taken from the catalogue will show the numbers and types of workshops in relation to each area and era, from the Neolithic to the later MBA. Distribution maps will display findspots according to type of craft and date. Further research beyond the scope of this Ph.D. could go on to compare the location

of workshops to related factors, such as their proximity to sources of raw material, water, fuel or other settlements. For pottery production, for example, this would require chemical or petrographic analyses of wasters, raw clay and finished products found at the place of production, a corresponding analysis of clay sources to find the origin of the raw material used, and analysis of sherds at many other sites to gain an idea of the distribution of products.

3.2 Terminology

Research on workshops is problematic due not only to a lack of agreed definition of the terminology, but also to the absence of a comprehensive method for the identification of such places from the archaeological record. Previous scholars have adopted different ways of identifying production areas, while some do not seem to have laid down a rigorous method at all, describing certain places somewhat freely as workshops, without a thorough analysis of what the data could also imply.[1] Further study should be made of which criteria can, and should, be used for identification, and the issues arising from these.

Various terms are used for areas where craft production took place; these can correspond with, for example, the intensity of specialisation, the scale of production, the location, the consumer of the finished products, and the complexity of equipment and skill required. Evely summarises well the problems caused by "no overall accepted interpretation of the terms, which permits a variety of impressions to co-exist, to the mutual disadvantage of researchers" (Evely 1988: 398). He then provides definitions of the following terms used of production areas:

Workshop "*room or building in which manufacture is carried on*" (concise OED)
"*...in which manual or industrial work is carried on*" (OED 1562)

Atelier "*workshop; an artist's or sculptor's studio*" (OED 1840)[2]

[1] e.g. Mylonas (1959: 32, 35-38, 144).

[2] These references are presumably page numbers; Evely does not make this clear.

Work Area *"a plain attributative use of 'work' - no precise connotation intended"*.

Evely notes that the only distinctions between these terms are the artistic connotations of atelier, and the difference in scale between factory[3] and workshop (Evely 1988: 398-9). Such general definitions will not suffice for the purposes of an archaeological study of craft production areas, since each term carries its own connotations. Platon offers a fuller definition of 'atelier': "un espace spécialement équipé, de façon permanente ou provisoire, dans lequel un ou plusiers artisans spécialisés ont travaillé à la confection d'objets" (L. Platon 1993: 105). Studies by French scholars make no distinction between 'atelier' and other words for 'workshop', using solely the former word. In the context of the prehistoric Aegean, the difference between the two terms is minimal, and the artistic connotations of 'atelier', as opposed to 'workshop', anachronistic.

Workshops are locations where craft specialists regularly perform productive functions. Craft specialists produce commodities for exchange rather than, or perhaps as well as, for household consumption (Clark 1983, cited in Mallory 1986: 155). When production is for personal or household use only, Clark refers to the producer as a craftsman and to the locus of production as an activity area rather than a workshop. Clark views 'workshops' as a type of productive locus used by craft specialists regularly producing commodities for exchange, as opposed to 'activity areas' which are used by non-specialist craftsmen for household production. The term 'workshop' implies a more organised, commercial[4] organisation at a higher level of specialisation than 'activity area', which carries implications of more sporadic, amateur production for household use. Clark is only taking into account economic craft specialisation carried in workshops, and does not consider technical specialisation, which could equally take place in a workshop. Nordquist makes a

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[3] "Factory" is not included here, as it would be anachronistic to apply it to the prehistoric Aegean.

[4] This word is to be understood in the context of the prehistoric Aegean, not in the modern sense of industrial commerce. An economic sense is implied, where part of all of the craftsman's living is made working here, and the workshop is probably run at a more organised level and more efficient than a production area.

similar reference to organisation, economic specialisation and facilities in a narrow definition of the pottery workshop: "an industry involving some investments in physical installations and organisation as well as more or less full-time (male) specialists, making pots specifically for trade networks" (Nordquist 1995: 201).

Tournavitou (1988: 447) makes a similar distinction, using the term 'domestic workshop' rather than 'activity area' or 'production area', giving the following definitions of each:

> *Permanent workshops* "are spaces, not necessarily specifically designed for, but certainly devoted to, all, or most of the year, workshop activities; spaces where a number of specialists are employed, i.e. individuals depending more or less completely on their craft for their livelihood."
>
> *Domestic workshops* "are spaces within private domestic buildings, used as workplaces by the inhabitants of these buildings, either at certain fixed times of the year, or whenever the need arose, to fulfil household requirements, as opposed to the far greater turnover expected from a permanent workshop." Individuals did not depend wholly on the craft for their livelihood.

The idea that 'domestic workshops' are within dwellings is not necessarily the case in reality; indeed much craftwork intended for household use was probably performed outside, for example potting and spinning. The ensuing implication that permanent workshops will not be located within dwellings is also erroneous: one need look no further than the maison-ateliers in Quartier Mu, Mallia. Tournavitou's definitions, however, introduce the following factors which are important in a definition of workshops: the length of time spent practising the craft and the amount of subsistence gained from the craft, which should show a positive correlation, the location of the workshop, and whether the consumer is the household or an employer.

Three terms will be used in this study: *workshop*, *activity area* and *working area*. The term 'workshop' is used here to denote a spatially, usually architecturally, defined area reserved for work by a craft specialist; there may be economic or technical

specialisation. An activity area is a space, perhaps not architecturally defined, used less frequently than a workshop for craftwork by a non-specialist or a part-time craft specialist. An activity area indicates a less specialised use of space than a workshop; specialised installations will not be present. 'Working area' is a general term encompassing workshops and activity areas; it may be used in cases where the distinction between them is unclear or to refer to all areas of craft production in general.

3.3 Craft Specialisation, Workshops and the Archaeological Record

There has been some confusion regarding whether craft specialisation can be inferred from the recognition of workshops or whether working areas can only be classified as workshops (rather than activity areas) once craft specialisation has been proved. The definition of workshops as areas of specialised production is inextricably tied with craft specialisation, which distinguishes them from activity areas. Craft specialisation, however, is not a tangible phenomenon, and must be deduced from archaeological data, including workshops. To take either specialisation or workshops as a starting point might lead to circular reasoning.

R. Evans (1978: 115) mentioned workshops, or specialised areas for craft production, amongst six expected phenomena which should be revealed in the archaeological record where craft specialisation was practised[5], besides the related expectations of population growth, developments in subsistence methods, role and status differentiation, and competition. Like other scholars, R. Evans deduces craft specialisation from the presence of workshops.

In her study of obsidian working, Torrence (1984: 51) states that the consequences of craft specialisation could be detected archaeologically by:

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[5] The other phenomena are specialised tools for craft production; storage facilities for completed craft items; resource exploitation of particular raw materials; exchange and trade for the distribution of craft items and the acquisition of raw materials; differential distribution of craft goods at sites and within settlement systems (R. Evans 1978: 115).

> "high degree of skill involved in production; low incidence of errors; small quantities of waste per unit of manufacture; standardization in methodology, and therefore in the size and shape of the output and the waste by-products; and presence of temporary or permanent shelters for laborers and their families at the site or in the near vicinity."

Skill, which is mentioned by a number of scholars as an indicator of craft specialisation[6], is a problematic criterion to apply. Certainly, those members of a society who spent all their working time practising a craft should be more skilled at it, and this should show in the finished product. Members of most families who only worked at a household level could have been skilled at commonly practised crafts such as woodworking and potting.

It is not only skill which defines craft specialisation, but also restricted availability of knowledge and facilities for the completion of the task; an example of this is metallurgy. Another factor is the frequency of the need for production events. If there is infrequent need in households for a small amount of a product, it is more efficient to have one person producing for the whole site, although it is arguable that this attitude is anachronistic, as not every society is necessarily concerned primarily with economy of time and resources; other factors such as social conventions, taboos or rituals can influence behaviour. It can be said with confidence, however, that the production of goods which take a great amount of time to manufacture and which are necessary in every household is more likely to be carried out by household members, rather than a small number of specialists who would simply not have sufficient time. Spinning and weaving are good examples of this: they are crafts that require knowledge to be passed on, and skill is also involved, but they must have been practised by many members of prehistoric societies.

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[6] Besides Costin, Torrence, and Healan (1986:150), Kourou and Karetsou (Techne 1997:112) infer specialised craftsmen simply from the amount of "skill required to meet the technical demands in modelling and painting" terracotta wheel-made bull figurines. Nikolaidou (1997:183), on the topic of ornament production at Sitagroi writes "On these grounds [skill needed] we may infer specialised production...for at least those ornaments that belong to standardised and long-established forms...required some degree of metallurgical expertise".

Workshops need not, in fact, be present at all in order to detect craft specialisation. Vitelli (1993a) and R. Evans (1973, cited in Elster 1997: 30) have presented convincing arguments for specialisation in pottery production in the Early and Middle Neolithic and Phase III Sitagroi respectively, without finding production loci. Craft specialisation, then, may be recognised from the archaeological record by a number of indicators, *one of which* is workshops.

Clark, however, insists that craft specialisation must be established first, before production areas can be identified as workshops:

> "*What makes an area a workshop is the nature of the manufacturing activity carried out in that location.* In other words, the identification of a workshop follows the identification of evidence of craft specialisation, be it special structural features or facilities, such as pottery kilns, or the unusual character of manufacturing byproducts, such as obsidian debitage" (Clark 1986: 42) (my emphasis).

The opinion expressed by Clark initially seems sensible. When the archaeologist is confronted with an area of craft production, it must be decided what type of production area it is, and the difference between activity area and workshop depends on whether the production was specialised or not. The decision may be made on archaeological evidence alone, when the data are sufficient. More often, however, insufficient evidence makes it difficult to distinguish the type of working area, and a consideration of other factors, such as the type of product, the consumer and the development of society (i.e. whether it was likely to have been capable of supporting craft specialists), may be needed before an opinion can be formed. Some factors may predict the likely presence of workshops before any have been found. Costin (1991: 16ff.) outlines methods that will indicate the intensity of specialisation: the more specialised the techniques and equipment, the more one can assume that a workshop existed. Mass produced, standardised goods would also suggest workshop production.

Clark is mistaken, however, in his opinion of what demonstrates craft specialisation. Production areas with 'special structures or facilities' such as kilns, levigation pits and foundries demonstrate a greater investment of time, effort and resources for production, which would not be necessary for occasional production for household consumption (non-specialised production). A foundry would further suggest specialisation, since metallurgy is inherently a specialist craft because of the limited access to raw materials and knowledge. Special structures or facilities, by themselves or with other indications of production, indicate working areas for specialised production, i.e. workshops. While this is true, the practice of many other crafts, however, could also be specialised without necessitating special structures or facilities and may not have left 'unusual' by-products, however these are defined. Clark does not point this out.

It is difficult to understand why "unusual by-products" might denote craft specialisation. Clark mentions obsidian debitage, which is ambiguous as evidence of craft specialisation or workshops; obsidian debitage is found at most sites, and the size of most deposits indicate that they are probably the result of a single knapping event. Although the skill of working obsidian was perhaps initially not widespread and therefore the craft was specialised in the earlier Neolithic, the deposits of debris hardly indicate the presence of workshops; in fact, very few obsidian workshops have ever been found. A better example of unusual by-products might be ivory trimmings, because this material had to be imported and only certain people or groups would have been able to obtain it. By-products alone do not designate a workshop, however, and whether unusual or not they must be accompanied by other signs of production in order to indicate a workshop (see chapter 5).

Costin (1991: 18) makes a similar point to Clark, expressing it more persuasively:

> "The recovery of data associated with production does not in and of itself identify specialization. ...The key, then, to identifying specialized production is the recognition of a differential distribution of the relevant artifact class or classes across appropriate analytic units (communities, households, time periods, etc.)" (Costin 1991: 20-21).

Her first point is already clear: an area of production may be an activity area, and not necessarily specialised. She suggests identifying workshops by examining the product and its distribution according to location and eras. Products found only in palaces, for example, may be labelled prestige items. The prestige accorded to items may vary according to time periods; as skills became more widely known, more efficient methods no longer the domain of the specialists, and what were once exotic raw materials more easily accessible, the exclusivity of the item should decrease.

This is not the only means of recognising craft specialisation or of defining a production area as a workshop. It is the examination of the production area itself, its facilities, tools, materials and products, which defines whether it is an activity area or a workshop. In unclear cases, a conjecture may be made following an examination of other archaeological data, such as the distribution of finished products. It is the identification of specialisation in the production area in question, rather than in the site or community as a whole, which reveals a workshop.

Chapter 4. Characteristics of Workshops

Workshops vary according to the items produced, the consumers, the location of the workshop, and the scale, intensity and organisation of production. These factors and how they inter-relate will be discussed in this chapter.

4.1 Functional variations of workshops

4.1.a Primary and secondary workshops

A 'primary' workshop manufactures products from raw materials, for example, making pottery from clay. All the products of the workshop can be called 'finished', even though some may be used in the production of other goods. 'Secondary' workshops use such products to make further finished items, for example, the production of inlaid wooden furniture, where the workshop fits the (already finished) inlays into (already constructed) furniture. Tournavitou (1995) uses these distinctions to conclude that the 'Ivory Houses' at Mycenae included not primary, but secondary workshops.

It is possible that a workshop could be both primary and secondary, producing all the necessary items for the assemblage of the final product. Where, however, the manufacture of each type of the 'primary' items requires special skills, for example wooden boxes inlaid with carved ivory and semi-precious stones, these component parts would probably be made by the relevant workshop accustomed to dealing with those materials. In such cases, the production is likely to be *attached*, since a palace could provide the level of organisation needed for co-ordinating the various workshops, it would have the necessary exchange contacts to obtain the raw materials, and it could afford to employ craftsmen to work in such a specialised, limited sphere as a secondary workshop.

4.1.b Attached and independent workshops

"Earle made the fundamental distinction between production of special, high-value goods for elite consumption [attached production] and production of utilitarian goods for broad distribution [independent production]" (Costin 1991: 5).[1] Earle's logic is flawed; he reasons that if prestige goods are primarily made for elite patrons by attached specialists, then utilitarian goods are made for broad distribution by independent producers. This does not take into account the elite's need for utilitarian goods, the production of which they could surely have controlled too, perhaps employing the same attached craftsmen to produce both prestige and utilitarian goods. Pottery workshops, for example, could have produced both fine and utilitarian ware. Earle's distinction between elite and general demand as the determinant for attached or independent production is also dubious. While it is unlikely that the general populace would have been able to commission or purchase goods from attached producers, independent producers by their very nature were surely not limited to supplying non-elites.

Costin defines the context of production as "the nature of control over production and distribution" (Costin 1991: 8) and states that it "describes the affiliation of the producers and the socio-political component of the demand for their wares. Attached production is sponsored and managed by elite or governmental institutions or patrons. ...independent specialists produce for a general market of potential customers" (Costin 1991: 11). This is a more reasonable definition and echoes that of Clark and Parry (1990: 298) who refer to the control of the finished product: "When craftspersons retain rights of alienation, specialized production is *independent*... If an outside sponsor...controls the finished goods, it is *attached* specialization... [which] has a strong economic (rights to goods) and political (rights to labor) aspect." They specify further the variants and scales of production of both types of production (see Table 4.1).

[1] Stein and Blackman (1993: 30) give further definitions of attached and independent specialisation.

Sinopoli (1988: 581-2), from a study of the production of textiles and ceramics in medieval South India, proposes three types of production in complex societies: *administered production* (regulated by a nonproducing group or institution under the control of the elite), *centralised production* (large-scale segregated production by specialists), and *noncentralised production* (smaller scale specialised production, more dispersed than the above). Knappett (1997: 309-10) has discussed production at Quartier Mu, Mallia and Myrtos Pyrgos in terms of these categories. Administered production was apparent at both sites, centralised production at the former and probably the latter, and noncentralised production at Myrtos Pyrgos but not at Mallia.

TYPES	VARIANTS[2]	SCALES OF PRODUCTION		
		Ad Hoc	**Part-Time**	**Full-Time**
Independent	Prestation	X	X	
	Barter	X	X	
	Commercial	X	X	X
	Small shop		X	X
	Factory		X	X
Attached	Patronised		X	X
	Precinct		X	X
	State-Sponsored		X	X
	Putting Out		X	X
	Tributary		X	X
	Servile		X	X
	Corvee		X	X

Table 4.1 Clark & Parry's schematic view of types and variants of craft specialisation (1990: 299)

Other aspects of workshops, such as the location, the intensity and the type of product (utilitarian or prestige) and raw material, will vary according to whether it is attached or independent.

[2] For definitions of the variants, see Clark and Parry (1990: 299).

4.2 Workshop location[3]

Costin describes the 'concentration' of production as a continuum between *dispersed* and *nucleated* facilities (Costin 1991: 9) relating to "their spatial relationship vis-à-vis one another and the consumers for whom they produce" (Costin 1991: 13). The concentration of production can be affected by the social and natural environment, the context of production, and the need for, availability, and ease of transport of raw materials, waste and finished products (Costin 1991: 13-14). Dispersal or nucleation is also determined by the nature of the demand for products (large and localised, or sparse and widespread), and whether or not workshops can benefit from pooling resources.

If one can term a type of nucleated production as 'community specialisation', it should be added that political reasons can cause its evolution. State control can cause community specialisation to enhance the political system's economic infrastructure or it can follow from community specialisation which has already developed for environmental or other reasons and has begun to need a more efficient administration system (M.T. Stark 1991: 72). Another reason for its development has been to create alliances with other communities, a famous example being the case of the Yanomamo (Venezuela); one group claimed to have unsuitable clay and to have forgotten how to make pottery, and thus created a military alliance with a neighbouring village from which they acquired pots. When the alliance was broken, the group suddenly 'remembered' how to pot, and 'discovered' that they did in fact have access to suitable clay. The group then traded its pots to new allies (Sliva and Keeley 1994: 98). Economic reasons may also be instrumental, such as the desire to dominate the market in respect of a particular product.

"Muller (1984) emphasizes the distinction between site specialization - where a single, short-term activity is carried out by an entire social group to meet its own consumption needs - and producer specialization - where an individual gains part or all of his/her livelihood through participation in a specialized activity" (Costin 1991:

[3] Costin (1991: 8) calls this "the relative regional *concentration* of production facilities."

3). Referring to this, Miller (1996: 21) writes "Stark echoes this distinction by differentiating household-based craft specialization from 'community specialization' while Perlès distinguishes 'intra-site specialization' from 'inter-site specialization (Perlès 1989)." Muller's definition of "site specialization" is problematic in the following ways. If an entire site specialises in a single activity for its own use, this is surely not specialisation. A whole site surely cannot afford to specialise in a single activity receiving nothing for its time and resources used in the process. If the products were consumed *outside* the site in exchange for other goods or services, that *would* be a form of specialisation. M.T. Stark's view is closest to the distinctions which are used here, although community specialisation *can* mean that a community was working part-time, and therefore based in their households, to produce goods to be taken elsewhere for exchange.[4]

The geographical location of the workshop is affected by the same factors as the concentration of production and corresponds with the scale of production. The type of product and raw material may be connected to the context of production; for example attached production for palace consumption may involve the use of both readily available materials such as clay, and precious or exotic materials such as ivory, which must be obtained using exchange contacts to which independent producers are unlikely to have access. In the case of the latter, the workshops are likely to be located where the elite can readily supervise them and maintain security and control over the valuable raw materials and products, that is near to or within palaces. Independent household production of utilitarian products made from materials that can be transported to the working area, for use by the family or local consumers, might take place within the dwelling or courtyard of the artisan.

Besides the artisan's residence, a palace or a palace-related area, workshops can be located outside the boundaries of a settlement for a number of reasons:
(1) Environmental factors include proximity to the source of raw material, to fuel, to water, to human resources (labour), to transport networks (i.e. the coast in the

[4] e.g. the Dalupa potters in the Kalinga villages: production is carried out at household industry level and households may have more than one potter. The settlements are interdependent, linked by peace pacts and exchange (cf. M.T. Stark 1991: 67, 69).

prehistoric Aegean) and to the consumers or market. The transportability of the raw materials, fuel and finished products is instrumental in decisions about the location of working areas; if the raw material is heavy, bulky, or needed in large amounts, proximity to the source is important. If transport of the finished product is difficult due to bulk, weight or fragility, the working area may be located close to the consumer. Primary work on raw materials may take place at the source to reduce bulk and weight, for example the shaping of obsidian cores at Sta Nychia and Demenegaki (Melos), where surplus obsidian was chipped off, and blocks which were found to be faulty were discarded. In the case of metallurgy, proximity to fuel may take priority (Stos-Gale 1998: 723), and historical records report that ores were often brought to a well-sited and well-equipped smelter rather than smelted near the mines (Stos-Gale 1998: 727).

(2) Issues of safety and living standards can play a major role in relegating craftwork that involves the use of fire or produces smoke, noxious fumes, noise and other pollution, to locations outside the settlement. Potentially dangerous waste products, such as sharp splinters from the production of obsidian blades, could also affect location.

(3) Customs and beliefs involving ideas of non-physical pollution, stigma and taboos connected with either the craft or its practitioners, or both, have been described in ethnographic studies as being the cause for locating the working area away from the settlement. Pottery-making and metal-working are the most common examples of this. In Zaghawa society (Sudan), 'blacksmiths' are the lowest section of society (the term does not necessarily denote that occupation) and people "say that they must live on the outskirts of 'normal' society so that their noise and smoke does not pollute the public. However, the crafts themselves are not so much a despised activity as the people who carry them out" (Torbert 1985: 280). Amongst the Moro of Sudan, the craft of pottery is considered to be impure, and special workshops are located outside the villages in order to keep the compounds 'clean'. Conversely, the Mesakin, an adjacent tribe, practise potting with accompanying rituals in houses and compounds which have been decorated for the occasion (Hodder 1982: 91). Ghanaian Shai potters only use clay pits that are administered by priestesses (Nicklin 1979: 453). The Zuni Indians in the North American Southwest, due to ritual restriction of the

exploitation of resources, only used black clay from certain locations, although it was found in many other places (Nicklin 1979: 452).

(4) Political or economic factors have been known to create restrictions or favour certain locations. The political case of the Yanomamo has already been mentioned. An economic example is in Ndume Ibeku, Nigeria, where the farmland is poor, so potting is practised in order to supplement the income.

Nicklin (1979: 438-48) cites examples where environmental factors have not prevailed for various reasons. The location of clay resources is not necessarily a critical factor in the location of areas for pottery production. The Emolo people of Lake Rudolph, Kenya, used a very fine ash because they knew of no ordinary clay deposits within a hundred miles. The potters of Tonala (West Central Mexico) use aromatic clay from far away for the slip on certain fine wares. There is cross-cultural variation concerning the lengths to which potters will go to obtain clay, and their ability to process the type of clay available and form pots, depending on the techniques known and the suitability of the clay. Peripatetic potters in the New World carry the raw materials around, rather than the pots, which would break. The Hausa in Northern Nigeria use workshops often situated a quarter of a mile from their settlements, whereas men from Sokoto travel two hundred miles to Yelwa where there is the water available for potting during the dry season. In the case of the island of Chowra (Bay of Bengal) five-mile canoe expeditions were made to fetch clay. Nicklin points out that the lack of wood for fuel may not inhibit potting; dung, coal, grass, straw, cereal chaff, peat and seaweed can all be used, and their consumption can be reduced if potters fire their vessels together or reduce the firing time by drying the pots for longer.

4.3 Scale of production

According to Costin, scale "encompasses two related variables: size and principles of labor recruitment" (Costin 1991: 15). The former refers to the "number of individuals working in a single production unit" and the latter reflects "the way craftspeople are brought into the production system" (Costin 1991: 15). Ethnographic studies of family-based industries, which are presumably small, have shown that labour may be

recruited on the basis of biological or marital ties; as the production unit grows, more distant or fictive kin and non-related individuals are included. Independent and attached workshops can both be large or small, but adds that in general, attached workshops tend to be larger because it is easier to supervise a large group than many small dispersed groups (Costin 1991: 15-16).

Another factor, not considered by Costin, which might determine scale, is the volume of work required: attached workshops are likely to be *nucleated* for ease of supervision; their scale, however, will surely be governed by the quantity of products demanded and the number of man-hours this will necessitate. Also influential on the size of the work-force is the level of skill required and hence the length of training or apprenticeship, which would restrict the practice of the craft to a few, in contrast to a craft which anyone could practise. If there was restricted access to knowledge of the craft, this would be a further limiting determinant.

4.4 Intensity of production

Costin defines the intensity of specialisation as reflecting

> "the amount of time producers spend on their craft. At one extreme is casual, part-time specialization where commodity production or labor service is used to augment basic domestic production of subsistence products. In contrast is full-time specialization, where the household subsistence provider(s) work(s) exclusively at one task, exchanging its products for all other goods and services used by the household" (Costin 1991: 16).

She argues that three economic factors determine whether independent specialists work part- or full-time. The first factor is *efficiency*, effected by establishing a regular routine and investing in technology, skill and training, which make full-time work worthwhile. Secondly there is *risk*, which is minimised by part-time craftwork combined with farming, where technology is simple or inexpensive. Full-time production will only occur when significant competitive advantages are to be gained from it. The final factor is *scheduling*, where circumstances may force a part-time

artisan-farmer to choose one of his occupations to be full-time. Attached specialists in non-industrial societies may work full-time for the following reasons: their patrons can afford to sustain them, especially since the craftsmen themselves generate revenue too, it is more efficient to train a few workers to a high level of skill than to train many who only work part-time, and the patrons may want control over the craftsmen to discourage 'moonlighting' (Costin 1991: 16-18). Accordingly, "unattached craft production goes hand in hand with part-time specialization" (Perlès 1992b: 135). This, at least, would be the case for the era considered in this thesis.

Other aspects of time variation include whether production is permanent or temporary (full- or part-time), sporadic or seasonal. It could be argued that full-time craftwork carried out in the lull in the agricultural season each year is either seasonal full-time work, or permanent part-time work; the former is probably the more specific. Despite the ambiguities involved, predictions can be made concerning the possible presence of workshops. It is most likely that workshops will be used when production is permanent, whether full- or part-time; this is especially the case with full-time work, since for reasons of efficiency there will probably be more investment in installations and equipment. When production is sporadic or seasonal, independent and organised at a household level, workshops are less likely to be found. Annual seasonal work practised full-time in order to supplement subsistence could benefit from the use of a workshop if resources and time permit it.

Contrary to Branigan's (1983) opinion, the presence of workshops need not necessarily imply *full-time* specialisation. A relatively large and well-equipped workshop indicates some form of specialisation, which might be full-time; this does not, however, imply that evidence for part-time specialisation will be "small isolated groups of tools without any trace of accompanying permanent workshops devoted to the craft" (Branigan 1983: 27). Part-time specialists practising the same craft as those working full-time will often need the same basic equipment, though it may be less sophisticated, depending on the type of craft. To smelt copper, for example, facilities to provide heat of at least 1083°C will always be needed, and a craft such as this, practised either seasonally or part-time throughout the year in quiet periods, will require some kind of workshop facilities.

4.5 Workshop product

The type of product may define the category of workshop, according to the standard of production and to whether the product is primary or secondary, utilitarian or luxury, and of ubiquitous or exotic raw materials.

4.5.a Standard of production

Infrequently practised household production using simple methods and few, if any, basic tools is likely to result in goods inferior in quality to those manufactured by full-time specialists with specialised equipment and tools at their disposal. These, of course, are extremes at each end of a continuum. Expectations could also govern production standards, and one would expect that attached 'palace' production using precious raw materials would demand higher standards of goods than household production of goods for use by family or kin.

4.5.b Primary or secondary products

The relation between these and the type of workshop has been discussed above (see section 4.1).

4.5.c Utilitarian or luxury products

Many utilitarian items could be made in activity areas; prestige items, especially those involving exotic raw materials, or materials requiring special skills and equipment to work them, are more likely to have been produced in a workshop. Luxury products are more likely to be made by attached specialists. A product may be considered to be a 'luxury' or 'prestige' item when: a relatively large amount of time has been invested in its manufacture or in the training of the craftsman; the skills required for production are complex and acquired by few artisans; rare or exotic raw materials

have been used for its production; the product is used for display or non-utilitarian purposes;[5] a combination of these factors.

It is probable that these conditions will be met by an elite or large institution. It is not impossible, however, for independent craftsmen to have manufactured prestige products: this could have happened in the early stages of societal development (the Neolithic), when products could be relatively complex but not so demanding in terms of knowledge and equipment that their production was limited to very few people (unlike, for example, metallurgy). Therefore those with the relevant ability or talent could become occasional or part-time specialists using their superior expertise to make products with the most prestige attached to them at that time. As society developed, the time available for craftwork, and contacts for providing knowledge or valuable raw materials, would become increasingly important factors.

Vitelli suggests that "by the fully ceramic EN, Franchthi potters chose among a range of available raw materials. They produced pots in a wide range of sizes and shapes, finished with different surface treatments, and fired with different fuels and procedures. The potters had considerable knowledge about ceramic processes...[yet did not apply it frequently in the EN]... Initially, their choices were apparently not guided by cooking and food storage" (Vitelli 1989: 27). Production at this early ceramic stage is thought to have been infrequent and with a low output,[6] and therefore carried out at a very basic domestic level, certainly without workshops. Despite these circumstances, many other authors have propounded that early pottery was not for utilitarian purposes, but for a more socially oriented use such as display, trade, or social storage[7] and therefore a prestige product, relative to that time period.

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[5] The concept of prestige can extend to viewing pottery as "imbued with magical powers - to ward off particular fearsome happenings, ensure desired ones, and testify to the devout performance of sacred rites" (Vitelli 1993a: 253).

[6] Vitelli (1989: 21-22) estimates EN pottery production at Franchthi at 12-13 pots per year, divided between five potters, thus very infrequent. For the MN, she suggests c. 150-175 pots per year, possibly by fewer potters working at any one time. Perlès (1992a) agrees with these figures.

[7] The preserved gloss, lack of soot deposits, and rarity of vessels and their small size at Franchthi do not suggest cooking or storage functions for EN pottery (Vitelli 1989; Demoule and Perlès 1993: 377; cf. also Perlès 1992a).

Taking the standpoint that early knowledge of potting techniques was much less widespread than later on in the Neolithic, Vitelli (1993a: 252) argues that "the progression within the Neolithic was actually from specialists at the very beginning to non-specialists by the end of the period". Perlès (1989) also propounds a "de-specialization" during the Neolithic in the area of obsidian blade production. Theocharis (1973: 40) believed that some Neolithic vases were intended for trade and decoration, the best made by specialist craftsmen, working part- or full-time. Although the latter scenario is rather too advanced to be applied to the Neolithic, his suggestion that at some sites pottery production was perhaps an important means of subsistence is possible, especially if one follows Halstead's theory of social storage (Halstead 1989: 74). This may also be true of stone vases: a group of specialists is assumed for Nea Makri because the volume of vases is unusually large compared with other sites. Sealstones and ornaments of shell and stone are thought to have been symbolic or prestige items in the MN (Demoule and Perlès 1993: 384).

4.5.d Ubiquitous or exotic raw materials

Generally speaking, ubiquitous raw materials will be used to manufacture utilitarian products at any level of production; exotic raw materials will be used in the production of prestige goods under the patronage of an elite group which has procured the materials through exchange contacts which only that group can maintain. There will always be exceptions, however, such as the use of clay for prestigious palace pottery production, for example Kamares Ware, and the use of exotic materials such as obsidian, which was difficult to obtain in the Mesolithic and Neolithic, to produce tools for everyday use. Regional raw materials, which are located in a specific area but not so far away as to be termed "exotic", come inbetween these two extremes.

4.5.e Standardised or unique products

A factor, which Costin does not mention, is whether the workshop is orientated towards mass production, or more individualised craft goods. This is related to other issues such as the consumer, the demand, the investment in specialised equipment,

interest in efficiency and perhaps division of labour. Demand for a large output of goods will require a larger workforce than a small output demand. Mass production will necessarily involve a larger output of more standardised products than the manufacture of unique goods. The latter will not be standardised where: production is at a basic level, using simple tools and practised infrequently, giving a different result each time; production is more specialised and frequent, but lacking the necessary equipment for mass production; there is a high level of organisation capable of mass production and standardisation, but specialising in producing unique prestige goods.[8]

4.6 Efficiency

Production will be more efficient when: there is specialised, labour-saving equipment in use; the craftsmen are highly trained, skilled and practised; the products are standardised; high output is demanded; subsistence depends on the craft (and accordingly, the process must minimise costs); there is considerable division of labour, where craftsmen specialise in a particular task at a certain stage of production; the production process is highly organised. Following these premises, one would expect that household production using simple techniques for family use will be less efficient than independent workshop production of standardised goods, because only a small output is required[9] and it is not cost effective to invest in specialised equipment for occasional production for personal use. Of course, factors of economy and efficiency will not always take priority (for example see section 4.2). Deliberate inefficiency may be used to increase the prestige of a luxury product.

4.6.a Division of labour

"All would agree that some basic division of labor by sex and age within the household is basic to all human societies..." (Costin 1991: 3). Therefore Costin

[8] Costin (1991: 268) also makes this point, and Stein and Blackman (1993: 31) add "Nevertheless, virtually all standardized goods are made by specialists."

[9] See Hagstrum (1985: 72).

excludes it from her definition of craft specialisation. It is, however, a relevant factor to be addressed in the case of workshop organisation. Van der Leeuw (1977: 70-71) believes that household production, household industry and individual industry (see section 4.7) have no division of labour. This opinion is questionable with regard to the former two types of production. In some cases, the men in the household might procure the clay for the women and children to prepare, and the women finally carry out the potting. Conversely, division of labour should not be assumed for all workshops. Although the Atelier de Sceaux, Quartier Mu, for example, could be classed as a "workshop industry" (using van der Leeuw's (1977) typology) where two people worked,[10] it is improbable that there was a division of labour. The two craftsmen, one an apprentice learning from another, were distinguished from the styles of engraving from the same stage of production, so it is probable that they were both carrying out all the steps of the production process. It is dangerous to generalise about the specific division of labour in craftwork in the absence of textual evidence, so this matter will have to remain open to debate.

4.6.b Specialised workshop facilities

A prime example of an invention that made production quicker, more consistent and efficient, is the potter's wheel. Kilns also increased efficiency, as large numbers of pots could be fired with more control over timing and temperature (and fewer firing-related losses) than when bonfires were used. A kiln requires capital investment of building materials and skilled labourers' time. Capital investment in specialised facilities is more likely when production carried out full-time or as a means of earning subsistence.

4.7 Types of production: previous models

Van der Leeuw (1977), Peacock (1982) and Costin (1991) have constructed typologies of modes of production, the former two adding that their models are not all-inclusive. Table 4.2 summarises the categories used by each study. The variables

[10] The amount of space in the workshop was sufficient for perhaps two artisans (Poursat 1996: 110),

used include the time involved, number of people, organisation, locality, hired hands, market, raw materials, investments, seasonality, labour division, time taken per pot, and status. Some of these variables are incorporated in Costin's four parameters (context, concentration, scale and intensity) which take into account the social, political, economic and environmental variables that affect the parameter values.

Van der Leeuw (1977)	Peacock (1982)	Costin (1991)
Household production	Household production	Individual specialisation
Household industry	Household industry	Dispersed workshop
Individual industry	Individual workshops	Community specialisation
Workshop industry	Nucleated workshops	Nucleated workshops
Village industry	The manufactory	Dispersed corvée
Large-scale industry	The factory	Individual retainers
	Estate production	Nucleated corvée
	Military & other official production	Retainer workshop

Table 4.2 Types of production

The characteristics of the categories relevant to this study[11] are discussed briefly below. The categories of van der Leeuw and Peacock, whose typologies were based on pottery production, are examined first, and their accounts of *household production* and *household industry* are combined under the same heading. Peacock's descriptions include defining criteria by which the workshop can be recognised. Van der Leeuw gives a more ethnographic description of each type of production, from which some criteria for recognition may be inferred.

and two artisans have been identified on stylistic grounds by Dessenne, one an apprentice.

[11] The latter half of Peacock's categories does not apply to the prehistoric Aegean (his model was formed to explore Roman pottery production). Van der Leeuw's *large scale industry* refers to a level of mechanisation found much more recently. It is not impossible that the last three of Costin's types could have functioned in Aegean prehistory, although a *retainer workshop* seems unlikely.

Household production

This is the simplest type of production; pots, for example, would be made without the use of a kiln or tools other than a supporting stand (not a wheel) (Van der Leeuw 1977: 72). Each household makes its own pottery, which is strictly functional. Peacock's assertion (1982: 8) that potting is of secondary importance and is therefore practised by women, is supported by instances in some societies, but it is not a universal phenomenon.

Household industry

Van der Leeuw's (1977: 72) account includes the following: that Balfet calls potters at this stage of production 'specialists' in a sociological sense, not through professional ability, but because they subsidise their income by exchanging pottery. Firing can take place one to three times a year in the dry season. Simple tools are used, but no investments such as kilns. Peacock (1982: 8) gives a more specialised meaning: "Production is in the hands of professionals who are potting for profit and so if there are facilities for wide marketing, these will be exploited." Production is, however, part-time and not the only means of livelihood.

Individual industry

Van der Leeuw (1977: 72) gives the example of a male itinerant potter who uses a kiln, receives some form of payment for his pots, and belongs to a guild that regards its members as specialists. This begs the question of where the kiln is situated; presumably the itinerant specialist travels with the already made pots.

Individual workshops

Because pottery is the main form of subsistence, it is usually practised by men,[12] although it may be practised for only part of the year. The use of the wheel and the

[12] See above, *household production*.

kiln is likely so the occupation is often sedentary; if circumstances favour itinerancy, however, this too is possible. Numbers of producers may vary from a single person, or for efficiency, a small team, perhaps members of his family.

Workshop industry

Van der Leeuw's (1977: 72) description: a "specialist who has a few helpers and who supplies a somewhat larger settlement", makes this mode similar to Peacock's *individual workshops*.

Nucleated workshops

Individuals may be grouped together because of the availability of raw materials, labour, or markets, or a combination (Peacock 1982: 9). Pottery is the main source of income, and the potting season is extended for as long as possible. The activity is almost exclusively male, and every available technical aid is used. The scale of production will attract middlemen with a wide distribution network.

Village industry

The economy and power structure of the village is geared towards pottery production. In the complicated social stratification, entrepreneurs gain power by helping the potters through crises and providing equipment, and then by controlling the distribution of the finished products.

Household production and probably *household industry* would involve activity areas, rather than workshops. In some cases, however, where Peacock's definition of household industry is used, a workshop may be involved. In Costin's categories (see below), it is likely that all of them would involve workshop facilities, the only exception being *individual specialisation* which could function in an activity area. Costin gives the following definitions of her categories:

Individual specialisation: autonomous individuals or households producing for unrestricted local consumption.

Dispersed workshop: larger workshops producing for unrestricted local consumption.

Community specialisation: autonomous individual or household-based production units, aggregated within a single community, producing for unrestricted regional consumption.

Nucleated workshops: larger workshops aggregated within a single community, producing for unrestricted regional consumption.

Dispersed corvée: part-time labour producing for elite or government institutions within a household or local community setting.

Individual retainers: individual artisans, usually working full-time, producing for elite patrons or government institutions within an elite or administered setting, such as a palace.

Nucleated corvée: part-time labour recruited by a government institution, working in a special-purpose, elite, or administered setting or facility.

Retainer workshop: large-scale operation with full-time artisans working for an elite patron within a segregated, highly specialised setting or facility (Costin 1991: 8-9).

Nordquist (1995: 201), discussing such production models, notes that a society may simultaneously have several modes of production. Technically advanced modes do not exclude the existence of simple ones.

4.8 A new typology of production areas and workshops

Hodder claims that the "organisation of production and the styles of the output must be related within a total social and cultural context", an area in which little work has

been carried out (Hodder 1982: 89). A comprehensive typology for the scale of production should use a combination of parameters seen in the authors' accounts above. Corresponding with these parameters, additional factors have been added. In an attempt to take all these factors into account, a new ten-part typology is suggested here, summarised in table 4.3.

In prehistoric Greece, not all the variations of production types set out below would have been possible at all times. Only the simpler levels of production would have been present in the early stages of craft specialisation, whereas workshops appeared later on, when a higher level of craft specialisation had been reached.

The various possibilities for the new typology have been defined in terms of the following parameters:

Scale	**individual** person, **group** or **community**.
Activity locus	**production area** or **workshop** (the latter implying investments in facilities for more efficiency; these may be located within a house[13]).
Consumer	**household/kin** (own use), **external market** (independent production to earn part or all of subsistence; can range from local to regional to overseas; can include the use of a middleman), or **patron** (attached production for patron (elite) who can use the product for personal needs or exchange it at various levels).
Time	**occasional** (whenever the need arises); **part-** or **full-time**, **seasonal** or **all year**.

[13] For example, the Maisons-ateliers at Quartier Mu (cf. Poursat 1996).

Efficiency **low** (much time spent on each product, due to either inefficient means - simple tools and a lack of specialised equipment - or a demand for a unique, elaborate product; the latter will nevertheless probably have investment in facilities), **medium**, or **high** (relatively little time spent per product due to standardisation, perhaps for mass production, division of labour, specialised equipment or facilities, or a combination of these).

The following factors are not specifically included in the list above:

1. whether workshops are primary or secondary: it can be expected that independent workshops will generally be primary. This is not an issue which will have major ramifications in a generalising typology;
2. where workshops are located geographically (within or outside the settlement): this can depend on various factors that are individual to particular circumstances (see section 4.2). As a result, this factor cannot be subject to generalisation in a model;
3. whether workshops are dispersed or nucleated: this is incorporated into *scale*, where individual and groups of producers will be dispersed, and community production is a nucleation of production. One could argue that community production should not come under the heading of 'scale' because it can involve many individuals and groups, which simply work together, and therefore cannot be distinguished separately from them. The main difference between this and individual or group production, though, is the consumer, which is not local, but usually regional;
4. whether the products are utilitarian or prestige: expectations can be stated but without sufficient certainty to generalise in a model (see section 4.5);
5. whether the raw materials are ubiquitous, regional or exotic: this varies according to particular examples and again, cannot be generalised (see section 4.5).

TYPE OF WORKING AREA	SCALE OF PRODUCTION UNIT	CONSUMER	TIME	EFFICIENCY	PRODUCTION TYPE (NAME)
ACTIVITY AREA	Individual	Household/Local market	Occasional	Low	**1**
	Group	Household/Local market	Occasional/P-T	Low-Medium	**2**
	Community	Regional market	P-T; Seasonal/All year	Medium	**3**
WORKSHOP	Individual	Local/Regional market	P-T; All year	Medium	**4**
		Patron	F-T; Seasonal/All year	High	**5**
	Group	Local/Regional market	P-T/F-T; All year	High	**6**
		Patron	(P-T)/F-T Seasonal/All year	High	**7**
	Community	Regional market	(P-T)/F-T; All year	High	**8**
		Patron	P-T; All year	Medium	**9**
			F-T; All year	High	**10**

Table 4.3 Typology for states of production

Possible examples of workshop types are:

1. Ayios Kosmas (Attica): House F, Room F3: obsidian, EH II.
2. Poros-Katsambas (Crete): Trypeti hill: obsidian, EM I - MM I.
3. Nea Makri (Attica): stone bowl makers, Neolithic.

5 or 7. Mallia (Crete): Quartier Mu: Atelier de Sceaux, MM II.

6 or 8. Raphina (Attica): copper smelting, EH II.

8 - 10. There are ethnographic examples from India but examples are unlikely from prehistoric Greece, except for possible mining or smelting settlements such as EC II Skouries (Kythnos) or EH II Raphina (Attica), where it has yet to be demonstrated that the whole site specialised in metallurgy.

The typology proposed here is more thorough and comprehensive than previous attempts, and unlike those of van der Leeuw and Peacock, it is not limited only to pottery production. It is more applicable to working areas from the EBA-MBA than the Neolithic, because definitions of, for example, prestige goods and scale of production are relative and differ greatly according to the era (see section 4.5).

Difficulties will arise because the finds are often inconclusive and the most basic distinction between workshop and activity area is not always easily made. Only working areas classified in the catalogue as A or D can be analysed with this method; even then it may not be possible to define them further as one of these types. The scale, consumer, time and efficiency are rarely obvious from the published finds. As a possible method of discovering concentrations of debris relating to specialised production Costin (1991: 18ff.) expounds a way of calculating ratios between artefacts such as unfinished and finished products, and unused and used goods. This would help distinguish between assemblages from consumer households, or households practising basic production, and specialist workshops if the data were more frequently available.

The scale of production may sometimes be estimated from calculations of man-hours,[14] identification of individuals by attribution studies, and amount of work space available.

[14] e.g. Torrence (1986: 154ff.).

A workshop producing distinctive prestige goods is likely to have a patron as the consumer. Elites, however, may not necessarily acquire all their goods from attached workshops; perhaps some workshops produced utilitarian goods for elite and non-elite consumers. This concept of a free market may be anachronistic; nevertheless, it cannot be ruled out, given the current inadequacy of knowledge concerning prehistoric exchange. The consumer of a workshop's utilitarian products might be guessed from the workshop's location. The time spent can only be estimated, following on (as in table 4.3) from the previous considerations, as can the efficiency of production.

It can be concluded that previous typologies have been too simplistic and insufficient detail has been given regarding how to distinguish objectively between the varieties when applied to an actual working area. Moreover, the authors did not suggest uses for the typologies. Here, a more comprehensive typology with accompanying explanations has been expounded but still its application to the archaeological record is limited. It can, however, be used to form predictions; a workshop containing prestige products attributed to two craftsmen and located near a palace (for example, the Atelier de Sceaux, Mallia) would be type 5 or 7, and could be predicted to be at least part-time, perhaps full-time, and to have a high level of efficiency. If the publication of sites becomes quicker and more precise, it may be possible to use such a typology more effectively so that further conclusions may be made regarding the socioeconomic structure of the site and of units within it.

Chapter 5. The identification of workshops and the classification of data

5.1 Criteria for the identification of workshops: previous research

Previous scholars have presented contrasting and sometimes indeterminate criteria to be necessary for recognising workshops. The lack of an agreed method for identifying workshops has resulted in dogmatic assertions by some scholars that certain loci are workshops, about which other scholars would exercise a far greater degree of caution. Indeed, some scholars appear to have used instinct rather than method in their claims of workshops. The following list is a compilation of all the criteria mentioned by various authors:

1. Specialised permanent production installations
2. Unfinished goods (not rejects), preferably from all or many of the production stages
3. Raw material
4. Waste:

a) Production debris

b) Rejects, mistakes, damaged goods in the stages of production

c) Experimental pieces

5. Tools
6. Finished products
7. Non-specialised permanent production installations
8. Associated store-rooms
9. Other equipment (for example pottery in which to store pigments)
10. Associated permanent equipment within working proximity (not necessarily in the workshop, for example kilns)
11. Windows or another means of providing sufficient light

Rice (1981) adds the criterion of identical kinds of fired vessels (for distinguishing areas of pottery production). Evidence for specialised production of the sort that may take place in workshops includes indications of proficiency of manufacture, mass production, homogeneity, and interchangeable mould-made pots. These are criteria

that will indicate that there was probably a workshop at a site somewhere, rather than criteria, which may be of help in analysing a specific working area. The only case where this method has been of help in this study is that of Patrikies, where it is supposed that there was a workshop because of many finds of specific types of ware in a thick deposit of sherds.

Table 5.1 provides a summary of the varying indicators used by previous researchers. The criteria will be referred to by their number in the list above.

SOURCE	CRITERIA
Tosi (1984: 25)	2 (including 4b and 4c?), 4a, 5, 6, 'materials for recycling' (3?), 'facilities' (1?, 7?, 10?).
Evely (1988: 402-409)	'artifacts': 'architecture': 2, 3, 4a, 4b; 1, 7, 8, 9, 10.
Tournavitou (1988: 447-449)[1]	2, 3, 4a, 4b, 5, 6, 1 and/or 7), pottery; architecture (plan and construction)[2]; connection with central administration (i.e. position close to administrative centre, tablets, sealings).
Costin (1991: 18-19)	1, 3, 4a, (4b? 4c?), 5.
Tournavitou (1995: 124-126)[3]	2[4], 3, 4a, 4b, 4c, 6, 7, 9.
L. Platon (1993: 105-6)	2, 3, 4a (including 4b and 4c?), 5, 6, 7.

Table 5.1 Summary of workshop indicators used by past scholars

[1] Factors relevant to the determination of permanent palace workshops.

[2] Tournavitou admits, however, that "The majority of workshops have absolutely no distinctive design", so this criterion is surely redundant (Tournavitou 1988: 447-9).

[3] Factors for indicating the presence of ivory workshops.

[4] Tournavitou distinguishes between (a) partly worked segments, rough-outs, prepared blanks and large offcuts and (b) unfinished pieces. The difference between these two categories is minimal; they are both unfinished pieces.

This summary was difficult to construct because authors do not specify what their categories include. Platon's "Objets inachevés", for example, might include category numbers 4b and 4c, as might his "Déchets de fabrication", or these categories might simply mean 2 and 4a respectively. He gave benches and shelves as examples of "Équipement annexe", so it was summarised as 7; it was not clear whether it might also include 1, 9 and 10.

Definitive criteria are needed to prevent subjective and misleading notions leading to the misinterpretation of evidence. Branigan's suggestion (1983: 27) that evidence for part-time craftwork would be small isolated groups of tools cannot be justified, for such a group of tools found in a grave would fit that description but could hardly be described as evidence of a part-time workshop. Moreover, the same essential equipment will be needed for most crafts, whether practised full-time or part-time. Although full-time craftwork may imply a more specialised and complex operation, it does not necessarily follow that full-time craftwork always needs permanent facilities and part-time work does not.

5.2 Indicators for areas of craftwork

To identify workshops from the archaeological record, the following are required:

1) a list of indications to look for in the excavation data, which may point to a certain place as a possible craft-work area,
2) a means of analysing the finds from that area to test whether they are statistically significant as indicators of a workshop (see section 5.5).

In order to scrutinise the data for the presence of working areas, one must first know what kind of evidence one is looking for. The evidence will vary according to the craft, the technology of the era and the type of production. Therefore the associated identifying criteria must be established for each type of craft. The differences in assemblages, built-in facilities, architecture and locations of workshops for different crafts make this complicated.

The approach taken by Shelmerdine in her examination of Mycenaean perfume workshops (1985) was to reconstruct from analogy and the evidence of contemporary Linear B tablets the method of production and then to diagnose the equipment, space and types of vessels which were certainly or possibly needed for production. For the time period considered here, Linear B is not applicable. Analogous evidence from ethnographic data relating to artifacts found in working areas might be useful for confirming the features which one would expect to find in the archaeological record to suggest a workshop. Its use, however, should not be extensive or relied upon, due to the number of problems involved with this method of inquiry[5].

The types of indicators associated with crafts are determined here in the following ways:

1) by combining every type of indicator found at workshops for that particular craft in the Aegean;
2) by using Evely's (1993) examination, unfortunately half-published, of finished artefacts from which the tools used in production may be discerned. This method cannot always be employed, however; for example in the case of cockle-shell beads, most traces of work have been deliberately erased in the polishing and finishing stages of production, or accidentally obliterated through wear (Miller 1996: 8). In such cases, it is necessary to use method 3);
3) by examining partly worked examples for information about the tools used;
4) by using information gained from replication experiments.

It is recognised that method 1) could be considered circular. With common sense, however, it is possible to discern a definite workshop from the archaeological record, for example, waste, tools and raw material found together indicate a working area. A starting point has to be made somewhere, and if one were to start with a list of

[5] For example the lack of analogy in other critical conditions, such as climate, ecology, environment, social factors and influences. One cannot expect recent or present pre-industrial societies from various parts of the world to have societies and lifestyles so similar to those which existed in prehistoric Greece, that they could provide a template for the contents of workshops. In the case of the manufacture of perishable goods and the use of non-durable tools and equipment, a lack of other evidence may necessitate the use of ethnographic parallels.

expected phenomena compiled from ethnographic evidence and experiments, it would be quite possible to have a list of artefacts which would be either anachronistic or wrong for application to the prehistoric Aegean, where different methods of production were employed. To compile a list of workshop artefacts from actual finds, especially those from definite working areas, gives a more realistic and workable means of identifying further craftwork areas.

Table 5.2 summarises the indicators that could, in theory, be found in a working area for each material. Only in rare cases will a workshop contain every type of indicator for a craft. Because some of the data for the table were taken from Neolithic to MM working areas, some which apply to MM working areas may not apply to those from the less advanced Neolithic. This must be taken into account when studying the data; where certain indicators are not present before a particular date, this is specified (e.g. potter's wheel discs). Where indicators differ for particular products within crafts these are dealt with separately, as in the crafts of stone work, and pottery and textile production. Similar indicators would have been found for the manufacture of stone figurines as for sealstones. Crafts involving the production of glass, faience and perfume have not been included because none are documented in the catalogue; these crafts are more prominent in the Neopalatial era.

In the table below, 'No.' corresponds with the types of indicator (raw material or tools for instance) as detailed in Table 5.5, whereas 'Indicators' are the type of find corresponding to that craft. Non-specialised installations (shelves, tables, worktops, benches, storage chests and associated store-rooms) could be used by any workshop, especially those with a more advanced type of production.

CRAFT	NO.	INDICATORS
Metal	1.	Furnace
	2.	Unlikely
	3.	Ore, scrap to be remelted, ingots, flux
	4.	Slag
	5.	Crucibles, tuyères, moulds (stone, clay or perhaps metal), model for cire perdue casting (rarely), hammers, grinders, whetstones
	6.	Tools (chisels, axes, awls, saws etc.), jewellery, ingots
Pottery[6]		
Pot-making[7]	1.	Kiln, levigation pits
	2.	Vases of unbaked clay
	3.	Raw clay, temper
	4.	Wasters, misfires, pots broken or distorted in firing
	5.	Potter's wheel discs (from EBA onwards), burnishers polishers and scrapers (pebbles, polished bone, shells and chipped stone), grinders, moulds (rarely found)
	6.	Vases (ubiquitous in the archaeological record)
Pot-painting	2/3.	Unpainted vases
	3.	Pigment for paint
	5.	Incising tools, pots for mixing pigment. (Brushes perishable)
	6.	Painted pottery (ubiquitous in the archaeological record)
Stone[8]		
Sealstones[9]	2.	Rough-outs or blanks, partly engraved sealstones

[6] Charlton et al. (1991: 106-108); Underhill (1991: 15); Poursat (1996: 111ff.). Torbert (1985: 278-288) gives an example of an ethnographic study of the archaeological signs that would be left from potting activities in the Sudan; Deal (1988: 111-142) does the same in a Mesoamerican context.

[7] cf. Nicklin (1979: 437-449); B.L. Stark (1985: 158-194, especially 168-171); Santley et al. (1989: 107-132); Vitelli (1993b: 207) for Neolithic tools; Poursat (1996: 111-113).

[8] Kenoyer et al. (1991: 44-63) detail an ethnographic study of the methods and tools used in Indian bead-making from agate.

[9] cf. Evely (1993: 146ff.); Poursat (1996: 103-110).

[10] cf. Warren (1967: 195-201; 1969); Younger (1979: 259-270); Evely (1980: 127-137; 1993: 172ff); Poursat (1996: 119-120).

	3.	Blocks of unworked stone (e.g. steatite, serpentine, chlorite)
	4.	Chippings, offcuts, seals broken in production
	5.	Bronze knife, chisel, saw, burin, point (metal, flint, or obsidian), drill (flint, copper or reed?) and abrasive (pumice, emery or sand), polishers (magnifying lens? Probably not). (Bronze tools mainly from EBA onwards)
	6.	Sealstones: cylinders, prisms, pyramids, stamp-seals, conoid etc.
Stone vases[10]	2.	Incomplete vases (not hollowed out, carved, or decorated)
	3.	Blocks of unworked stone (e.g. limestone, schist, marble)
	4.	Chippings, offcuts, vases broken in production
	5.	Bronze knife, chisel, saw, burin, point, compass[11], drill and abrasives, perhaps hammer and mallet, possibly paint; tools of obsidian, quartz, copper or copper alloy (depending on the hardness of the raw material). (Bronze tools mainly from EBA onwards)
	6.	Stone vases
Chipped stone	2/6.	Prepared platforms
	3.	Raw nodules of obsidian/stone
	4.	Chips and flakes, cores
	5.	Hammers (not usually distinguishable with certainty in the archaeological record as serving this purpose), points for pressure-flaking
	6.	Blades
Shell[12]	2.	Partly worked shells, blanks
	3.	Unworked shell
	4.	Chips of shell (pieces from the central string-hole, and shells broken in production)[13]

[11] None survive, but their use for decoration is detectable on vessels, jewellery and seals (Evely 1980: 133).

[12] cf. Evely (1993: 219ff.); Miller (1996: 7ff.).

[13] Miller (1996) describes the types of debris produced at each stage of shell bead production in replication experiments.

	5.	Drill, often stone (chipped stone micro-points, preferably with traces of rotational activity); grindstone, hammerstone, abrasive, possibly paint
	6.	Beads, other ornaments/jewellery: buttons, rings, bracelets
Textile[14]		
spinning	5.	Spindle whorls of clay/stone
weaving	5.	Shuttles of clay/terracotta; loomweights of clay/stone (ideally found in a row to suggest loom destroyed on site; sometimes found in heaps or even in jars, indicating the storage of a dismantled loom; more often found scattered miscellaneously over sites)
garments	5.	Spindle whorls and loomweights of clay/stone; shuttles of terracotta/clay; needles and pins of bone/metal; spool; rubber
dyeing[15]	1/7.	Tanks, tubs, basins, platforms
	3.	Pigments
	4.	Shells of *Murex trunculus* (most commonly), *Murex brandaris* or *Thais haemastoma*
Horn, bone, tusk, antler and ivory[16]	2.	Partly worked material
	3.	Unworked material
	4.	Chippings (rarely found)
	5.	Metal and stone tools: chisel, knife, graver, awl/point/burin, saw, abrasives. (Metal tools mainly from EBA onwards)
	6.	Implements, inlays, ornaments; antler often used as a tool, such as a punch; bone and horn for small objects; ivory for inlays and seals
Leather[17]	5.	Metal leather-cutters (from EBA-MBA onwards), stone scrapers

[14] cf. Charlton et al. (1991: 108ff.); E.J.W. Barber (1991).

[15] cf. Reese (1987: 201-206); E.J.W. Barber (1991: 223ff.).

[16] cf. Evely (1993: 219ff.).

[17] cf. Branigan (1968: 91); Sliva and Keeley (1994: 91ff.).

Wood	5.	Metal and stone tools: axe, chisel, knife, saw, point, burin, etc. (Metal tools mainly from EBA onwards)

Table 5.2 Indicators of craftwork

5.3 The location and indicators for particular crafts

The usefulness of the types of indicator will be examined later (section 5.4). It is appropriate now, however, to make some observations about the indications for particular crafts and the difficulties in pinpointing their production loci.

Metal

All the indications of metalworking are specific to and therefore only indicate that craft, except perhaps some smithing tools such as hammers and whetstones. However, although slag "provides a conclusive sign of metallurgical activity" (Stos-Gale 1998: 718), it cannot be used to distinguish whether melting or smelting was practised (McGeehan-Liritzis and Gale 1988: 209), although it is, in fact, likely that most reports concern slag from melting metal rather than its production (Stos-Gale 1998: 720). Although problems might pertain to dating the locus if diagnostic pottery is not present, C14 dating of charcoal in slags or thermo-luminescence dating of clay crucibles could be used. A typological analysis of the products, which may be present at the workshop or could be determined from matrices in moulds, can provide an estimated date depending on the type of product (those used for a long time, EM-LM for example, are of little use for chronology).

Potting

Criteria that have been used for the archaeological recognition of pottery production, besides the more obvious indications such as kilns and wasters, include the relative concentrations of residues from production within sites (Tosi 1984: 23; Santley et al. 1989), presence of raw material storage (Deal 1988), and identification of tools from use-wear analysis (Deal 1988; Underhill 1991: 15).

While wasters at a site show that potting work has been carried out somewhere, the location for potting is difficult to identify with certainty. Wasters alone probably indicate the existence of a dump or kiln thereabouts. Tools and raw materials are more indicative of the place where the vessels were formed; they are, however, portable and their presence does not necessarily indicate that production took place in that area (B.L. Stark 1985: 167). All the tools, however, with the exception of moulds, are ambiguous as potting indicators, either because there are problems in identification (a naturally occurring smooth pebble may mistakenly be labelled as a 'burnishing pebble'; identifications of some items as potting wheels have been contested by others) or because they are not tools specific only to potting. Many items utilised will have been perishable, such as sticks, straws, hides and fleeces (B.L. Stark 1985: 173-4; Vitelli 1993b: 207). Regarding the raw materials, clay occurs naturally with great frequency; to find it stored in a vase or a levigation tank (also problematic to identify) would suggest that it was being deliberately stored for future potting, but unfortunately it is rarely found thus.

A further problem is that the signs of pottery production vary depending on the type of production, from occasional manufacture for personal or household use, which might leave no detectable traces at all, to large-scale specialised production which should leave more indications in the archaeological record (Van der Leeuw 1977; Peacock 1982; Feinman 1982; B.L. Stark 1985; Santley et al. 1989). It should be easier to detect workshops than activity areas (B.L. Stark 1985: 167-173; Deal 1988).

Some Mesoamerican studies use mathematical methods to detect areas of pottery production. Santley et al. (1989: 112ff.) conducted extensive transect surveys at Matacapan, Mexico, measuring the densities of kiln debris, wasters and sherds per square. Co-variations and correlation coefficients were also used to produce further information, for example comparing the size of production area between household and non-household production areas. While these might work well for sites in Mesoamerica, they cannot usually be applied to sites in the Aegean because the necessary information is not available. It is possible that future excavations might make use of these technical methods; for the present study, however, which involves sites excavated without the aim of acquiring such data, an alternative method, more

simplistic than these very specific statistical analyses must be used (see below, sections 5.5-5.9).

Pot-painting

No pot-painting tools are specific to that craft. Pigments alone could relate to the painting of architectural features, stone, bone, shell, wood or pottery, or of the human body. Unpainted pots may have been awaiting decoration, or could be deliberately left unpainted. Of the two claimed examples of decorating (painting) workshops, one at Phase IVA Achilleion is analysed here only as a possible activity area, and the other at Lithares has been reinterpreted by the excavator as a sanctuary. The locus of this type of work, if ever located with certainty, will probably be included in a potting area.

Pot-firing

It is important to ensure that structures identified as kilns are not bread ovens. There are several examples in the catalogue of structures interpreted as bread ovens or kilns (Sitagroi, Sesklo, Kolonna), and of kilns that could have been used for pottery or metal work or both (Silamos, Crete); faience work is another possibility, although unproved so far for any EBA-MBA structures. Finds of wasters in or around the structure, of course, make identification more certain.

Stone seals and vases

Unfinished products and broken products are specific indicators of the craft. Finds of bore cores may indicate the production of vases or, less commonly, hafted axe heads. Raw materials, tools, offcuts and chippings could correlate with either seal or vase work, though a toolkit for sealstone work may contain smaller tools than those for vase production, and the waste from sealstone work is unlikely to contain such large pieces as that from vase work.

Chipped stone

One must discriminate between workshops and workshop *dumps*, which may or may not coincide with the workshop (Clark 1983, cited in Mallory 1986: 155). This is particularly difficult in the case of obsidian because so few indications of production

remain. "[A] mere concentration of obsidian debris does not by itself indicate a workshop; rather, the obsidian must be primary manufacturing refuse" (Clark 1986: 33). The latter may still indicate a dump. Parry's definition of obsidian workshops is based on the absolute densities of obsidian in the collections, the proportion of obsidian to the total ceramics and the proportion of tool manufacturing debris to tools (Parry (1990), cited in Charlton et al. 1991: 103). That such deposits might be dumps is contradicted, Charlton et al. argue, by excavations suggesting that debitage is not transported a great distance from the production locus (Charlton et al. 1991: 103). A household workshop was found, with the debitage dumped with other household rubbish between two residences.[18] Logistics and ethnographic data, however, suggest that obsidian debris is taken away (Clark 1986: 32).

Shafer and Hester (1986: 159-61) measured the volume of production debris, which includes flakes and microdebitage and chipping dust, and claimed that accumulations consisting of 99% pure debitage and little or no midden debris were workshops rather than dumps. While this may be so, surely debris from workshops might equally be dumped in middens for general waste, as in specified areas. They reject the idea that these assemblages could represent neighbourhood lithic dumps by arguing that if this were the case, there would be a range of debitage and more obsidian-working mistakes would be apparent. A workshop, however, would produce a range of debitage. From the absence of humic layers, Shafer and Hester conclude that the deposits represent a continuous accumulation built up over a short period of time, the length of which is undefined by the authors. There is nothing, however, to prove that these were not workshop dumps rather than workshop sites. No mention is made of other finds that might indicate the presence of a workshop, such as tools, blocks of raw material and perhaps finished products. Moreover a quick rather than slow accumulation of debitage is surely more suggestive of a dump than a workshop.

[18] This research was conducted in Aztec sites in Mexico; the conclusions drawn here may not relate to the Aegean.

The method used by Torrence (1986),[19] which examines the finds to calculate the efficiency of production and the number of man-hours in an obsidian deposit, is preferable. Those advocating the methods above could spend hours analysing areas of lithic waste, only to find (using Torrence's method) that they represent, for example, five man-hours of work perhaps from a single knapping episode. This would instantly discount the possibility of a workshop dump. This method has been successfully applied to several locations in the Aegean whose status and function had previously been debated on a subjective basis, for example the locus on the South side of the Royal Road, Knossos (see Catalogue).

Shell

The stages of production, associated tools and by-products and types of shell used for certain products are discussed by Shackleton (1988) and Miller (1996) in the context of *Cerastoderma* bead-making at Neolithic Franchthi, and by Tsuneki (1989) and Halstead (1993) in relation to *Spondylus* shell objects at Neolithic Dimini. Shell-object production loci are mainly found in the Neolithic. Halstead's work illustrates the importance of locating specific concentrations of waste and tools to illustrate a working area; the fact that waste was fairly evenly scattered, whereas the finished products were concentrated in certain areas, suggested that while the goods were produced in every domestic area, consumption of the finished product was more limited. Miller's arguments for whether the remains at Franchthi represented a dump or a working area are set out and challenged in the catalogue (see *Franchthi: Paralia)*.

[19] Torrence (1986: 154) describes the experiments by Sheets and Muto (1972). One person (a novice obsidian worker) took two and half hours to reduce an already prepared core (820g.) to 84 blades (746g.) producing 24g. of waste. When applying these figures to the prehistoric Aegean, Torrence adds the following points to bear in mind: that the worker was not a specialist, and that the latter would no doubt take less time to complete the process; and the amount of waste would be greater than that from the experiment when a worker did not start with a prepared core. One would expect that the average Neolithic and Bronze Age village would not require more than one day's worth of blade production by only one knapper to produce enough blades for the year.

Textiles

See sections 6.2 and 6.3.

Ambiguous clay or stone objects may in some cases have been optimistically identified as spindle whorls, shuttles and loomweights. If correctly identified, however, they are craft-specific. Spinning is likely to have been practised ubiquitously, so to find a production locus is unlikely. Similarly, weaving would also have been commonly practised by most households, so production loci can be assumed for each dwelling place, but are difficult to pinpoint because loomweights are rarely found in rows which might indicate a loom *in situ* rather than in storage. Spinning, weaving and garment production all use easily portable implements and perishable materials, so definite workplaces are rarely found.

Carrington-Smith's identification (cited in Halstead 1989: 77) of centralised production from twenty two spindle whorls in an FN house at Rakhmani provoked the question of how many spindle whorls should be present to indicate production on a greater scale than for household consumption. John Younger (pers. comm. Aegeanet 1999) suggests that if women possessed several spindle whorls,[20] perhaps five each, then twenty two should represent four women in the household: not a large-scale operation but usual household production. If this is the case, one must ask why these numbers of spindle whorls are not found more often. Perhaps whorls were more usually made of perishable materials or were left around the site rather than in houses when the settlement was abandoned.

Identifying dyeing locations is also problematic. Vast quantities of dye-producing shells are required to make just a small quantity of dye, and most heaps of shells are probably the result of household refuse from the consumption of the molluscs. Unfortunately, the quantities of the shells are not often given in reports ('vast amounts' is hardly specific), nor is the condition of the shells: dye extraction requires a severe crushing, while shells simply torn apart to extract the creature probably indicate consumption as food.

[20] The possession of several whorls is convenient because it avoids unwinding before more spinning may be performed. Examples of women possessing a number of whorls have been noted archaeologically and ethnographically (E.J.W. Barber 1991: 305).

The facilities perhaps used are also generally ambiguous as evidence because they are not craft-specific and could be used for other purposes. There are some means to distinguish the uses of ambiguous facilities: dyeing would require facilities to boil the raw material and a basin large enough to contain the dye and textiles; wine production would also require a basin but with a run-off channel and a collecting basin or tub; cooking might use a basin but this would need a means to heat it (Warren 1972a: 25-29). A tub or tank similar to this used for dyeing would, however, be used for separating olive oil and for washing clothes and food, for example.

Horn, bone, tusk, antler and ivory

Very few areas of bone, horn and ivory work have been identified. The tools for working these materials are portable and not craft-specific. Bone is a common find over sites, so specific indications of working it must be found before it may be classed as a raw material for craftwork. Waste flakes, found with tools and raw materials will be positive indicators. Waste is so rarely found, however, especially of ivory from this period, that workshops have not been identified with any degree of certainty.

Wood

Wood must have been worked at every site, probably by members of most households, and most sites have tools that could have been used for this. Unfortunately, such tools, made of both stone and metal, are easily portable and not specific to woodworking. This and the perishability of the raw material, unfinished goods, waste and finished goods make it difficult to pinpoint the specific location of work. Some groups of tools have been identified as carpenters' hoards, which is a possibility but unproven. Other suggestions include traders' assemblages and tools for other types of work. "As a rule of thumb, the greater the numbers and range of tool types recovered in a single context, the better the chances are that they comprise **a craftsman's kit *in situ***", either in storage or in use (Evely 1988: 409).

5.4 Examination of the identifying criteria

1. Permanent specialised production installation

This is the most definite indicator of craftwork at a precise location when it can be identified with certainty. In many cases, however, it is difficult to verify the function of an installation, and other criteria such as tuyères, metal splashes and slag, and wasters are preferable for distinguishing foundries and kilns respectively, from ovens or other structures. A perforated raised floor in the structure and apertures for controlling the draught are also indicative of craft-related structures. Some crafts, however, do not require built-in facilities, for example wood working, spinning and weaving and ivory working (Tournavitou 1988: 447-9).

2. Unfinished goods

These are good indicators of a work area, although it is possible that they could have been put in a different room temporarily (L. Platon 1993: 105-6; cf. Poursat 1997: 59-60 and Krzyszkowska 1992b: 145). L. Platon also states that identification of half-finished objects is not always easy. His reason for believing this is unclear; perhaps he means that distinguishing these from rejects is sometimes difficult. The presence of unfinished goods is unlikely if the workshop fell peacefully out of use, rather than meeting with a sudden destruction.

3. Raw material

Raw material would have been kept in the workshop or a nearby storeroom, or in a secure place controlled by the proprietor if rare or precious (L. Platon 1993: 105-6). Whether raw materials are found depends on the durability of the material and the situation at the time of abandonment, for example, an order having just been completed and therefore there being little spare raw material (Tournavitou 1988: 447-9). It may be difficult to identify some raw materials as such, for example blocks of local stone, which might be present naturally in many places, unless they were found with other indicators of a craftwork area. Raw material alone could signify a

workshop, a storage area, or nothing significant if it is ubiquitous[21]; it is much more conclusive when found in association with other identifying criteria.

4. Waste

Waste includes waste generated from production, such as ivory shavings or stone chippings, reject products, which include mistakes and goods damaged or broken during production, and experimental pieces. The detection of debris by archaeologists can depend on the type of material, whether it was thrown out, brushed up or recycled, and whether it is perishable or easily overlooked. Its presence alone might indicate a dump rather than a workshop. Some debris is more likely to indicate the location of working rather than a dump, such as small lumps of slag which are not dangerous or inconvenient to leave *in situ* where they fell, unlike sharp obsidian chips, for example. Evely (1988: 409) argues that for crafts that produce limited amounts of debris, where waste from all stages of production is found, this is more indicative of an activity area. This is not the case, however, as it is equally likely that the location is a dump unless other indicators are also found. Whatever the context, finds of debris at least indicate that work was carried out somewhere on the site. Finds of slag are always entered in the catalogue because they are relatively rare. Obsidian waste, however, indicative of either a dump or a working area, is so commonly found that it is not recorded unless the excavator or subsequent authors have specifically suggested that it is a workshop. Thus, obsidian waste at, for example Pseira (Seager 1910: 16), Vasiliki (*AR* 1978-79: 40) and various sites in Euboea (Sackett et al. 1966), have been omitted.

Discard is usually found away from the activity area in societies where the activity locus is enclosed within a family living space and the occupation of the site is permanent (Murray 1980: 497). "Rubbish was certainly collected and dumped in Minoan Crete" and pieces from production areas were moved to different contexts in the course of building campaigns, for filling walls and making up floors, "thereby giving the illusion of manufacture" (Evely 1988: 408-9).

[21] cf. Evely (1988: 402-9).

Tournavitou's comments (1988: 453-4), although referring to obsidian, are applicable to all crafts: waste and mistakes are "theoretically unavoidable in a workshop area" but they are often displaced or lost. She states that their presence also depends on whether the material produces much waste, what is done with the waste, and whether the archaeologists can recognise it. She concludes, however, that "if waste and mistakes **are** found on a site, it is usually an unerring indicator of workshop activity, much more so than half worked pieces, in the absence of which, and with the exception of very few cases, identification should be most tentative." Costin (1991: 26) is more optimistic: "If we thoroughly understand the production process, it should be possible to distinguish work areas from middens associated with production through measures of artifact diversity and disorganization (cf. Schiffer 1987) as well as through the relative percentage of complete tools recovered."

5. Tools

Tools alone do not identify a workshop; they could indicate a storage place elsewhere, and some were for domestic use and not specialised (L. Platon 1993: 105-6). When found in conjunction with other indicators, tools are more conclusive evidence. The types and amounts of tools found depend on the activity and the conditions of abandonment of the site (Tournavitou 1988: 447-9). Metal tools are unlikely to be present in most cases because, being made of valuable material, they would have been salvaged if possible before the workshop went out of use. Therefore their absence cannot be taken as a negative indicator.

6. Finished products

These are difficult to use as evidence for a workshop; in some cases, however, when goods of precious material are found with some of the raw material, they can be used as identifying criteria (L. Platon 1993: 105-6). They are not positive indicators of a workshop area (Tournavitou 1988: 447-9); they would, nevertheless, have been found at certain stages of production in the workshop. In some cases they are useful for identifying what the workshop made; for example, if blocks of stone were found together with some metal tools, it would be unclear whether the products were stone

vases, figurines, sealstones, moulds or other items, unless a number of finished products were also present.

7. Non-specialised permanent equipment or installation for production

Objects in this class are not easy to detect; many would have been perishable, such as wooden tables and shelves (L. Platon 1993: 105-6). They are also not necessarily indicative of a workshop; they would have been found in domestic areas too. They are included in the identification method here as an additional criterion because they may have been present in some workshops.

8. Associated store-rooms

If the workshop was not large enough to store all the necessary equipment and products, it is probable that storage areas nearby would have been used. Store-rooms alone cannot identify a workshop as these are common features in the archaeological record. In the catalogue of workshops, associated storage areas occur surprisingly rarely. The reason may be that the excavator concentrated on the working area more than on nearby rooms, or that it is difficult to tell from the remains whether store-rooms nearby were associated with the working area. This criterion is difficult to apply.

Other indicators of working areas, which are not included in the method to be used here, include:

Non-specialised portable equipment

This difficult to identify as specifically associated with a workshop and cannot really offer any further confirmation of a classification. A jar containing raw clay, for example, is not as important an indicator as the raw clay itself, so this category will be omitted from the classification system used here.

Associated installations nearby

This criterion will also be omitted from the method used here; although installations like kilns and furnaces are likely to be located near to rather than within the workshop, certain types of work are only identified by the installation because the actual

workshop area is too difficult to detect. Areas of pottery production, for example, have mostly been identified by the presence of kilns; the one exception at Myrtos, thought by Warren to be a pottery workshop on the basis of some potting discs and nearby raw clay, is now contested by many and believed to be a storage area. For convenience here, although a kiln or furnace is a place of intense heat rather than a location where a craftsman spends time making products, the kilns and furnaces are taken to be the workshop areas. Therefore associated installations will be included in number 1.

Windows

Windows alone cannot indicate a workshop as they were included in all sorts of buildings. Without sufficient good, natural light, some work, such as sealstone engraving, would have been impossible; therefore the likely position for such workshops would be a well-lit first or second floor with windows, or a covered outside area (cf. Evely 1988: 410; Tournavitou 1995: 126). Therefore the absence of windows could rule out certain crafts from particular areas, and perhaps a room with indications of sealstone working might instead be identified as a storage area if windows could be proved not to have been present. Unfortunately, windows are difficult to identify in most cases, so to use their absence as evidence in an argument would be dangerous. This category will also be omitted from the method used here.

Table 5.3 shows where the various types of evidence are usually found. The numbers in brackets indicate that these indications might appear in a workshop or domestic context or might indicate another feature.

FINDSPOT	EVIDENCE PERTAINING DIRECTLY TO THE PRODUCT	EVIDENCE OF EQUIPMENT USED IN MANUFACTURE	OTHER EVIDENCE
EVIDENCE WHICH WOULD USUALLY ONLY BE FOUND IN A WORKSHOP	2, 3, (4a), (4b), (4c)	1, (5)[22], 10	
EVIDENCE WHICH COULD BE FOUND IN BOTH A WORKSHOP OR A DOMESTIC CONTEXT	6	(5), 7, 9	8, 11
EVIDENCE WHICH COULD INDICATE ANOTHER FEATURE	(4a), (4b), (4c)[23]		

Table 5.3 Types of evidence for workshops

[22] Tools might be found in workshops or other contexts including domestic, hoards or funerary, depending on the types of tool. Crucibles, for example, are unlikely to have been moved far from the production area, whereas metal tools are likely to have been salvaged from disused or destroyed workshops.

[23] Indicators 4a, b and c could indicate a dump rather than a production area.

Table 5.4 summarises the usefulness of the criteria as indicators of the exact location of a workshop when they are found alone, i.e. unaccompanied by other indicators:

Indicator Type	Indicator weight
1. Specialised permanent production installations	3
2. Unfinished goods (not rejects), preferably from all or many of the production stages (when not found in funerary contexts)	2-3
3. Raw material	2
4. Waste: a) production debris b) rejects, mistakes, goods damaged in the stages of production c) experimental pieces	2
5. Tools	2
6. Finished products (what the alleged workshop makes)	1
7. Non-specialised permanent equipment or installations	1
8. Associated store-rooms	1

Key to indicator weight:

1 Not a particularly useful indicator; does not necessarily signify workshops, but lends weight to an already-classified workshop.

2 Signifies working somewhere, but does not necessarily indicate exact location of working.

3 *Signifies working in exact location.*

Table 5.4 Summary of the importance of criteria when found alone

5.5 A method for confirming or disproving workshop identification

Identification of working areas based on the spatial co-occurrence of several types of indicators is generally more reliable than scatters of items from a single class (Tosi

1984: 25)[24]. Workshop indicators, however, have varying levels of reliability. A specialised production installation is a certain indication of work at that location, whereas a finished product is not. It is the specific *combination* of criteria which is important in determining a workshop. A storage area, a non-specialised permanent installation and some finished products found together would not necessarily indicate anything besides a storage area. Finds of tools, raw material and debris together, however, would provide virtually conclusive evidence of a working area.

In order to develop a method that incorporates this factor, the criteria have each been given a value that reflects their usefulness as an indicator of a workshop, either found alone or with other indicators (see Table 5.5). The values, based on the usefulness of the indicators as specified in Table 5.4, were calculated as follows. Indicators 6, 7 and 8 were given the minimum value of 1 because they are largely insignificant factors, not necessarily indicating a workshop, but lending weight to a classification already made by more decisive criteria. When found together, they would still be insufficient indicators for a workshop, their summed value only equalling 3. This is not as high as the value of just one of the stronger indicators such as raw material, which has a value of 4.

Values of 4 were awarded to indicators 3, 4 and 5 because when found individually they do not necessarily indicate a workshop in the location where they are found (thus the value would be much less than the minimum of 8 to indicate a probable workshop). When found together, however, their summed values increase rapidly, so that two of these indicators (total value of 8) would indicate a probable workshop and three (total value of 12) would indicate a workshop, using the scale calculated in accordance with these values (see Table 5.6).

Unfinished products are likely to be found in a workshop, and accordingly were valued at 8, to indicate a probable workshop. When found with another significant indicator (3, 4 or 5) the total value (12) becomes sufficient to indicate a workshop.

[24] Similarly Krzyszkowska (1992: 148), and Poursat (1996: 1): "seule la présence simultanée de plusiers éléments de la chaîne technique de fabrication est susceptible d'indiquer la présence réelle d'un atelier".

Specialised production installations are the only indicators that show the exact location of work, whether found alone or with other indicators. Therefore their value needs to be the greatest of all the indicators, and the number sufficiently high to indicate a workshop when found alone. The value of 12, also the minimum value to indicate a workshop, was given because it may be reached only by a specialised installation or by a combination of other indicators.[25]

To test an alleged workshop, the sum of the values of the types of finds is compared against the scale detailed in table 5.6. Thus, of the combinations given in the above examples, a storage area, non-specialised installation and finished products would result in an insignificant value, whereas tools, raw material and debris would provide a high value indicative of a workshop. Where workshops appear to have been used for several crafts, these are considered separately, the method being applied to each.

Indicator	Indicator weight
1. Specialised permanent built-in equipment.	12
2. Unfinished goods	8
3. Raw material	4
4. Waste: a) production debris b) reject products: mistakes, goods damaged in production c) experimental pieces	4
5. Tools	4
6. Finished products	1
7. Non-specialised permanent equipment	1
8. Associated store-rooms	1

Table 5.5 The values of identifying criteria

[25] Further detail illustrating the weighting given to the indicators is given in Appendix L.

To apply this method, the values of each criterion found at a site are summed and the total (T) is compared against the following scale (Table 5.6):

T (Total)	Type of locus indicated by T
T = 12 or more:	workshop (**A**)[26]
T = 8 - 11:	probable workshop (**B**).
T = less than 8:	possible workshop (**C**)
	activity area (**D**)
	possible activity area (**E**)
	not a working area (**M**) e.g. storeroom, dump, or other.

Table 5.6 Scale to show the meaning of total value of workshop indicators

Where a total of less than 8 is calculated, there needs to be further work. A degree of subjectivity is inevitable in examining the data at this stage. The higher the value, the more likely it is that the identification should be C, and the lower the value, the more likely that it will be M. For different crafts, different criteria may be expected, so some initiative will be necessary as a model cannot be used rigidly to predict categories of working area for all types of craft operating with different techniques, tools, raw materials, demand for products, and so on.

When there are finds to the value of the above categories, but there is no associated architecture to define an actual workshop or working area, the letter F will be added. If there is certainly a workshop somewhere, it would be AF, if there is a probable workshop somewhere it would be BF, and so on. In cases where craftwork definitely occurred but it is doubtful whether it could be a workshop or activity area, the classification will be C/D. This method is more useful in determining whether the locus was used for craftwork rather than distinguishing the scale of the operation; the latter is usually made clear more by the type of craft in question; obsidian working

[26] The code of letters for types of working area is given below.

usually only leaves production debris, and therefore a low value which would indicate C, E or M.

5.6. Classification of working areas

5.6.a Problems

In some cases it is difficult to discriminate between an activity area and a workshop on the available data. Questions arose, such as in which category to include mines and kilns. Work occurred at mines, but these cannot be classified as *workshops* or *activity areas* because they are areas of extraction rather than production. Work was not necessarily continuous, there was no purpose-built structure for work, and there were few remains of the work itself, other than tool marks and extracted metal-bearing rocks, sherds, hammer stones and obsidian blades. Mining is, however, a part of the metallurgy process and therefore a part of production. Therefore it was deemed appropriate to form a separate category for mining.

Kilns are not places where clay is sorted, or where pots were formed and painted, and are therefore not workshops, so are in a separate category. Some authors mention kilns, meaning structures for firing pottery; others mention metallurgy kilns. Here, the term 'kiln' is reserved for pottery production only, and 'furnace' is used for metal-melting or smelting installations[27]. Pottery workshops are difficult to detect and are rarely found with kilns; it is difficult to discern whether other pottery production activities went on in the kiln area, so the discovery of a kiln does not necessarily indicate the presence of a workshop in that place too. It is quite possible that the kiln was situated away from the potting and painting areas. Furnaces, however, are included in definitions of places of metal production because casting the metal into products must necessarily be done where the metal is melted. Therefore the area of the furnace must be a workshop. Another process likely to be performed near to the furnace is working the metal, that is, altering the shape of the solid object after

[27] A furnace is the installation for heating the metal; a foundry is a metallurgist's workshop.

casting. This may be performed on a cold work object or on an object softened by heating. Although a furnace may be used for heating, it need not be as hot as for casting.

Hoards are not necessarily indicative of craftwork at their find-spot; it depends on the find context. A hoard of tools by itself, found with no other indication of work like waste or installations, is problematic because it indicates work but the nature of the production and the place where this is carried out remain uncertain. Metal tools could be used for carpentry, stone work, ivory and bone carving, and leather work. The context in which the tools were used could have been a workshop or an activity area, the user a sedentary or itinerant craftsman. To allocate hoards to either category would therefore be presumptuous, so a separate section was created for these. In cases where hoards seem to be part of the evidence suggesting a workshop context (that is, they were found in an architecturally defined area with other indications of work, such as production waste), they have been included in the appropriate category (activity area or workshop etc.). Finds of tools or equipment discovered in graves, which may indicate that the burial was that of a craftsman or that work was done nearby, are included as a separate category because they do not indicate the actual location of a workshop although they do relate to craftwork. Difficulties also arise in locating working areas and classifying the information in cases where finds of, for example, crucibles and slags are scattered over a site, indicating production of some sort at the site but not marking a specific location for the activity.

Not only do problems arise from the evidence at the sites themselves, but unreliable and imprecise reporting of that evidence hinders the formation and testing of theories such as those presented in this work. Some authors have stated a particular locus to be a workshop and cited a reference, which, it turns out, contains no detail or indication of any workshop at all. In some cases, authors assert that, for example, metal-working was practised at a site; they omit, however, the basic details of where exactly this was done, what the evidence is, and from which references they obtained the information. In equally unhelpful instances, they state the finds that indicate a workshop, but do not indicate where in the site they were found and provide no references. In other cases, authors state that a structure 'may perhaps' be a workshop, giving little other

information. Until more information is put forward concerning these instances, they must be categorised separately (see section 5.6b).

5.6.b Categories used in the catalogue

The following classifications are used to sort the data in the catalogue:

A. workshop (including furnaces)
B. probable workshop
C. possible workshop
D. activity area
E. possible activity area
F. no definite location
G. kiln
H. hoard
I. stray find
J. craftsman's grave
K. insufficient detail
L. general statement or inference
M. other

A-E Identification of categories A-E needs analysis using the scoring system explained in section 5.5, to determine which type classification they fall under.

G-L G - L may be more readily identified; I may be accompanied by what it might indicate, for example a single crucible might be classified as I = BF; a piece of slag would be I = AF.

G An identification of G sometimes depends on the excavator's opinion; some 'kilns' could actually be ovens, whereas definitely identified examples have a well-preserved structure and are associated with wasters and other signs.

H A hoard is listed as such when it has specified as such by an author; it is defined here as a number of metal tools found together.

I A stray find is an indication, such as part of a crucible, found out of context or by itself in a context apparently unrelated to a workshop, which indicates that craftwork probably occurred somewhere on the site. The implications of its presence are usually stated, so a stray crucible would be catalogued as I = BF because crucibles are easily portable, so may not designate work at a site with certainty, whereas a piece of slag would be I = AF because it is a definite indicator of work. A location assumed by another scholar to be a workshop, which is classified in the catalogue as I = AF, for example, is thus by implication not deduced to be a workshop by the reasoning used here.

J A craftsman's grave might be indicated by, for example, the presence of unfinished goods or tools.

K This classification is determined by the opinion of the author, for example, "There was a stone workshop at X", where no further detail or references are given or have been found by research. In such cases, the classification will be "(A) K", to indicate that author's assertion, without being able to confirm or deny it because of the lack of information provided. Where some detail is given to suggest a possible workshop, it is classified as "C, K", to indicate insufficient detail.

L This is an inference from the analysis of finished goods or a general statement by an author that there must have been a workshop and/or industry at a site, although none have been located.

M Where other interpretations of a space are possible, they are given in brackets after the classification, for example "C or M (dump)".

Many cases are unclear; there may be an area where work clearly was done, which may be difficult to classify as a workshop or an activity area. To write "A/D" would be incorrect because the signs do not indicate a definite workshop. To write "C/D" might be interpreted as contradictory, because areas classified as C may imply that the status of this area as a work place is in doubt. The classification of C/D will be used, however, to indicate that the area is at least an activity area, and perhaps a workshop. When the function of an area is unclear, being some kind of working area or a specified other (for example a dump), this will be written as "C/E or dump (M)". Where classifications of "C" or "E" are made, by virtue of their being *possible* work places,

an alternative use for the area is already implicit, so the alternative of "M" is not stated, unless there is a specified alternative classification, such as oven, storage or dump.

Problems arise where workshops or activity areas have been suggested and the finds listed without the actual findspot specified. It is difficult classifying such categories because of confusion in attributing F after a classification. The classification F was originally intended for those examples where indications strongly suggest a workshop in a specific area, except that no architectural associations, which are necessary for the identification of a workshop, were found. F was to mean that the workshop was in the vicinity of these finds. There are two other cases, however, in which F might be used. Firstly, where strongly indicative finds, such as slag, are mentioned for a site without specified findspots, they indicate working somewhere on the site, thus AF. Secondly, where finds, such as slag, occur alone at a specific locus, they might indicate the site of metalworking or a dump, and would definitely indicate metalworking somewhere on the site, and could be classified as C/M (dump) (as the classification of that particular locus) = AF.

5.7 Testing the method

The method will be tested by an examination of three types of actual areas at archaeological sites:

1. Five locations, which have been widely agreed to be workshops because of the large number of criteria indicating this use, will be examined.
2. Three locations whose previously assigned status as workshops has since been persuasively refuted by several scholars will also be examined. This will test the new method's effectiveness in ruling out areas which contain assemblages similar to those found in a workshop but which, on closer examination, must at most be secondary assembly or storage areas.
3. Four domestic areas, not used for craft-work, will function as a control.

In theory, a larger number of examples should be used for each of the types of location tested, so that the result is statistically reliable and not coincidental. In ideal

circumstances, an example of each of the three types of archaeological area would be taken from each of the six regions specified in the catalogue (see Chapter 6), from both the EBA and MBA, and perhaps from the Neolithic too. In practice, however, there are so few sites that have either been accepted unquestionably to be workshops, or have been disproved conclusively following a previous diagnosis as workshops, that such a rigorous inquiry is not possible. Even for the control examples, site reports with detailed lists of the contents of ordinary domestic rooms are not abundant.

5.8 Results of the test

Table 5.7 summarises the data and evidence for the sites believed to be workshops. In Table 5.8 the three sites with doubtful status are given with their indicators and values. The data for the control sites are tabulated in Table 5.9. Question marks denote that the criteria were not definitely identified as that particular type of indicator. See the catalogue for the details concerning which excavators or scholars have agreed that the areas in Table 5.7 are workshops.

Site	Craft	Date	Indicators	Value
Skouries (Kythnos)	smelting	EC II	1, 3, 4	20
Mallia: Quartier Mu: Atelier de Sceaux	sealstones	MM II	2, 3, 4, 6	17
Mallia: Quartier Mu: Atelier de Potier	pottery stone	MM II	5, ?6 2, 4, ?5, ?6	4/?5 12/?17
Zakro: area of space Phi	metal	MM I-II	1, 4	16
Menelaion: Aetos hill	pottery (kilns)	MH	1, ?6	12/?13

Table 5.7 Recognised workshops

The value for all the workshops in Table 5.7 is equal to or greater than 12, except for pottery in the Atelier de Potier. That workshop receives a sufficient value to indicate its use at least as a workshop for stone. A comparison of these high values against the scale given in section 5.5 confirms the previous opinions that these loci are workshops.

Site	Alleged Craft or Product	Date	Indicators	Value	Final verdict
Lithares (Boeotia): Sanctuary of the Bulls	Figurines	EH II	?6	0/?1	Sanctuary
Myrtos (Crete): Room 49	Pottery	EM IIA	5, ?6	4/?5	Storage area
Knossos (Crete): South side of Royal Road	Obsidian	EM IIA	4, 6, 7	6	Working area or dump

Table 5.8 Areas formerly considered to be workshops

Table 5.8 demands further explanation. The Sanctuary of the Bulls at Lithares is the only case where an author has re-examined the evidence and realised that the previous attribution of 'workshop' was erroneous. In the absence of further examples similar to this, which would have been ideal for testing the model, the other sites tested are those whose function is contested by various scholars and this is reflected in their indicator values which are higher than the Sanctuary of the Bulls, but much lower than the definite workshops.

The finds from Room 49 indicate pottery production somewhere at Myrtos. Contrary to Warren's (1972a: 18) and Branigan's (1988a: 48) opinions, the attributes of the room itself suggest that it was probably not the production site: the value is 4 or 5, and the room is small. The classification of the room containing obsidian near the Royal Road at Knossos has been much contested. Warren (1972b: 393) claims it is a workshop, whereas Torrence (1986: 152ff.) argues, with the aid of statistics, for a low intensity use, perhaps the result of a single knapping event, and therefore an activity area or a dump. A value of 6 suggests its status as a working area is questionable, and contradicts Warren's assertion.

Site	Date	Evidence	Value	Probable Use
Myrtos (Crete): Room 39	EM IIA	Pottery.	0	Non specified
Ayios Kosmas (Attica): Room E 2	EH II	Copper: fragment of tweezers. Stone: figurine, mace-head, palette, querns, grinders. Obsidian: chips, blades. Pottery: fine and coarse. Terracotta whorl. Red ochre. Bones. Shells.	Ochre: 4 Whorl: 4	Main living room
Mallia (Crete): Quartier Mu, Room VIII 3	MM II	Pottery: pithoi, amphorae, small jars etc., weights. Stone: table, lid. Copper band.	4	Habitation area
Mallia (Crete): Quartier Mu, Room VIII 4	MM II	Pottery: pithoi, amphorae, small jars etc. Stone weights.	4	Magazine

Table 5.9 Areas that are not workshops

Table 5.9 details finds from rooms no longer believed to be workshops, from various regions and eras. Obsidian blades are common finds and cannot be classified as tools here because they do not suggest any particular craft or other activity, being multi-purpose domestic tools in this context. Weights (assuming that they are loomweights) suggest weaving, however, and whorls suggest spinning, so these will be given a value of 4 in the category of tools. There could have been many purposes intended for the red ochre at Ayios Kosmas, as a pigment for textiles or paint for pottery, figurines or personal adornment. It will be given a value of 4 as a raw material. The querns and grinders were no doubt for the preparation of food, so receive no value. All the other

finds are classified as 'Other', as they are in the catalogue, receiving no value since they are not diagnostic.

The value for the Ayios Kosmas room is not 8, but two values of 4 representing different crafts. The whorl and lump of ochre cannot be proved to be connected as part of the same craft, and are hardly suggestive of a workshop. The mix of pottery, obsidian and a few other items seen in these rooms is typical of domestic areas, containing items that do not point to the concentrated practice of any particular human activity. A single whorl, an obsidian blade and some pottery represent items for everyday household subsistence activities: spinning, cutting, storing and so on.

In this test, the method has provided the expected results for each type of archaeological area. The unanimously agreed workshops all achieved at least the minimum value required to propose that they were indeed workshops. The area that was previously thought to be a workshop, before re-examination suggested that it was a sanctuary, received a minimal value not suggestive of a working area at all. The other contested loci also revealed values less than 8. The domestic areas also received low values suggestive of, at the most, occasional domestic work. It has already been acknowledged that it would have been preferable to test the model with more examples. With the available means, however, of testing it, the model has met the required expectations and is used in the catalogue to test problematic areas whose classification is ambiguous, contested or unclear.

5.9 Overcoming potential problems with the method

Evidence from working areas will not necessarily yield the full complement of associated artefacts in their original concentrations; the removal of portable objects and production debris, the use of perishable materials, and the difficulties of identifying certain items present problems for the archaeologist (Costin 1991: 19).

According to Costin (1991: 19-20), complications in thorough studies of craftwork can occur when different stages of production are carried out in different locations, perhaps far apart. In lithic work core preparation may be performed at or near the

quarry and blades made elsewhere; in metallurgy, the smelting may be near the source and the remelting and forming of goods elsewhere; for textiles production, thread preparation and weaving may be performed in different places.

This only presents a complication, however, if one wants to study the entire production process starting from the source of the raw material to specific archaeologically recovered finished products, all in one location: realistically, opportunities for such a study will occur infrequently[28]. It is, of course, convenient to find all stages of a production process in a single location. Nevertheless, the examples presented by Costin do not prevent a thorough study of production in the Aegean. Distances between sources of material and places of manufacture have been overcome with trace element analysis of obsidian, lead isotope analysis of metals (see Stos-Gale 1998: 721ff.) and chemical and petrographic analysis of clay. The principal problems are that some raw material sources may yet await discovery, and dating their exploitation is not always straightforward. There are also problems with lead isotope analysis. These are discussed by Budd et al. (1995) and include the possibility of isotope source fields of different countries overlapping, thus leading to ambiguity of results, and inconsistencies in the data for ore source fields between successive publications, necessitating continuous modification of data.

Places of quarrying obsidian and preparing cores have been identified at Melos, and sites with evidence of blade production using Melian obsidian have been found all over the Aegean. Prehistoric copper, silver and lead mines have been located and successfully dated at Laurion (Attica), Tsoulis (Kythnos) and Ayios Sostis (Siphnos). Although lead isotope analysis does have its problems, being not entirely reliable and giving confused results when remelting of scrap causes a mix of metals of different origin, items made of lead from Laurion, for example, have been identified at EB II-III Amorgos, Naxos, Syros, Kea and probably Lerna and Raphina (McGeehan-Liritzis and Gale 1988: 209). If more analyses of slags from metal workshops were performed, links could be made between sources and workshops, rather than just the finished

[28] "No single site has ever yielded a full complement of ivory workshop material from unworked tusks to finished products by way of roughouts, blanks, offcuts and debitage", but with caution and an open mind it is possible to make progress in identifying workshops (Krzyszkowska 1992: 148).

products. For textile production, however, following the process from raw material to finished product would be impossible due to the lack of preservation of sources and products.

The method of classification may indicate only activity areas for the Neolithic, because craft was practised at a more basic level with fewer craft-specific tools and facilities at that time. One cannot, however, automatically assume that Neolithic sites will reveal only activity areas (cf. Andreou 1996: 559-560) merely because it is the Neolithic. Specialisation, albeit of a different nature from BA, is present in the Neolithic. If the types of indications for craftwork which are found in the Neolithic were to be found in an MBA context, they would probably be classified as activity areas in comparison to other MBA working areas with more numerous and sophisticated equipment. When found in a Neolithic context, however, they should be compared only with features from that period. This will be difficult when specialised production leaves as few signs as non-specialised production; the amount of time spent producing a pot may define it as a prestige item, although the archaeological remains from its production are the same as those for an utilitarian vessel. This factor only applies to the following crafts which can be practised at varying levels of specialisation leaving similar signs: potting, obsidian work, textile production (perhaps not dyeing), and some stone work (not sealstones, whose production starts in EBA). Scholars still cannot decide, from the remains, whether obsidian production was specialised or not. This problem also applies for the EBA and MBA for crafts whose indicators have changed little since the Neolithic or are the same for household and large-scale specialised production, namely textile work and obsidian knapping. The only method, by no means foolproof, is to examine the volume of raw materials, tools, waste etc. and hazard a guess to the scale of the operation, perhaps with the assistance of estimating working-hours in the case of obsidian work. The only area Torrence is willing to accept as an obsidian workshop is that at Phylakopi, so this problem is perhaps unlikely to occur for obsidian; similarly, large-scale textile-work is not documented with certainty until the LBA,[29] when Linear B tablets provide this information, and the only large deposit of textile-working equipment found so far is in the Loom Weight Basement at Knossos.

[29] At Troy II, however, there is impressive evidence for large-scale textile working.

The problem remains, however, of defining areas for specialised production in the Neolithic both in the field and in theory. It seems that it is not yet possible to form an accurate method given the archaeological evidence, so for consistency in the catalogue the method set out in section 5.5 will be used; the reader must bear these points in mind. In some cases workshops might be predicted because there are comparatively more indications than at other areas of work for that craft. Sites which bear a clear importance in relation to other sites in the practice of a craft, such as Dimini, might be predicted to have workshops rather than activity areas, because the volume of craft-related material, in this case shell, is greater than at most other sites of that era.

Some subjectivity is inevitable in the application of the method to all periods in question. What is important is that the method is not used naively and that there is awareness of its limitations. Some of its classifications are intentionally vague (B, C, E) because it would be dangerous to assert a classification based on the available evidence. When classifications are uncertain, such as C/E/M, this is not the fault of the method but usually of insufficient information; if chemical analyses, distribution analyses, surveys of the surrounding area and so on were all performed for every working area, some uncertainties might be answered. In some cases, however, it is simply not possible to be positive about the use of an area because of problems such as the survival of evidence. The author is confident, however, that most classifications in the catalogue are as accurate as possible. The method proposed in this work is an important starting point for providing a greater awareness of the problems associated with diagnoses of 'workshops'; perhaps future work might fine-tune the method or be prompted to find new means to analyse the evidence. Here, the focus is on workshops. The next step would be for future research to concentrate on non-specialised activity areas in order to reveal more about household units, their level of self-sufficiency and their interactions with each other. This will require a much finer analysis of each site because indications may be elusive.

Chapter 6. Introduction to the Catalogue

6.1 Introduction to the catalogue of workshops

The only previous attempt to compile a catalogue of workshops was over ten years ago by L. Platon (1988), who omitted many of the entries cited here. His presentation of the data was inconsistent: for some workshops he used a similar methodical layout to the one used here in 'Inventory of Finds', whereas for others he gave the information in a less orderly manner. In some cases he did not specify a date; it is unclear whether this was an omission on his part or whether that information was unavailable or unknown. In this catalogue, where information was unavailable or unknown, it is stated as such. In creating such a catalogue, this study intends to break new ground and provide a basis for future research to be added to, debated, and from which to calculate statistics and to formulate new theories.

The catalogue below is of alleged workshops. A further advantage of compiling this database is to develop and test the method against which 'workshops' may be assessed, and their identity as such either confirmed or disproved. The purpose is to expose any mis-identifications, and by drawing attention to these to encourage further and more critical thought in the future before hasty classifications are made. The need for further or clearer detail in archaeological reports will also become apparent.

6.2 Workshops and activity areas

Although the catalogue will contain some activity areas, it is intended to concentrate more on workshops. This is for a number of reasons:

a) household production (and therefore the activity areas where it was carried out) must have been very common[1] and its presence does not give as much information as

[1] Hourmouziades (1977: 222), referring to Neolithic Dimini, writes that all members of the community were able to produce objects of everyday use. Nordquist (1987: 38, 60) suggests that carpentry and production of simple bone, ivory, horn, tusk and shell were probably performed in every household at MH Asine.

do workshops about the complexity, economic, social, and perhaps political organisation of society;

b) the recovery of activity areas from the archaeological record is more infrequent and biased than that of workshops[2]. It can be difficult to detect some types of workshops, even though production should, by definition[3], be regular and therefore leave more traces than the less frequently used activity areas. In types of production where specific facilities are not needed, tools are not left *in situ* or are ambiguous to identify, and the materials used and worked are perishable, identification of workshops may be uncertain or missed. These problems are compounded in the case of activity areas, which are less likely to involve the permanent facilities associated with specialised craft production and may only be used for one occasion, the traces of which will be minimal over a time-scale of thousands of years. A pottery activity area might be a courtyard outside a house, where a member of the household made pots once a year to replace those broken over the past twelve months. She could form her pots by hand on a wooden board and fire them further away from the dwelling place in a bonfire.[4] All these processes would be most likely to pass undetected in the archaeological record. A workshop, however, producing more vessels for more consumers, using more sophisticated equipment to cater for this, should leave permanent traces which could include wasters, kilns, potter's discs, raw material and finished products. The investment of space and labour in suggests a more long-term interest in the practice of a craft and a degree of specialisation, therefore a workshop.

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[2] "Household production by individual families for their own use will be the context most difficult to diagnose archaeologically" (B.L. Stark 1985: 167).

[3] Clark (1986: 43) uses a measurement of scale, obtained by dividing the number of products (see below) by the length of time the manufacturing area was used, to determine whether an area was a workshop or an activity area. In doing so, he recognises a further problem: it may be difficult to determine whether an area of craft production was a small workshop or an activity area. The number of products is estimated by waste created from replication experiments compared to that actually found. This method presupposes a knowledge of the technology used and the type and size of commodities brought to the production area (Clark 1986:43), and also presupposes that the full amount of waste was found and could definitely be associated with the production area. While the method is sound in principle, these criteria are rarely met in reality. This study makes definitions between workshops and activity areas by other means.

[4] For reasons that could include safety, smoke pollution, and proximity to fuel.

c) some types of craft production in activity areas are easier to identify than others and many may have been carried out on such a small scale that they will not be picked up at all. A bias in the identification of activity areas results from the fact that only the durable and more unusual artefacts will be noted in excavations, such as obsidian flakes, spindle whorls and loomweights, which may indicate production, perhaps from a single event, in activity areas. Activity areas where pottery, for example, was made are unlikely to be found even though a household may have produced pots once or twice a year for generations in a regular place.

Although evidence for spinning and weaving is ubiquitous, some excavators point out that spinning or weaving took place, having found a handful of loomweights or spindle whorls scattered over the site. These instances have not been recorded in the catalogue because such activities are to be expected at household level everywhere. Women, even those of high status, are mentioned in Homer's works as spending their time weaving. Finds of spindle whorls in 'rich' graves in Greece and Mesopotamia suggest that higher status individuals also spent time spinning. Brown (cited in Barber 1994: 31) describes how women in the 1960's spun wool to make traditional costumes as they rode to the market or completed other jobs, as this task can be practised virtually anywhere and is a lengthy process. She claims that they spent as many labour hours making cloth as producing food for the household, and this was at a time when they bought half the clothing ready-made. Barber (1997: 515) echoes this when she writes, "One can guess from ethnographic parallels and survivals that the ordinary women in the Aegean spent much time spinning and weaving simple sheets, blankets, towels, and basic clothing for the family's needs." She adds that it takes seven to eight hours' worth of spinning to produce thread that can be woven in an hour.

When looms or more specialised production areas are inferred by the excavator, these have been noted, and the caveat to accompany them is that, despite the excavators' optimism, they may merely indicate household production or the storage of tools. Although these activities were common, concentrations of finds are unusual and the remains of production (weights, whorls, shuttles, bobbins and spools) are often indeterminate (Barber 1991: 107), so it is hard to tell whether these occurrences are

rare indications of a household craft, or whether they signify specialised activity. A cluster of loomweights is often termed 'the remains of a loom'; this can only be confirmed when the weights were found in rows, ideally with carbonised wood, and such details are rarely published. Moreover, finds of spindle whorls and loomweights do not necessarily indicate a working area: spinning was probably done virtually everywhere (Barber 1991; 1994 passim.), and looms would probably have been stored out of the way when not in use (Barber 1991: 101-2). It is my belief that many of the finds related to textile work indicate the place of storage.

6.3 Problems encountered during research for the catalogue

Studying the published data systematically for information about potential workshops is a complicated task beset with problems. Excavators publish their findings with differing amounts of clarity and detail. Some publications list the items found in each room, whereas others list all the pottery finds in one section, then all the stone items, and so on, in such a way that it is difficult or impossible to identify all the finds from one particular room.

Platon gives examples of the difficulties associated with older works, notably vagueness of information (L. Platon 1993: 104-5). Some authors offer a comprehensive report of the whereabouts, dimensions and contents of the workshop (examples include Mylonas 1959 and Poursat 1996), whereas others give a less precise description, omitting details such as the dimensions of the workshop, or even failing to describe the workshop at all. One such case is Caskey's reference to "another workshop" (Caskey 1956: 160) in squares G7-8, Lerna.[5] He includes no further references from which one might obtain more information; moreover, he does not even say what the function of the workshop was, nor is any clue given by the context of his statement. Where material for the workshops database has not been included in the published reports, it has been necessary to enter that particular workshop as an incomplete record.

[5] This is cited in full in the catalogue, no. D17.

The lack of published data from sites sometimes makes it difficult to apply the method for testing workshops and this may lead to distorted conclusions. Descriptions of finds do not often distinguish between 'partly-worked' unfinished goods and 'partly-worked' rejected goods that were broken during production. The different types of production debris: waste, rejects, mistakes and experiments, were combined because excavators do not always make such detailed distinctions. Debris is most often mentioned if it is obviously a significant indicator of a feature, such as the obsidian flakes found at Knossos in buildings along the Royal Road. If it is not considered to be important by the excavator, it might not be mentioned, or even noticed.

Some excavators' tendencies to assume that an area was a workshop, without applying a critical or rigorous analysis first, is mentioned by Poursat (1996: 1). Similarly, the failure of some scholars to distinguish between workshops and activity areas is unhelpful and may make classification imprecise if insufficient evidence is reported.

At the opposite extreme, some excavators refuse to commit themselves to stating whether or not an area is a workshop, attributing the identification of a controversial example to others instead (Mylonas 1959: 31)[6]. This suggests that the excavator does not entirely agree with this identification, in which case it would be useful to know what his concerns were. These, however, are not usually given.

Major difficulties arise when authors mention workshops or production facilities which another scholar 'found'; in the cited reference the other scholar never actually stated that the location was a 'workshop', merely listing the finds without analysis. The later author has effectively suggested that the excavator diagnosed the area as a workshop, which they did not. Nordquist (1987: 59) misleadingly states that a loom with cylindrical weights was found at Eutresis and refers to Goldman (1931: 192), whose excavation report merely lists eight loomweights from the MH period and makes no inference at all that a loom stood in a certain place. While the presence of looms is a reasonable deduction from the evidence, it is not proven, only guessed.

Had the loomweights been found in greater numbers in a row, it would have been more conclusive that they had been part of a specific loom in a defined area.

A lack of detail about an entry in the database may also result from authors mentioning in passing a workshop which has been found but which is as yet unpublished, the information having come from personal communication or observation. The author's own information may therefore be scanty. Some papers or books mention a workshop, with a reference to a conference paper or an unpublished dissertation from another country, which would be very difficult to obtain for study, and may only contain a brief discussion or another reference, rather than further archaeological details about the workshop.

A further difficulty has been encountered when production, and perhaps craft specialisation, has been demonstrated at a site but the actual production locus has not been found. An example of this is the specialised pottery production at EN and MN Franchthi alleged by Vitelli (1989: 19). She argues for local production from a combination of factors including: the raw materials were available within a 5-10 km. radius; large vessels were found, which had probably not been transported far[7]; there were objects which might be wasters, debris, and potters' tools; characterisation analysis perhaps supported local production; pottery between contemporary sites in southern Greece was closely comparable, but with local variations, suggesting production at each site. Vitelli demonstrated, by an analysis of the finished products, that pots were produced there, perhaps once a year. Another instance where production is indicated at a site and the work place is not yet known, is where hoards of tools are found; they suggest that a wood, ivory or bone worker was at work in the vicinity, but do not reveal the location or regularity of the work. Similarly, spinning bowls (Barber 1991: 74), spindle whorls and loom weights attest to textile manufacture, not necessarily at that findspot. Debris is a clear indication of craftwork somewhere at a site.

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[6] Mylonas (1959: 31) writes "so many obsidian chips and blades were found in this room that the laborers called it "the obsidian workshop"." See catalogue entry C5 for a full citation.

While a good idea of the production carried out at a site can be gained by evidence other than that of actual workshop locations, not every case can be included in the database because of the sheer volume of catalogue entries this would entail. It can be assumed that most households produced textiles, all or most settlements produced pottery, and wood, stone and bone or horn work was probably practised at every settlement. Debris from obsidian working is also commonly found at sites. The catalogue focuses on specified locations of craftwork, mainly workshops; however, where indications of less commonly practised crafts have been found, such as slag, these will be noted because they indicate more specialised production.

More detailed excavations of some sites may lead to a biased focusing on them as exceptional; for example, so few sites from EM II Crete have been excavated that there has been a tendency to concentrate on the finds from Trypeti, Ayia Photia, Vasiliki and Myrtos in particular. At Myrtos, spindle whorls in many dwellings suggest that spinning was performed everywhere; numerous, mostly adult, sheep bones suggest wool production at the site. The location of the site on a windy hill would have been ideal for drying the cloth (Barber 1994: 104, 106, 109). The suspected dye-works and two concentrations of loomweights in the same area suggest cloth production loci. It is tempting to interpret Myrtos as a cloth-making site, exporting textiles to other Cretan sites or even overseas in the Early Bronze Age (Barber 1994:109). Barber argues that it was not long after Myrtos was destroyed that the Minoans were exporting patterned textiles to the Nile Valley, and that these textiles had such complex patterns that one must assume that their production had been practised for a long time before this date, at least as far back as the time of Myrtos.

It must be borne in mind that Myrtos is one of very few EM II sites which has a clear and relatively short-lived stratigraphy and has received considerable attention from a number of respected scholars. It is bound to stand out amongst other less well excavated sites or sites with longer occupation periods and disturbance from later activity. It is only in the Late Bronze Age that it can be demonstrated from the Linear

[7] Rutter (1993: 33 endnote 46) argues that large vessels could have been transported.

B tablets and perhaps from Egyptian wall-paintings that textiles were being produced on a large scale for foreign export. The political structure of society and the organisation afforded by the palaces could support this specialisation in textile manufacture for export. It is doubtful, however, that there were the necessary means in the Early Bronze Age to support such site specialisation in such a time-consuming craft, especially when households had to produce cloth for their own needs first. It is more convincing to suggest that the signs of textile production at Myrtos represent nothing more than household production by the inhabitants, and that this archaeological example would not be unusual if more sites were found with such a favourable lack of disturbance.

6.4 The layout of the catalogue

For convenience of reference, the workshop sites are set out alphabetically within a regional framework: Macedonia, Thessaly, central Greece, the Peloponnese, the Cyclades and Crete. Sites in the Cyclades are grouped under islands, which are alphabetically ordered. Where there are a number of workshops at one site, these are ordered chronologically. Each catalogue entry is given a number within its region, for example Ayios Mamas (Macedonia), Pit F may be referred to as A 1, and Myrtos (Crete), Room 58 as G 47.

The name of the site is followed, where the information is available, by the specific location of the working area or finds. The *workshop type* refers, where possible, to the product made or the craft activity, or where this information is not known, to the material worked. This variation is the result of differing circumstances concerning the finds. For example where the only finds were crucibles and slags of unspecified metal, as at MM Knossos, the *workshop type* is 'metal'; when the finds reveal which metal was worked, as at EC II Skouries, the *workshop type* is 'copper'. The products made by a metal workshop are not usually known, because the finds usually consist of crucibles, slag and furnaces; even when moulds are found, one cannot guarantee that all the moulds used remain there. The finished products of this valuable material are unlikely to remain in the workshop. With stonework, except for cases where the remains are only a block of raw material or a collection of tools whose purposes could

be multiple, the remains in the form of unfinished products, waste and finished products usually suggest what was worked (specifically, beads, sealstones, vases or figurines). When the *workshop type* is 'obsidian', this indicates blades manufacture; in more unusual cases where obsidian is used for vase production, the workshop type would be 'stone vases'. In the case of textile work, the finished product will be cloth, so the craft activity, spinning or weaving, is specified as the *workshop type*. When the *workshop type* is 'kiln', clearly the product is pottery. Often, a kiln is the only indication of pottery production, and so it is a category in its own right, unlike foundries, which are usually accompanied by other finds. 'Kiln' here means 'potter's kiln'; some authors state the latter in full, differentiating them from 'metal kilns', which will be referred to here as furnaces.

The *date* of the workshop is usually straightforward, having been agreed by the sources. In cases where there are differences, these are stated. Conventional terminology will be used for all regions, following Barber and McGillivray (1980) for the Cyclades, thus EC I rather than Grotta-Pelos, for example. Included in the *sources* are the authors of the original excavation report where possible. Later articles or books are also cited, whose authors may have restudied the finds, present different interpretations, or have new information.

In the *Inventory of finds* the artefacts are listed under the classification of what type of indication they are in relation to the workshop in question. Question marks denote uncertainty regarding the status of an item relating to the workshop. This means that, for example, if chisels were found in an alleged metal workshop containing moulds for chisels, although they are both tools and finished products in their own right, they might be classified as *Tools/finished products?* because they could be tools used in metallurgy or the product of the workshop. In the instances where authors have produced different accounts of what was found, each version is noted. Ambiguous metal objects, which some may describe as chisels and others as small axes, and confusion over knives or daggers will cause differences in accounts; in the case of some hoards, there are even varying opinions as to the number of metal objects.

Comments consists solely of other information and the hypotheses of authors. *Analysis* includes critical reviews of the sources, discussion of the material, conclusions (albeit sometimes tentative) concerning ambiguities and a classification of the locus or finds. The 'value' of the finds attributed by using the classification method is not always specified in the simpler cases to avoid stating the obvious.

Chapter 7. Conclusions

7.1 Application of theory to data

The theory examined in Chapter 4 may be applied to the examples of workshops listed in the catalogue. The work places considered are those classified as A or B. The various aspects of workshops, such as location, type of workshop and product, for example, inter-relate, so a degree of repetition in the discussion is inevitable.

7.1.a Type of workshop

All the workshops appear to be primary. To distinguish between attached and independent workshops, it is likely that the former will mainly occur in connection with and near to elite centres. The Quartier Mu workshops (F32-F35) at Mallia provide the only convincing evidence for attached workshops. Imported stones were worked in F32 and perhaps F33 and F35, metal, an imported and rare material was worked in F34 and F35, and imported ivory which was extremely rare in this period appears to have been worked in F32. F33 is believed to have been involved in the production of non-utilitarian goods, perhaps for use in sanctuaries. F32 made sealstones, presumably with an administrative role. It is argued in the catalogue analysis that Buildings A and B controlled the supply of metal and perhaps metal tools for use in the workshops. These indications all suggest that the workshops in Quartier Mu were attached to Buildings A and B to some degree; moreover, the two buildings contained administrative tablets, which the workshops did not, which suggests that the workshops were at a lower administrative level.

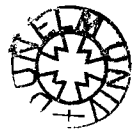
7.1.b Location

The most remarkable factor that has been brought to light by the author's research is the small number of workshops that have been identified. When one considers the volume of finds excavated in the Aegean, each one having been produced in a working area, one would expect to find many more work places. Archaeologists' concentration on excavating settlements rather than sources of raw materials or fuel

may have left many workshops undiscovered, distorting present statistics of their numbers and locations. The volume of fuel required for the amount of pottery-firing necessitated by a site over the years and for smelting and casting metal must have been an important factor in the siting of installations and perhaps sites. Lack of publication and concentration on later strata or on particular types of site such as Minoan palaces may also explain the paucity of identifiable workshops (see section 7.3).

The location of workshops, whether near to elite residences for supervision, in settlements, at their boundaries, close to sources of raw materials or fuel, or on the coast for ease of sea-transport, cannot be discussed with assurance because of the possible distortions discussed above. A further impediment is some excavators' lack of detail concerning the precise location of the workshop, and in some cases the lack of a map to illustrate the workshop's position. In some cases, only the details about the workshop are provided, and the surrounding area is not included in the discussion. Nevertheless, the locations of the identified workshops may be discussed.

The most likely example of workshops located close to patron residences are the Quartier Mu workshops (see section 7.1.a). Although the coherence of the quarter is uncertain (Dandrau and Treuil 1997: 55), it is an example of nucleated workshops which suggests a craftsman's quarter, probably for easier control by the palace or palace-related administrators, perhaps also for sharing facilities and ideas as an added advantage. At Zakro, metal and stone workshops (F76, F77) were located in Space Phi, close to what is thought to be an earlier palace. There are also indications of metal and stone working near the old palace at Knossos, and of metal, stone and bone working in Unit B within the first palace at Phaistos. Textile work appears to have been carried out in the old palaces at both Knossos and Phaistos, on a significant scale at the former. The relationship between the workshops and the earlier palace-like structures at Knossos, Phaistos and Zakro is unknown. A similar relationship cannot be assumed for each settlement: unlike the Quartier Mu workshops, the working area at Phaistos contained fragments of administrative tablets. The Quartier Mu workshops appear to be separate from administrative areas and elite residences or



palatial buildings, whereas at Phaistos and perhaps Knossos some craftwork seems to have been carried out within the palace.

Workshops located within settlements include shell working at Neolithic Sitagroi (A1) and Dimini (B6), and potters' workshops in a house at MN Sesklo (B17) and in Building 4 at LN Dikili Tash. At MH Kirrha, two kilns were found within a house (C16) and a possible kiln surrounded by a thick layer of sherds was found in House VIII at Kolonna (C21). It seems odd to have had a kiln within a building, because of the hazards of fire and pollution, yet all the examples of kilns known from LN Bulgaria were located within houses (Treuil 1992: 43).

At MH Lerna, two probable kilns and a furnace were located in the south central area amongst houses (D20, D21). At MH Nichoria, metallurgy was practised near to buildings about which little is known but which might have been houses or workshops (D26). Steno, possibly an example of community specialisation, has revealed six furnaces in the village area (D30). Similarly, indications of metal work have been found in two rooms at Kastri (E33, E34), Room 11 probably being an area for melting and working metal. It is believed that furnaces, indicated by tuyères, were located in courtyards amongst the workshops at Quartier Mu, and the furnace at Zakro is also next to the protopalatial building. Apparently the noise, noxious fumes and fire risk were not always influential factors leading to the siting of kilns and furnaces away from habitation areas. One might explain the proximity to habitation at Quartier Mu and Zakro as facilitating elite control over the craftwork. At the other settlements, explanations are not obvious and perhaps proximity to a source of labour was the main influencing factor.

The obsidian working areas at Knossos (F14) and Mallia (F25) are within rooms which had either been disused previously and were used for a single knapping event, or which were used more frequently and the waste was removed and deposited safely elsewhere. Whichever explanation is correct, the waste was safely deposited. The large debris heap or open air workshop at Phylakopi (E18), however, is more difficult to explain. The by-products, splinters of volcanic glass, are dangerous and yet a large

area, apparently within the EC-MC settlement, is covered with a thick layer of them. The siting of a large workshop at Phylakopi, which is not particularly close to the obsidian sources, is also puzzling if theories that Phylakopi did not exert control over the island's obsidian resources (Torrence 1982: 197; 1986: 214-6; Dickinson 1994: 236) are to be believed. A possible explanation is that Phylakopi enjoyed a significant trade in obsidian blades and platforms. It did not necessarily control access to obsidian, because the sources are located some distance away and there is no evidence of control (Torrence 1982: 197);[1] travellers could obtain their own obsidian if they desired. Phylakopi may have supplied prepared platforms or blades to sea-farers who either had insufficient knowledge of the obsidian sources or who lacked skill in preparing platforms or blades, or who were visiting to perform various exchanges and obtained obsidian while there for convenience.

A couple of workshops are situated at the outer limits of settlements: an alleged EB II-III kiln at Polichrono (A16), and a kiln at LN Dimini. The MH kilns at the Menelaion (D24) are not specified to be near any buildings, but the map provided by Catling (*AR* 27 (1980-1981) fig. 23) focuses more on LBA finds. At Sallou (D29), a large metallurgical kiln was sited just above the village. There seems to be no regular pattern for the location of kilns and furnaces either inside the settlement or at its boundaries.

Examples of working near to raw material sources are confined to those which have attracted more scholarly interest, being localised and containing unique elements which may be recognised in products to show their distribution away from the source, namely metal and obsidian sources. There was allegedly evidence for metalworking in a settlement (C23) near to a mine in the Laurion region. At Leondari (E15) on the island of Makronisos close to Laurion, there are also indications of metalwork. At Ayios Sostis (Siphnos) (E31) there is probable smelting near the silver and lead mine. Preliminary working was performed at the obsidian quarries at Sta Nychia and Demenegaki. The evidence for figurine working at Avdheli (Naxos) (E22) is slim but made more probable by the site's location in an area rich in emery; Doumas suggested

[1] This is contested by R.N.L. Barber (1987: 118), who argues unconvincingly that control of the

that the site was settled in order to mine the stone (Oustinoff 1984: 39). Neolithic shell-working and Minoan dye-producing sites are located near to the coast, but this is typical of many settlements anyway.

Although logistically it makes sense to work materials close to the source to reduce bulk for transport, many workshops are not located there. Kilns and furnaces at settlements that are not close to clay beds or mines are examples of this. In the case of kilns, the reason for this might be the fragility of the products. Metal was a precious commodity, so working it in settlements or close to palaces where security would be greater would be sensible. Smelting near the source, however, would greatly reduce bulk; it also seems to have been carried out at some settlements, including Raphina (C34) and Quartier Mu. The former appears to have been a community specialising in metallurgy, importing bulky metal ore and processing it close to the houses of the workers; the settlement was on the coast not far from the Laurion source, convenient for receiving imports by sea. The copper mined at Tsoulis (Kythnos) (E13) appears to have been worked 2 km. away at Skouries (E14), and the workers are believed to have lived at Geronimou (Hadjianastasiou and MacGillivray 1988: 32) which is c. 200 m. to the southeast.[2] Skouries is in a windy location, suitable for producing the high temperatures needed for smelting; perhaps other benefits of this location included a more abundant source of fuel and a better harbour for exporting the metal. This is also a likely example of community specialisation.

7.1.c Scale of production

The scale of production is difficult to establish. The Quartier Mu workshop-houses are thought to be the residences of artisan families; the available space in the workshops, however, could accommodate only one or two people. Work on a large scale was carried out at the probable workshop settlements at Skouries and Raphina, and perhaps the Ayioritika settlements (D29, D30). The volume of demand cannot be established until chemical analysis is used to trace the distribution of products out

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quarries was possible, despite the lack of evidence.

from a production locus; work of this nature has recently been carried out by Day, Whitelaw and others (for example, Day 1988; Whitelaw et al. 1997; Whitelaw pers. comm. 1996) with regard to pottery distribution in certain regions of Prepalatial, Protopalatial and Neopalatial Crete.

7.1.d Intensity of production

The intensity of production is unclear from archaeological data. Workshops with specialised facilities must have seen more regular use than workshops for the same craft without similar investments of time and resources; the specialised equipment was installed either because the craft requires it, and therefore it might be used frequently to justify the investment, or in order to increase the frequency of production and make it more efficient. The allocation of space within the Quartier Mu houses F32-F35 specifically for craftwork, space that takes up a significant percentage of the total house area, suggests a significant intensity of work. Also indicative of this is the probable elite patronage involved. If the work was not full-time, it must have been performed on a regular basis.

The possible specialist communities at Skouries, Raphina and Ayioritika are likely to have practised metallurgy at a greater intensity than most other settlements; this is shown by the stark difference between these sites and others which have not revealed furnaces or extensive deposits of slag and other signs of metallurgy.

7.1.e Product

A problem with the study of workshops is that their products are not always evident. Rare finds of moulds in metal workshops reveal ambiguous or few types of product, which surely does not reflect the actual range of products made. Except for one workshop at Mallia (F33) where moulds for pottery items were found, the products of pottery workshops are not discernible. Wasters indicate the shape and ware type of

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[2] On the grounds that 'no evidence of normal households' has been found, G. Philip and C. Broodbank (pers. comm. 2000) suggest that this may have been a temporary residential location for the miners, rather than a permanent community.

pot being fired, but excavators have not provided much detail about these. It is possible that workshops produced both utilitarian and fine wares. The problem with stone workshops is that it is unclear whether the remains in the locus reflect their entire production repertoire or a particular assignment worked on at the time of destruction.

The raw materials that may be considered to be exotic include metal, rare stones, ivory, and obsidian, although the latter is distributed all over the Aegean. The identification of production involving exotic raw materials and prestige goods has probably been more frequent than that of ubiquitous raw materials and utilitarian goods for two reasons. Exotic materials and prestige have aroused more attention amongst excavators because of their rarity, and they are often more noticeable in the archaeological record. An example of this is that finds of slag, a metallurgy by-product, are invariably commented upon by excavators whereas wasters and debris from bone or local stone-working may pass undetected or unmentioned.

Despite these problems, the patterns revealed by tracing the movement of distinctive goods from the source to the workshop to final destinations may be informative about trade patterns and relationships between sites. Work of this type has been concentrated mainly on obsidian whose sources are localised to two main deposits on Melos; those at Yiali are of a different type and were used with less frequency. Further analysis is needed to trace the products from the metal sources at Ayios Ioannis, Ayios Sostis and Laurion.

It is sometimes difficult to determine between luxury and utilitarian products. Spondylus bracelets, for example, appear to be common at Neolithic Dimini, but this does not necessarily mean that they are not luxury products. If, as it is suggested here, Dimini (B6) is an example of community specialisation, or specialisation on a significant scale, producing luxury goods for trade to other regions, the goods themselves, although common at that site, are defined as luxury products. This definition is justified by the amount of time and skill involved in their production, the limited availability of the raw materials and their relative rarity in the regions where

they are traded. Therefore one cannot assume a correlation between large numbers of goods at a site and a utilitarian, or non-prestige, function.

There seems to be the predicted positive correlation between attached workshops and the production prestige goods. Metal was a relatively rare commodity in the pre- and protopalatial Aegean, and goods of this material may be considered to be prestige. The practice of metallurgy is strongly connected to the Minoan palaces in the MBA. The Quartier Mu workshops were involved in the production of prestige or non-utilitarian goods: metal items, seals and vases of rare stones, seals of ivory, and pottery items for probable use in sanctuaries (Poursat 1983: 79).

7.1.f Efficiency

The clearest way to determine efficiency it to study the production debris, work which has not been a priority for most excavators, and to look for the presence of specialised facilities. In the case of the former indication, the most notable instances of examinations of debris are at obsidian dumps or activity areas; obsidian was worked less carefully and efficiently at Phylakopi than at Knossos, which is to be expected with the 'Law of Monotonic Decrement' where the material is used less wastefully as distance from the source increases (Torrence 1986: 80). It is also possible to analyse slag for efficiency with an examination of the size and analysis of slag and prills. The conclusions have, however, been used to propose chronologies for the work, rather than efficiency compared to other contemporary sites (Gale et al 1985: 85).

Sites with specialised facilities, furnaces, for metallurgy include EH II-III Kolonna (C19), EH II Raphina (C34), MH Lerna (D20), MH Malthi? (D23), MH I Nichoria (D26), EC II Skouries (E14), EC I-II Ayios Sostis (E31), EC II-III Kastri? (E33), EM III Chrysokamino (F5), MM II Quartier Mu, courtyard VI 4 (E29), MM II Quartier Mu, North Space (E34) and MM I-II Zakro (F76). With the exception of Ayios Sostis, Skouries and Chrysokamino, these are sites believed to have been major settlements. Perhaps the larger, more important settlements had the means to import and work metal. Perhaps, on the other hand, the signs of metallurgy, coupled with the fact that the number of extensively studied and published EBA and MBA sites is not

overwhelming, have convinced archaeologists that the sites are important. Sites with kilns are listed in Appendix H. One would expect greater efficiency in working areas with elite patronage, namely the Minoan palaces, and this is found at Zakro and Mallia but not yet at Phaistos or Knossos. Further excavation of the Protopalatial palaces and the surrounding areas is needed.

The only case of apparent division of labour, or at least separate areas suited for different stages of craftwork, is at Skouries (Stos-Gale 1998: 719). The work was apparently well organised; smelting, for example, was on the windy, exposed part of the cliff, which would have helped achieve the necessary high temperatures in the furnaces, while manual metal extraction from slag was in a sheltered position (Stos-Gale 1998: 719). This site is exceptional in its scale of craftwork; at other sites where the size of the workshops could accommodate one or two individuals, a division of labour cannot be seen. Even if one craftsman prepared the raw material and another made the finished product, this would not be evident from the remains.

7.1.g Type of production

The type of production, for example, household production for family use, or a group of workers producing for a patron, may only be suggested for a few sites.[3] It has already been suggested that most examples of working areas for weaving cited in the catalogue are for household production, the only exception being Knossos (F18) where a larger scale is suggested by evidence for the storage of about twenty looms. Most of the textile working areas, excluding dyeing, are probably Type 1. Types 2 and 3 are difficult to quantify; Type 3 could be assigned to the obsidian quarries (E16 and E19) if any signs of the local community supplying nodules and blades regionally could be supplied. No such evidence exists however. It is possible that Nea Makri was a specialist community as early as the Neolithic, producing far greater amounts of stone bowls than other contemporary settlements. One must be wary, however, of reading too much into the finds; the volume of finds might equally be the result of

[3] See Table 4.3 for details.

consumption preferences differing from other sites, whether the site produced its own bowls or received them from elsewhere.

Of the types of workshops, the probable metalworking workshop at Kastri (E33) might be an example of Type 4. The small work space suggests an individual working; the nature of metallurgy with restricted knowledge and facilities would make it likely that the individual was producing for the settlement or other sites on the island, probably part-time all year as the demand arose. Types 5 or 7 are represented at Quartier Mu, where the workshops are believed to have allowed one or two craftspeople to work. Skouries, Raphina and the Ayioritika sites have already been suggested to be specialist metalworking communities, supplying a wide area with metal ore or goods. Of these, Skouries is the most likely to be an example of Type 8, because it was processing the metal extracted from the mine nearby; the workers in the nearby settlement perhaps mined, smelted and cast metal. From here, metal was exported and distributed over the Aegean. The scale of work at Raphina and the Ayioritika sites is not yet known because details concerning the settlement do not permit research to determine whether the entire settlement was involved with metalworking. If these do not represent Type 8, they are surely Type 6. It is probable that Types 9 and 10 are too advanced for the period considered here, unless one labels the Quartier Mu complex of 'maison-atelier's as a community.

7.2 The compilation of statistics

7.2.a Introduction

Statistics were compiled in order to compare the numbers of workshops and activity areas between crafts, regions and eras. A problem quickly became apparent during this process: some loci had been classified as C, E or M but indicated that craftwork was practised somewhere on the site, the overall classification being C, E or M = AF (as is the case for E34). It transpired that such catalogue entries would distort the interpretation of the statistics; the number of actual specified loci would include these as possible workshops (C) or not workshops at all (M), which would suggest that craft-work perhaps did not occur at that site at all. A more complete picture should

include all the workshops even if they were undetected in the archaeological record (AF). To include the entries only as AF, however, would be equally misleading because it would ignore the locus analysed in the catalogue and would only deal with supposed workshops rather than actual, specified loci. To include the entry as both C and AF would duplicate the data, which would be equally misleading.

The solution was to compile two sets of statistics. 'Actual working areas' statistics include only specific loci and not what their finds might imply, thereby excluding all "F" classifications. 'Total working areas: actual and inferred' statistics takes into account all the workshops which may have existed, including those already classified as actual workshops or activity areas, and those inferred from loci classified as C, E, I or M. Finds are classified as, for example, I = AF, M = BF, or E = DF, are recorded as A, B and C/D respectively. Therefore a classification of C = AF would be entered as C in the 'actual working areas' statistics, whereas in the 'total (actual and inferred)' statistics it would be classified as AF. Compiling the two sets of data avoids duplication, keeps actuality and theory separate, and provides a more complete picture of the total number of actual and hypothetical workshops (A or B).

7.2.b The crafts

The crafts were divided into the following categories:

1. obsidian and flint blades[4]
2. stone
3. metal, including furnaces
4. pottery, including kilns
5. shell; mother of pearl
6. bone; horn; antler; tusk; ivory
7. textiles: weaving; spinning; dyeing

[4] This is a separate category from stone because the products, blades, require a different technique from vases, figurines, sealstones etc. The two categories are entirely separate crafts.

Some crafts were not included for various reasons: the workplaces of leather and wood are difficult to detect because the materials are perishable and work on them could have been practised anywhere. It is uncertain what is indicated by hoards; they might have been used for woodwork in any location, or they could have been found in a storage area. They are included in a separate table. Mines and craftsman's graves are not included because they are not workshops; they are listed in separate tables. Inferences of workshops from finished products (L) and areas classified as "K" are not included because they are too vague.

7.2.c Catalogue classifications

A and B are taken together for the statistics. D is dealt with separately because it indicates work on a smaller scale than A and B. C and E are taken together as their status as a working area is uncertain, and the data are often insufficient to determine what the scale could be (workshop or activity area). Where the classification in the catalogue is C/D, indicating a working area whose scale is uncertain, it has been entered here as D to err on the side of caution. Areas classified as (A) K, for example, are included within A and B; they cannot be ignored because an excavator or reporter has seriously believed that they are workshops but has provided insufficient information for a detailed examination in this catalogue. For statistical purposes, the excavator or reporter's opinion has to be taken as accurate.

Kilns are included with A and B as workshops because, as permanent installations, they indicate a degree of specialisation and a stage of production in a particular place. Possible kilns are accordingly included with C and E. Where a number of kilns were found in the same location, they are treated as one workshop entry. Where a site contains a number of kilns at different locations, these are entered as separate workshops. Where two crafts were practised in one workshop, they are entered as two workshop entries.

7.2.d Chronology

Dates in the catalogue entered with a question mark are assumed to be correct here. Dates such as EM I-II, which shows continuous use, and EM I/II, which shows use in one of those periods, are entered as EBA, rather than in both EB I and EB II. This is to prevent giving a misleading impression that there were more workshops than actually existed.

Workshops that were used for a specific era, which has not been ascertained but has been estimated to lie within limits cutting across major eras such as EM I - MM II, are not included. This is because they cannot contribute to the statistics comparing the EBA with the MBA. Where the same workshop was literally used from the EBA to MB I, such as E19, this will be entered as a workshop in the EBA and in MB I. Similarly, where the same area was used as a workshop in separate periods, for example F64 in the EB I-II and MB I, the workshop will be entered for the separate periods. Demenegaki (E16) and Sta Nychia (E19), obsidian sources which were probably used continually throughout the Neolithic, EBA and MBA, have been entered for all three phases.

The following sites were excluded because the details regarding which craft was practised or other information was too vague to be useful: A21, B2, B14, D19, F12, F56. Other sites were excluded because their estimated date was uncertain, and estimates spanned several major phases, such as EBA to MBA. These were: A7, C1, C15, C21, C35, C36, E17, F6, F7, F52, F53, F72, F73.

7.2.e Regions

Some regions were combined to give a better scope for comparison; it is easier to compare four areas rather than six, and the statistics would have been scanty for Macedonia, Thessaly, Central Greece and the Peloponnese had they been examined individually. Therefore the statistics for Macedonia and Thessaly were combined because these regions had significant contact with each other in the Neolithic and perhaps the EBA, and show similar patterns of development. From the EBA, the

centres of progress moved largely to the south of Macedonia and Thessaly; Central Greece and the Peloponnese show similar trends and their statistics were also combined. The Cyclades and Crete were kept separate because they show their own patterns of development.

7.3 Trends observed for craft workshops by era and region (see Appendices B and C)

The following discussion will concentrate on workshops because in some cases the statistics for activity areas are unreliable (see 7.3.a, 7.3.d. 7.3.f and 7.3.g) and more information may be deduced from workshops rather than activity areas and possible working areas (C or E).

7.3.a Obsidian

Debitage from obsidian work is commonly found all over the Aegean, demonstrating that this material was worked in very many places. The presence of obsidian waste, however, is usually reported without the excavator making the truism of suggesting that it indicates an obsidian working area. There are exceptions, however, where excavators, especially those from earlier in the century, have classified areas with waste as workshops; such areas would probably not be classified in the same way today.

Therefore the statistics calculated here for chipped stone work will be skewed, because only those areas specified to be workshops or activity areas have been considered in the catalogue. The figures reached will suggest that there are far fewer activity areas than there actually were. The only reliable figures will be those of workshops, because excavators do mention unusually large quantities of obsidian waste; after analysis in the catalogue some areas have emerged as possible workshops, notably E18, F14 and F25, though none were identified with certainty as workshops.

7.3.b Stone

There are many more total (actual and inferred) workshops than actual identified ones. The reason for this difference is that in many cases stone bore cores have been found which indicate craftwork, but not necessarily at that findspot. Most working areas are MBA. The majority by far are in Crete, and all of these, except F45, are at the palaces, Mallia in particular.

7.3.c Metal

The statistics reveal no activity areas because metal is defined as an inherently specialised craft, requiring knowledge which would not have been commonly held, contacts for obtaining raw material, and usually a furnace and specialised tools. The difference between actual workshops and the total (actual and inferred) is large: one and five for the Neolithic, seven and twenty seven for the EBA and eight and eighteen for the MBA respectively. The reason for this is that slag is recorded whenever it is found because it is not a common find, and it does not necessarily indicate metallurgy at that particular locus but does indicate metallurgy at the site.

No metal-working areas have been identified with certainty for the Neolithic, though the Bin Complex at Sitagroi (A18) is classified as B. The total (actual and inferred), however, is five, all LN-FN. Three are from the Cyclades (E2, E8, E12, all on Keos), and two from Macedonia and Thessaly (A12, A18). Possible explanations might take into account the fact that sources of ore exist in these regions, but their exploitation in the Neolithic has yet to be proved. Additionally, the spread of knowledge of metallurgy or of people with such knowledge south from the Balkans and west from Anatolia might account for the earlier appearance of metallurgy in these regions than in the rest of the Aegean.

There is a flourishing of metallurgy workplaces in the EBA, especially in EB II, which corresponds with Renfrew's theory of an expansion of contacts and knowledge in this period. Of the twenty seven total (actual and inferred) EBA workshops, nearly half

are in Central Greece and the Peloponnese, nine are from the Cyclades, four from Macedonia and Thessaly, and two from Crete.

The increase in the number of metal workshops from the Neolithic to the EBA in Macedonia and Thessaly is slight, whereas the increase in the rest of mainland Greece is much larger. This suggests that the centre of development for metallurgy moved from the northern Aegean to the south. This factor has already been taken by Renfrew (1972) to suggest that after the Neolithic the centre of general development shifted from northern Greece (Macedonia and Thessaly) to southern Greece (Central Greece and the Peloponnese). Certainly, more growth in the number of metallurgical sites is seen in the EBA and MBA in southern Greece, but metallurgy does not cease in northern Greece: there are four sites with probable metal workshops in the EBA and three in the MBA.

In Central Greece and the Peloponnese there is a decline in the number of metalworking sites in the MBA, which reflects the general paucity associated with the MH period. One inferred MBA metalworking site (E5) has been identified in the Cyclades. Crete is the only region to show an increase in metallurgy workshops, from a total (actual and inferred) of two in the EBA to nine in the MBA, of which nearly half (F29, F34, F35, F39) are in Quartier Mu, Mallia, and the rest are at Knossos (F16), Phaistos (F58), Poros-Katsambas (F66), Pyrgos (F67) and Zakro (F76). This suggests that the palaces could have controlled metallurgy, or at least supported the work on a significant scale compared to other settlements: the only securely dated non-palatial site amongst these, Poros-Katsambas, has strong connections with Knossos; Pyrgos is dated to MM II or MM III and has been closely linked with Mallia.

7.3.d Pottery

The statistics for pottery production will be skewed, because although production probably occurred in every settlement in activity areas, extant indications of such production loci rarely exist. Workshops using permanent installations should leave more traces for archaeological detection. The difference between the number of actual

workshop loci, including kilns, and the total (actual and inferred) is small because workshops are usually identified by or as kilns, and other indications of their existence at a site, such as debris, which would give a classification of AF or BF, are rare.

In the Neolithic no pottery working areas are reported for Crete or the Cyclades, and only one likely and two possible activity areas have been identified in Central Greece and the Peloponnese. The main centre of development in this period was northern Greece, where five workshops and six possible working areas have been identified. Localised pottery styles suggest many more working areas existed.

Six probable workshops have been identified in the EBA, of which half are in southern Greece, two in northern Greece and one in the Cyclades. Crete, again, reveals no workshops. These results might be obscured by the use of kilns in the northern Aegean and open firing in the southern Aegean for similar types of production, whether specialised or not. The possibility remains that pottery production had taken place for longer in northern Greece than elsewhere in the Aegean and production techniques involving kilns were more advanced there.

In the MBA seven probable workshops were recorded, none of which were in northern Greece, where MBA sites are very rare and less development is apparent than other regions, or the Cyclades, where excavation has concentrated more on LBA than MBA. Southern Greece reveals four probable workshops, two at Kirrha (C16), one allegedly at Marathon (C31) and one at the Menelaion (D24), and Crete reveals three at Khania (F11), Mallia (F33) and Silamos (F73), where the chronology is unclear and possibly LBA. These results are contrary to the predictions made by theories of greater development in Crete than in the mainland. This might be due to the fact that pottery workshops are difficult to detect; permanent installations are often ambiguous: levigation tanks might be interpreted as pits unless clay is found in them, kilns may be argued to be ovens if no wasters are found, other production tools are portable, and wasters may be overlooked or misinterpreted as ordinary sherds.

One would expect pottery workshops to have been found at the Minoan palaces because metallurgy workshops were found there. If detection problems[5] do not account for this, another explanation might take into account the difference of raw materials: metal was rare and probably imported, whereas clay was common and local. It could be that only the early palaces had the means to import metal and therefore controlled its exploitation, whereas pottery production was not such an important concern, being produced by most, if not all, sites, so it was not controlled by the palaces. If this was the case, the question remains of where the palaces obtained their pottery. Perhaps their needs were met by activity areas within or near the palaces. These explanations seem less plausible than the likelihood that kilns lie undetected because of the difficulties of excavating the first palaces extensively.

7.3.e Shell

All the shell working areas are dated to the Neolithic. One workshop and five probable activity areas have been identified, the latter from Macedonia and Thessaly, and the former from Franchthi in the Peloponnese (D8). It is likely that workshops existed at Dhimini (B6), Dimitra (A8) and Sitagroi (A21) (Tsuneki 1989: 16), and perhaps at Dikili Tash (A2), even though actual loci for production have not been confirmed. Tsuneki (1989, fig. 17) suggests that other Neolithic sites produced *spondylus* objects, but gives no further details. A degree of specialisation is likely because production is concentrated in the north Aegean, *spondylus* objects were traded to the Balkans and the production methods require skill, time and practice (Tsuneki 1989: 10ff.). Therefore at the northern Aegean sites specified above, the areas of production might be described as AF rather than DF; further information is required before this theory may be confirmed. This may be a rare example of regional specialisation, for export to another region (the Balkans).

Explanations for the relative lack of *spondylus* production in the southern Aegean have not been forthcoming. The raw material is as abundant there as in the northern Aegean (Shackleton and Renfrew 1970: 1064), so a lack of resources is not the

[5] i.e. problems with identifying workshops or the limited scope of excavation beneath the second

reason. Perhaps the reason is cultural: production was concentrated in the north because it maintained trade links with communities in the Balkans, whereas in the south Aegean either trade contacts by which shell items were received did not exist or communities did not want to import *spondylus* goods. Perhaps for this or other reasons the prestige value seen in northern Greece was not accorded to the products further south in the Aegean.

Presumably trade contacts with the Balkans broke down or the focus of trade shifted away from shell ornaments after the Neolithic, and this spelt the end of their production in the EBA and MBA northern Aegean.

7.3.f Bone, horn, antler, tusk, ivory

No workshops were found for the working of bone, horn, antler, tusk or ivory. No working areas in any periods were found in northern Greece and the Cyclades. The exploitation of tusk and ivory was greater in Crete where it was use for the production of seals, but no workshops have been located except for a possible instance at Mallia (F32), where the quantity of ivory was very small compared to that of stone. Bone, horn and antler, however, were probably more commonly worked than the statistics suggest. Objects made from these materials are found commonly enough but their production does not require specialised workshop facilities or tools, and in some contexts the materials themselves may have perished. Bone working must have been commonly practised; perhaps excavators have regarded the Neolithic production of bone tools as too common to cite instances of working areas, or the working areas have been accidentally passed over: only one activity area is recorded in the Neolithic, at Crete (F55). No working areas are reported for any of these materials in the EBA, and the MBA shows a possible locus in Crete (F 57) and two activity areas in southern Greece (C14 and D2). These statistics are not reliable due to the difficulty in detecting working areas.

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palaces.

7.3.g Textiles

The statistics for actual and probable working areas are skewed because only areas specified to be textile workshops or to contain looms were considered in the catalogue. The statistics thus reveal few working areas, whereas textile production, excluding dye production, must have been virtually ubiquitous in reality.

The results of the study do reveal, quite accurately, the probable lack of weaving and spinning workshops. It is possible that cloth was produced on a large scale at Knossos (see F18), but it is more likely that large-scale production was first practised in the later palaces, unless the Linear B tablets of the final palace phase provide a biased impression. The evidence for large-scale cloth production in the Neopalatial period derives from the Linear B tablets; it is possible that such production also occurred in the Protopalatial period and has passed undetected either because the administrative tablets did not record the details or because Linear A has not been translated. Arguments suggesting that the quantity of textile-related finds is too small to suggest large-scale production could be countered by the possibility that perishable spindle whorls, loomweights, shuttles and spools were used. Additionally, one might speculate that Crete exported perishable goods, including textiles, because few Minoan products have been identified in the overseas regions that had traded with Crete since the Protopalatial period. The Mari texts mention the importation of a textile from Kaptara (probably Crete), and the sign for cloth is common in Linear A and Hieroglyphic.[6] Arguments for possible large-scale textile production in the Protopalatial period are speculative, and for now one must take the existing evidence at face value and accept that no textile workshops have yet been identified.

The production of purple dye is likely to be a more specialised operation, given the huge quantities of shells and specialised facilities required, so it is more probable that there are workshops, rather than activity areas, for this aspect of textile work. All the possible dye working areas have been found on Crete: F19, F22, F47, F51, F69. Perhaps this reflects a greater quantity of dye-producing molluscs living around Crete

[6] I would like to thank G. Phillip and C. Broodbank for drawing this to my attention.

than elsewhere in the Aegean, or, more probably, that Crete had a greater interest in the production of prestigious purple dye whether for trade overseas or for social uses within Crete. All the possible workshops were at coastal sites, which may be accounted for by proximity to the huge quantity of shells required for dye production or proximity to a harbour from which the dye or dyed cloth may have been exported. With the exception of F47, all the loci are MM. F19, F22 and F51 are possible locations for the production of purple dye, whereas F47 and F69 are areas with installations perhaps used for dyeing. Interestingly, no sites have revealed indications of both dye production and dyeing installations.

7.4 All crafts, trends of workshops by era

With the development of civilisation, defined in part by the growth of an administrative system, a more prominent social hierarchy, advances in production techniques, an integrated cohesive production (utilitarian and prestige goods) system and the development of specialised production, and trade on a larger scale over longer distances, one would expect an increase in the number of workshops over time. This is indeed the pattern revealed by the statistics of actual working areas; through the Neolithic, EBA and MBA the number of workshops in the Aegean, taking all crafts together, rises from eight to twelve to seventeen respectively. The total (actual and inferred) number rose from twelve to thirty five to thirty seven respectively. The statistics for activity areas and possible workshops or activity areas, as has been stated above, are less reliable. Those for activity areas show no particular pattern, whereas the possible workshops or activity areas show a slight increase through the eras.

In the Neolithic Aegean, eight actual workshops were identified. One is from the Peloponnese for shell work and seven are from Macedonia and Thessaly, of which six are for pottery production and one for metal, with a further inferred metal workshop too. Three inferred metal workshops were from the Cyclades, all on Keos. No Neolithic workshops were identified for Crete. The majority of workshops are in northern Greece, reflecting its status as the main centre of development in the Neolithic, and the more extensive excavation of Neolithic settlements here than elsewhere in the Aegean. The three inferred workshops on Keos are interesting; Keos

lies near to ore sources at Laurion but evidence for their exploitation in the Neolithic has not yet come to light.

There are no working areas from EB I. A few loci were dated to EB I-II (E26, E28, E31, F64, F65), all from Crete. This reflects the scarcity of EB I sites in general in the Aegean, the majority known from Crete. Few working areas were dated specifically to EB III, but working areas did exist in EB III, dated to EB II-III and included in the statistics as EBA. It is possible that there were more working areas from these eras and that they have been included in a more general dating of 'EBA' by the excavators. It is probable that the two obsidian quarries on Melos (E16 and E19) were also used in these periods, and perhaps the obsidian working area (E18) at Phylakopi.

The EBA Aegean has twelve actual workshops, mostly for metallurgy. Four metal workshops and a kiln (C10) are in Central Greece and Peloponnese, two metallurgy workshops and a kiln (E3) are from the Cyclades, two pottery workshops from Macedonia and Thessaly, and one metal and one dyeing workshop (F47) are from Crete. A total (actual and inferred) of thirty five workshops, again mainly for metallurgy, includes fifteen from Central Greece and Peloponnese, eleven in the Cyclades, six in Macedonia and Thessaly, and three in Crete. These figures echo the commonly held theory that by the EBA, the centre of development had shifted from northern Greece to southern Greece; central Greece and the Peloponnese reveals the greatest number of total workshops in this period. The pattern of workshops reflects the greater development of the Greek mainland, which had developed the impressive corridor houses and was using administrative seals (cf. Watrous 1994: 713), whereas Crete had not yet reached its floruit. Nevertheless, the paucity of workshops identified in Crete is surprising because the island, although lacking any clear equivalent to corridor houses, shows signs of prosperity and extensive trade contacts which are not seen further north in the Aegean: ivory and stone vessels were imported from Egypt or Syria, and gold, whose native origin has not been discerned, appears in Crete but not in the Cyclades. The problem in attempting to compare the regions lies with the different types of data recovered from each place; the Greek mainland has revealed impressive settlements with corridor houses, the Cycladic EBA is known largely from graves, some rich in finds, rather than settlements, and EM Crete is

known from multiple-burial tombs, particularly in the Mesara region, and a handful of settlements. The reasons for the different types of development are still unclear. Until more EBA sites, whose existence is indicated by the cemeteries, are found in the Cyclades and Crete, comparisons regarding the numbers and types of workshops will be misleading.

In the MBA, there were seventeen actual workshops in the Aegean, and thirty seven actual and inferred workshops. Of the former, none are from Macedonia and Thessaly, seven are from Central Greece and the Peloponnese, none from the Cyclades, and are ten from Crete. Of the total workshops, three are from Macedonia and Thessaly (metal workshops), nine from Central Greece and the Peloponnese (metal and pottery workshops), three from the Cyclades (stone, obsidian and metal) and twenty two from Crete (stone, metal, and a few pottery workshops). These figures demonstrate Crete's greater state of development compared to other regions in the Aegean and its predominance in craftwork in this period. Most of the Cretan workshops (eight actual and four inferred) are at Mallia, a statistic influenced greatly by the discovery of the artisans' quarters at Quartier Mu. Other sites with actual workshops include Khania (F11), Poros-Katsambas (F66) and Zakro (F76); Knossos (F15, F16, F17), Mochlos (F45), Phaistos (F58), Pyrgos (F67) and Zakro (F77) have inferred workshops. In this flourishing period dominated by the development of the first palaces, it is interesting that workshops for stone, metal and pottery, although largely within or near to the palaces, are not restricted only to those sites but are also found elsewhere, if rarely. This suggests that the palaces were the main centres for specialised craftwork, especially for stone work and metallurgy. Although relatively little is known about the first palace at Mallia, the extensive evidence of craftwork and administration seen at Quartier Mu suggests that this was an advanced centre of production, with resources to provide for specialised craftwork in common and rare materials including metal, imported stones and ivory. The limited scope for excavation beneath later remains at the other palaces means that it is not known whether they also had areas of artisans' houses and workshops. Quartier Mu was, however, located at a small distance from the major structure, perhaps a palace, which lies below the LM palace, and excavations around Zakro, Phaistos and Knossos have

not revealed any major areas of craftwork; the most similar craftwork areas are Area Phi at Zakro and Unit B at Phaistos.

In Macedonia and Thessaly, MBA excavations are very few. In the Cyclades and Crete, there are few EBA and MBA excavations of 'ordinary' sites, i.e. settlements without unusually important buildings. The mainland has revealed rather more 'ordinary' EBA and MBA sites, such as Lithares and Eutresis. The MBA in the Cyclades has been represented mainly by Ayia Irini and Phylakopi, both of which have unclear stratigraphy. In Crete, excavations of post-EBA sites have focused on palace sites, and excavators have been reluctant to remove the Neopalatial strata to investigate the underlying Protopalatial remains. There are few excavations of non-palatial MBA sites: Gournia and Palaikastro are dominated by LBA remains, Vasiliki has been examined more for its EBA finds, and Petras awaits further attention. Had the excavators not chanced upon Quartier Mu and decided to examine it in detail, the statistics reached here for MBA workshops would have been vastly different. This leaves a doubt concerning just how many of the statistics are due to chance rather than a reflection of past reality.

7.5 Other results from the study

7.5.a Dimensions of workshops

The dimensions of most workshops were not available. Dimensions of workshops and probable workshops will be examined first because these are the most reliable figures. Dimensions varied between 0.7-1.5 m. and 3.85 m. width and 3 m. and 6.7 m. length. The workshops averaged c. 2.5 m. by 3.9 m., most measuring between c. 3 m. and 3.5 m. The dimensions do not seem to differ between workshops in the EBA and MBA, though the numbers of workshops analysed are not really sufficient to be statistically significant. Some workshops were used for several crafts, and dimensions do not appear to be affected by the practice of different crafts. Loci classified as activity areas or workshops have similar dimensions, whereas those that are possible workshops have unusually small or large dimensions: E34 and F40 are perhaps too small, suggesting an alternative use, and E18 is enormous suggesting a waste heap

instead. The areas classified as M have varying dimensions, those of F49 being part of the reason why this area could not be a workshop as Warren (1972a) believed (see catalogue).

7.5.b Combinations of crafts

Most workshops appear to have specialised in one material, from which one or several types of product might be made, or one product, either from one or various raw materials. Possible combinations of crafts witnessed in the Aegean include figurine production and pottery painting at LN Achilleion (B5), weaving and perhaps dyeing at MM Hamalevri (F69), stone and bone at MM Phaistos (F57), stone and metal in Polythyron III, 7, Mallia (F39) and alleged pottery and metal at MH-LH Malthi (D22). More certain combinations are weaving and dyeing in EM II Myrtos (F47 and F48), metal, stone, and perhaps bone at MM II Atelier Sud, Mallia (F35), clay work, pottery, and metal at Atelier de Potier (F33), stone and ivory seals at Atelier de Sceaux (F32). The combinations of weaving and dyeing are plausible, and the practice of metal work combined with pottery and stone work would made sense where the workshop could make the clay or stone moulds for casting metal goods.

7.5.c Mines

Only three mines may be safely considered to have been used in the pre-Neopalatial period; these are a mine at Thorikos in the Laurion source area (C39), Ayios Ioannis (E13) and Ayios Sostis (E31), all from the EBA. Presumably the Laurion ores continued to be used through the MBA because metallurgy continues to be evident at Thorikos. There is some clustering of workshops and possible metal workshops around the general region of the mines in the Neolithic and EBA, but other workshops are also evident much further away. In the MBA the known metallurgy workshops are located in all areas of the Aegean except the Cyclades; perhaps the principal ore source was now Laurion and those in the Cyclades were no longer used, which might explain the lack of clustering in the Cyclades. Distance from mines may also have been a less important factor in the MBA as advances in seafaring knowledge and equipment made longer distance trading more efficient.

7.5.d Craftsman's Graves

Of the possible fifteen craftsman's graves in the Aegean, seven are accepted to have been identified accurately, and eight are classified with less certainty. The greater numbers of discovery and excavation of graves on Crete and the Cyclades has resulted in more finds being revealed in these areas. Crete holds the majority of the graves, the Mesara bearing most. Those graves at Lerna obscure the reality of craftsman's graves on the mainland, because at this site a rare examination of the graves with an awareness of possible craftsman inhumation was carried out by Angel who discerned two such possible graves. The diagnosis was made largely on the skeletal evidence of the bodies: arthritic changes in the right shoulder joint and biceps groove suggested a weaver, and the bone wear patterns, deformations and arthritis of another skeleton suggested a smith (Angel 1971: 54, 58-9). If such a study were to be performed more widely, many more examples would no doubt come to light. The body of a woman weaver would surely not be such a rare find in a society where most women would have spun and woven regularly. The study was innovative, however, and should be repeated more often.

The details of other goods in the craftsman's graves are usually not given. Those in Naxos contained few goods other than those concerned with craftwork. Koumasa Tholos B (F21) and Mochlos Tomb I (F45) appear to have been rich in grave goods including many metal finds, expensive to bury and remove from circulation. Both tombs, however, contain multiple inhumations and it is not possible to connect the finds possibly related to craftwork or any other finds with a particular skeleton.

7.5.e Craftsmen's Houses

The only craftsmen's houses identified with certainty are from MM II Quartier Mu, Mallia (F32-35), dealing with stone, metal and pottery production. These houses are unparalleled elsewhere in the Aegean. The other possible craftsmen's houses appear to have few finds specified besides those connected with the craft. The finds in the Quartier Mu houses are mainly connected with craftwork and everyday household

tasks such as food preparation. No hieroglyphic tablets were found to suggest that the craftsmen held a particularly high status; administration is believed to have been carried out within Buildings A and B, which, besides tablets, contained metal ore and metal tools, perhaps carpenters' or leatherworkers' kits. This further suggests control on a higher administrative or social level of the production of craft goods.

7.5.f Hoards

Of the 17 possible hoards identified, most are centred in Crete, with perhaps three from Naxos, the only Cycladic island so far suggested to have produced any hoards. Elsewhere in the Aegean, the hoards are scattered, from Laconia to Petralona. Of the possible total of hoards, all those from Crete are roughly dated to the MBA. Elsewhere in the Aegean the dates for the hoards range from Neolithic to EBA, with one (E24) dated EC-MC. The dates of the certain hoards range from EB II to MB II; there are no certain hoards from the Neolithic, which is not surprising because metal goods were rare in this period. Seven hoards are accepted to have been accurately classified, the majority from Crete and most from Mallia.

The greater number of hoards and possible hoards from MM Crete might be explained by the greater wealth of this island compared to other areas of the Aegean at this time. Incorrect assigning of provenances is the most likely explanation for the relatively large number of possible hoards appearing to be from Naxos. In some cases provenances of tools have been conjectured from the order of purchase and position in museum displays, and in other cases the findspots stated by dealers might have been made to fit with the buyers' expectations.

7.6 Final Conclusions

7.6.a Results of the study of workshops

The study of workshops has supported previous theories of the development of civilisation and the movement of centres of development. The commonly held theory that northern Greece was the centre of development in the Neolithic, to be replaced by

southern Greece in the EBA, followed by a flourishing of Crete as the main centre of development in the MBA, is reflected in the numbers of workshops in these regions.

The study also revealed new information about prehistoric society. It seems that Mallia was an important Protopalatial centre, supporting a number of apparently attached craft specialists. Other interesting information came to light, such as that all the purple dye production loci and dyeing installations are in Crete, predominantly in the MBA. In Crete, metal workshops are concentrated mainly in or near the palaces, suggesting palatial control.

A significant caveat, however, is that the statistics and results of this study reflect the interests of archaeologists as much as reality. The volume of finds in the Aegean does not correspond with the remarkably small number of workshops identified. An illustration of this is the wealth of goods contained in the graves at Chalandriani, about whose production circumstances virtually nothing is known. The study of workshop locations revealed no particular pattern for the siting of workshops regarding whether they are within, on the edge of or outside settlements. This is a disadvantage for excavators because no particular type of location is suggested on which to focus their efforts in finding more workshops. On the other hand, unless workshops have passed undetected, excavators have concentrated on settlements and cemeteries, from which too few workshops have been revealed to correlate to the volume of finds; this suggests that more workshops do lie outside the settlements. If archaeologists wish to know more about workshops, perhaps they should concentrate their efforts on the edges of sites and surrounding areas; surface surveys and geological studies of the landscape may reveal sources of raw materials which could be examined for indications of prehistoric use and nearby workshops.

7.6.b The success of the method for identifying and classifying workshops

The method has had extensive employment in classifying and re-interpreting loci previously identified as workshops. In many cases it has resulted in a re-interpretation of a supposed working area as M (B16, C6-8, C14, D15, E11, F18, F31, F49, F54, F68, F78). In other instances it has assisted in re-interpreting loci as working areas or

possible working areas, rather than the previously asserted classification of workshops (A9, B3, B4, B5, B9, C1, C3, C4, C5, C30, D32, E16, E18, E19, F11, F14, F25, F74). This is a significant advance for research if previous, perhaps hasty or misguided, classifications can be recognised and altered. If the method is used in the future, it may help prevent future incorrect classifications.

Inevitably the method is not foolproof and in some cases the likelihood of a locus being a workshop or otherwise has to be considered when the finds are inconclusive. The classification of the finds themselves as raw material or waste or other, for instance, is sometimes subjective. These problems may be resolved in part by future excavations recording the information more accurately and in more detail.

The method is useful for analysing specific loci and providing a classification; for cases where there are finds, usually production debris, which indicate certain craftwork somewhere but which are not concentrated in one particular area, the method would attribute a value of 4, which would only indicate a possible working area. This would indeed be the case for that particular spot, but conceals the reality that a workshop existed somewhere. The method is beneficial for classifying specific loci, which is what it was created for. Further inferences of craftwork in unspecified loci must be made more subjectively.

Evely (1988: 398) rightly pointed out that "crafts can be carried out in such a variety of conditions that only the simplest of models can be made applicable to them all (largely because the demands made by the materials on the craftsman differ so much...)". Not only are there variations between crafts, but also within crafts; pottery for example may be carried out without specialised equipment or archaeological traces. This model, however, is simple enough to distinguish between workshops, activity areas and non-working-areas.

The aim of this research was to compile a detailed catalogue of working areas, concentrating on workshops, and to develop a method for establishing a greater degree of reliability for classification. From this, future research may assert with

greater confidence that loci are workshops and may integrate studies of workshops more fully within wider research of the prehistoric Aegean.

APPENDIX A.

SUMMARY OF THE CATALOGUE

A. MACEDONIA

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
A1	Ayios Mamas: Pit D	EBA	kiln	G
A2	Dikili Tash	Neo	shell ornaments	CF/DF
A3	Dikili Tash	MN	flint tools	DF
A4	Dikili Tash: W30	MN	metal	M
A5	Dikili Tash: X30	MN	kiln	G
A6	Dikili Tash: Building 4	LN	3 kilns, pottery	G + A
A7	Dikili Tash: principal sector	EBA/MBA	metal	I (= AF)
A8	Dimitra	Neo	shell ornaments	(C/D) K, F
A9	Kitrine Limne: Megalo Nesi Galanes site	late LN	pottery	E
A10	Makri: centre of settlement	EN-MN	pottery	E
A11	Makrygialos: Agiasma	LN	shell jewellery	(C/D) K, F
A12	Mandalo	FN	metal	BF, K
A13	Nea Nikomedeia: Cutting A	EN/MN	2 kilns	G?
A14	Olynthus: southeastern area	LN?	kiln, pottery	G + C/E
A15	Petralona	EB II	hoard	H
A16	Polichrono: outer limit of settlement	EB II-III	kiln	(G) K
A17	Saratse	EBA-MBA	metal	I (= AF)
A18	Sitagroi: Bin Complex	Period II-Vb (LN - EB II)	metal	B (= AF)
A19	Sitagroi: Bin Complex, QN 7 and QO 8	Period III (LN)	textiles	D
A20	Sitagroi: Burnt House: Oven 2	Period Va (EB II)	kiln?	G?
A21	Sitagroi: ZB	Neo-EBA	shell ornaments	CF/DF
A22	Toumba Nea Anchialos: area of the Archaic cemetery	EBA	kiln	(G?) K
A23	Vardaroftsa	EBA+	metal	I (= BF)

B. THESSALY

CAT. NO	SITE	DATE	WORKSHOP	ANALYSIS
B1	Achilleion: Square B	EN (Phase late IB)	lithic blades	E (= DF)
B2	Achilleion: Square B Courtyard	EN (Phase IIA)	unspecified	E
B3	Achilleion: Squares A, B, C, D	EN (Phase IIB)	stone tools; unspecified	E (= DF)
B4	Achilleion: Square A	EN-MN (Phase IVA, early)	pottery	E
B5	Achilleion: Square C 'temple'	EN-MN (Phase IVA, middle)	pottery + probably figurine decoration	E
B6	Dimini: House N and Space G	LN	shell	C/E (= CF/DF)
B7	Dimini: in 3rd and 4th wall, northwest side	LN	kiln	G
B8	Dimini	FN	metal	M
B9	FS 30	Middle/Lower Palaeo	stone tools	E
B10	Klithi (Epirus)	Lower Palaeo	bone and stone	D
B11	Larisa	EN	metal	I (= CF?)
B12	Lianokladhi III (Malis): the house	MBA	weaving	E (= DF)
B13	Megalo Monastiri region: 6 findspots	Lower Palaeo	flint?	E
B14	Pefkakia Magoula	MBA	installations	K
B15	Pefkakia Magoula: House 316B, Space W	MBA	metal	I (= BF)
B16	Rakhmani: House Q	FN	textiles	M (= DF)
B17	Sesklo: 'Potter's workshop', House 11-12	MN	pottery	A
B18	Sesklo	LN	hoard?	H?
B19	Sesklo	LN-FN	stone	I (= CF/DF)
B20	Sesklo	EBA?	kiln?	G?, K
B21	Sesklo	MBA (late?)	metal	I (= BF)
B22	Tsangli: House P and T	MN	various	D/H
B23	Volos Kastro	EBA	metal and copper mine?	AF; mine - date? K, F

C. CENTRAL GREECE

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
C1	Aliveri (Euboea): Makria Rakhi and Mesonisi hill	Neo-EH	obsidian	C/D
C2	Askitario (Attica): House E	EH II	metal	I (= BF)
C3	Ayios Dimitrios (Euboea): Almiropotamos	EH II	obsidian	E (= DF)
C4	Ayios Kosmas (Attica): Area O	EH II	obsidian	E (= DF)
C5	Ayios Kosmas (Attica): House F, Room F3	EH II	obsidian	D
C6	Ayios Kosmas (Attica): House F, Room F4	EH II	unspecified	M
C7	Ayios Kosmas (Attica): House H, Room H'3	EH II	unspecified	M
C8	Ayios Kosmas (Attica): House J	EH II	food?	M
C9	Ayios Nikolaos (Euboea)	MH	metal	(A) K, F
C10	Eretria (Euboea): Vouratsas Plot	EH?	kiln	G, date?
C11	Eutresis (Boeotia)	EH?	metal	M
C12	Eutresis (Boeotia): Pit V	EH II	hoard	H
C13	Eutresis (Boeotia)	MH	weaving	DF, K
C14	Eutresis (Boeotia): House E	MH, level II	bone + mother of pearl	C/E + M
C15	Kirrha (Phocis): valley	EH-MH	metal and tin mine?	C (date?); no mine
C16	Kirrha (Phocis): House 2 and Plot B	MH	3 kilns	G
C17	Kitsos Cave (Attica): Sondage 2, level III	FN	metal	I
C18	Kolonna III (Aegina): Dyer's House	EH II-III	dye production	C/E, K
C19	Kolonna IV (Aegina): Weisses Haus	EH II-III	metal	C
C20	Kolonna V (Aegina): Werkplatz	EH III	pottery + kiln?	C + G?
C21	Kolonna V-VI (Aegina): under House VIII	EH III-MH	kiln?	G?, K
C22	Koropi (Attica): North edge of town	EH II-III	metal	(A) K
C23	Laurion (Attica): village	EH II	metal	(A) K, F
C24	Lefkas	EH II	metal	L
C25	Lepoura Magoula (Euboea)	EH?/(Myc?)	metal	I (= AF) (date?)

C26	Lithares (Boeotia): Rooms 34 and 45	EH II	textiles	D
C27	Lithares (Boeotia): area of Houses M, N, X	EH II	obsidian	C/E (= CF/DF)
C28	Lithares (Boeotia): Sanctuary of the Bulls	EH II	figurines	M
C29	Manika (Euboea)	EH II	metal	I = AF
C30	Manika (Euboea): Sector V, Room A&B, Area Gamma	EH IIA(-B)	obsidian	C/E (= CF/DF)
C31	Marathon (Attica): Plasi	MH	kiln	(G) K
C32	Nea Makri (Attica)	EN	stone bowls	L
C33	Porto-Boufalo (Euboea)	EH	obsidian	C/E
C34	Raphina (Attica): Trenches I-III, and 'waste pit'	EH II	metal	A
C35	Rouf (Attica)	LN/EBA?	metal	(A) K
C36	Territory of Stratos (Acarnania): Valley of the Lepenous	Prehistoric	flint	(A) K
C37	Thebes (Boeotia)	EH II/III	hoard	H
C38	Thebes (Boeotia)	MH	weaving	DF, K
C39	Thorikos (Attica): mine no. 3	EH II	lead + silver mine	Mine
C40	Thorikos (Attica): east slope Velatouri, house	MH	metal	I (= AF)

D. The PELOPONNESE

CAT NO.	SITE	DATE	WORKSHOP	ANALYSIS
D1	Alepotrypa (Laconia): cave	LN (Phase V)	hoard?	H?
D2	Asine (Argolid): many places	MH	horn, bone, antler	E (= DF)
D3	Asine (Argolid): Houses D and T	MH	stone	C/D
D4	Asine (Argolid): various	MH	obsidian	E (= DF)
D5	Ayios Stephanos (Laconia): N-G1, H	EH-MH, especially MH	obsidian	E (= DF)
D6	Corinth (Corinthia): Temple Hill	EH	metal	BF
D7	Fourni: F32 (Argolid)	mainly EH II	obsidian	CF/DF
D8	Franchthi (Argolid): Paralia, Trench L5	EN	shell beads	A
D9	Franchthi (Argolid)	MN	weaving	DF
D10	Franchthi (Argolid)	Neo	pottery	DF
D11	Franchthi (Argolid): Paralia, northern sector	FN	pottery	(E) K
D12	Kastria (Achaea): Limnon Cave, Test B	late LN I	kiln	G?
D13	Lerna (Argolid)	EH II-III	obsidian/flint	DF
D14	Lerna (Argolid): House BD-47	EH III	metal	I? (= BF)
D15	Lerna (Argolid): House A-M, 3rd and 4th floor	MH II	horn + bone	M
D16	Lerna (Argolid): House GA-CA	MH	textiles	D
D17	Lerna (Argolid): Trench BE, body 137 Ler	MH I-II	textiles	J?
D18	Lerna (Argolid): Grave DE-35, body 181 Ler	MH	metal	J?
D19	Lerna (Argolid): Squares G7-8	MH	unspecified	(A) K
D20	Lerna (Argolid): South Central Area	MH	metal	B
D21	Lerna (Argolid): South Central Area	MH	2 kilns	G?
D22	Malthi (Messenia): A41-43, A46-47	MH - end LH?	pottery and metal	C/E (date?) C/E (date?)
D23	Malthi (Messenia): Room 109	later MH?	metal	C (date?)
D24	Menelaion (Laconia): Aetos hill	MH	2 kilns	G

D25	Midea (Argolid): lower town, Trench P	MH	metal	J?
D26	Nichoria (Messenia): Area V	MH I	metal	A
D27	Perachora (Corinthia): Lake Vouliagmeni	EH II	pottery	BF + GF
D28	Sakovouni (Arkadia): east part excavated area	Neo	obsidian	DF, K
D29	Sallou (Ayioritika Mantineias, Arkadia): Alemis' Plot	EH II-MH I	metal	A
D30	Steno (Arkadia): village area	EH	metal	A
D31	Tiryns (Argolid): R 197	EH II	metal	I (= CF)
D32	Tiryns (Argolid): West corner of R185, R197	EH II	obsidian	R185 = E R197 = (D) K
D33	Tiryns (Argolid): Rooms in LXII 39/40	EH II	obsidian	E (= DF)
D34	Tiryns (Argolid): Room XVI	EH II/III	metal	I (= BF)
D35	Zygouries (Corinthia): House U	EH II	metal	I (= BF)

E. The CYCLADES

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
E1	Dhespotikon: Cheiromylos	EC I	metal	I (= M)
E2	Keos: Ayia Irini	FN	metal	I (= BF)
E3	Keos: Ayia Irini, Area J	EC II	kiln	G
E4	Keos: Ayia Irini	EC II	weaving	DF
E5	Keos: Ayia Irini, various	EC II-MC	metal	AF
E6	Keos: Ayia Irini, Area A	MC	stone	C (= BF)
E7	Keos: Ayios Simeon, below church	EC?	metal	BF (date?)
E8	Keos: Kephala, Areas D, E, G, L, cemetery	FN	metal	I (= BF)
E9	Keos: Kephala, Northern and Western area	FN	obsidian	C/E (= CF/DF)
E10	Keos: Kephala, Site 39	FN	obsidian	M
E11	Keos: Paoura	FN	obsidian	M
E12	Keos: Paoura, P45-47	FN	metal	AF
E13	Kythnos: Ayios Ioannis, Tsoulis	EC II	copper mine	Mine
E14	Kythnos: Skouries	EC II	metal	A
E15	Makronisos: Leondari, House CIX, lower floor	EC	metal	I (= BF)
E16	Melos: Demenegaki	unstratified, Meso+?	obsidian	D
E17	Melos: Phylakopi, J2	(EC II)/MC	metal	I (= AF)
E18	Melos: Phylakopi, B5, 3; B5, 18; C4; Area 1&2	EC-MC I	obsidian	C (= AF)
E19	Melos: Sta Nychia	unstratified, Meso+?	obsidian	D
E20	Naxos: Aila, Grave 23	MC?	wood/leather	J
E21	Naxos: Apollona, Grave 38	EC II	wood	J
E22	Naxos: Avdheli, the house	EC II	stone figurine	C/E
E23	Naxos: Zas Cave	FN	hoard?	H?
E24	Naxos: location unspecified	EC(-MC)	hoard	H?
E25	Naxos: 'Kythnos hoard', location unknown	EC II	hoard	H?
E26	Paros: Avyssos	EC I-II	metal	BF
E27	Paros: Naoussa, to the east	BA?	copper mine	No mine
E28	Paros: Pyrgos	EC I-II	metal	K
E29	Saliagos: outside main building, K4,N3,Q1,S4	LN-FN	obsidian	C/D
E30	Seriphos: near Kephala	EC	metal	BF

E31	Siphnos: Ayios Sostis, northern slope	EC I-II	silver + lead mine and metal	Mine + AF
E32	Syros: Chalandriani, south side	EC II?	cinnabar mine	date?
E33	Syros: Kastri, Room 11	EC II-III	metal	B
E34	Syros: Kastri, Room 20	EC II-III	metal	C (= AF)

F. CRETE

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
F1	Ayia Kyriaki: tomb	EM	metal	J
F2	Ayia Photia: cemetery	EM I-IIA	metal	J?
F3	Ayia Photia: Kouphota	MM IA/B	metal	(CF)K
F4	Ayia Photia: Kouphota, large rectangular building	MM IA/B	obsidian	D
F5	Chrysokamino: Area XA	EM III	metal + copper mine?	A (no mine)
F6	Gavdos	unspecified	metal + copper mine	date? Mine: date?
F7	Gournia	EM-MM?	metal	I (= AF) (date?)
F8	Region of Ierapetra	up to MM I-II	hoard?	H? J?
F9	Khamaizi: Area 1	MM IA	hoard	H
F10	Khania: the Plateia, House I, Room E	EM II	obsidian	D
F11	Khania: the Kastello, Trench 1	MM I-II	pottery	B
F12	Knossos: Stratum IX, area AC	EN	pigment?	I (= EF)
F13	Knossos: Ext. BD.7 and F	MN-FN	weaving	E (= DF)
F14	Knossos: South side of Royal Road, trench F	EM IIA	obsidian	C/D
F15	Knossos: North side of Royal Road	MM	stone	C (= AF)
F16	Knossos: South of site, trenches W and P	MM IB	metal	I (= AF)
F17	Knossos: below miniature frescoes chamber	MM IIA	stone	C (=AF)
F18	Knossos: Loom Weight deposit	MM II	weaving	M (= CF/DF)
F19	Kommos: AA central court	MM IB/II	dye production	M (= CF)
F20	Koumasa: tomb?	EM-MM?	metal	I/J
F21	Koumasa: Tholos B	EM-MM?	wood	J
F22	Kouphonisi	MM II	dye production	CF, K
F23	Lebena	EM-MM?	copper mine?	date?
F24	Magasa	LN	stone tool	M
F25	Mallia: Sondage K, oval room	EM II	obsidian	C/D
F26	Mallia: Quartier Mu, east terraces of Building A	MM II	pottery	I (= CF/DF)
F27	Mallia: Quartier Mu, Building A, I 9	MM II	hoard	H

F28	Mallia: Quartier Mu, Building B, IV 4	MM II	hoard	H
F29	Mallia: Quartier Mu, Building C, VI	MM II	metal	A
F30	Mallia: Quartier Mu, Building D, VII 4	MM II	hoard	H
F31	Mallia: Quartier Mu, Building E, XII 2	MM II	unspecified	M
F32	Mallia: Quartier Mu, Atelier de Sceaux	MM II	sealstone	A
F33	Mallia: Quartier Mu, Atelier de Potier	MM II	pottery + stone vases	B + A
F34	Mallia: Quartier Mu, Atelier de Fondeur	MM II	metal	B/A
F35	Mallia: Quartier Mu, Atelier Sud	MM II	stone vases + metal	B + A
F36	Mallia: Quartier Mu, sector J4/5	MM II	stone (seals?)	B
F37	Mallia: Quartier Theta, Phi	MM I-II	kiln?	G?
F38	Mallia: 'room'	MM I	stone	C/E, K (= BF)
F39	Mallia: NW angle, north of Polythyron III, 7 or 8	MM I-II or MM III	stone vases + metal	AF + AF (date?)
F40	Mallia: Room XVII 2	MM I-II?	stone vases	C (= AF) (date?)
F41	Mallia: under great straircase VI 8	MM II-III?	pottery	C/E (= CF/DF) (date?)
F42	Marathokephalon: tholos	EM I-MM I	leather	J?
F43	Mochlos: cemetery	EM IIB-III	obsidian	DF
F44	Mochlos: location unspecified	EM-MM	metal	I/J
F45	Mochlos: Tomb I and elsewhere	MM/LM	stone vase	J? + I (= BF)
F46	Mokhos: location unspecified	EM II/MM I-II	hoard?	H/I
F47	Myrtos Fournou Korifi: Area 8, Rooms 10-12	EM IIA	dyeing	B
F48	Myrtos Fournou Korifi: Room 58	EM IIA	weaving	(C)/D
F49	Myrtos Fournou Korifi: cell 48, Room 49	EM IIA	pottery	49 = M, Area = CF/DF
F50	Myrtos Fournou Korifi: 130 m. to the NW	EM IIA	metal	C
F51	Palaikastro	MM II	dye production	M (= CF)
F52	Palaikastro	MM/LM	kiln	G (date?)
F53	Palaikastro: Block Xi and elsewhere	EM/MM?	metal	I (= AF) (date?)

F54	Patrikies: south boundary area	MM IA	pottery	M (= CF)
F55	Peleketon Cave	Neo	bone tools	(D) K
F56	Petras: on major hill	EM II	unspecified	(C/E) K
F57	Phaistos: Rooms LI, LIII, LIV, LV	MM	stone + bone	C + C
F58	Phaistos: near Rooms LIII-LV?	MM?	metal	I (= BF)
F59	Phaistos: Unit B	MM IB-II	weaving	E (= DF)
F60	Phourni (Archanes): west of Buildings 18 and 19	EM	obsidian	E (= DF)
F61	Platanos: grave	EM-MM	weaving	J?
F62	Platanos	EM I-MM II	metal	L
F63	Platanos: tombs	EM-MM	stone vases	J
F64	Poros Katsambas: towards Kairatos banks	EM I-IIA, MM IA	obsidian	DF
F65	Poros Katsambas: Trypeti hill area	EM I, IIA, MMIA	obsidian	C/D
F66	Poros Katsambas: Skatzourakis plot	MM IIB	metal	B
F67	Pyrgos III: North side of hill, cistern, and elsewhere	late MM II/ MM III	metal	I (= BF)
F68	(Rethymnon) Hamalevri: Bolanis	MM IA	obsidian	M
F69	(Rethymnon) Hamalevri	MM	weaving + dyeing	E (= DF)
F70	Samba	EM II-MM II/ (LBA?)	hoard?	H? (date?)
F71	Selakanos	EM II-MM II	hoard?	H?
F72	Selino	unspecified	metal + copper mine	date? Mine - date?
F73	Silamos	MM I-II/LM	kiln	G (date?)
F74	Vasiliki: 'Big House'	EM IIB	metal	I (= BF)
F75	Vasiliki: SW rooms and House X	EM IIB+	weaving	E (= DF)
F76	Zakro: Harbour Road, area of Space Phi	MM I-II	metal	A
F77	Zakro: Harbour Road, area of Space Phi	MM I-II	stone	AF
F78	Zakro: Room H	MM I-II/ MM IIIB	textile	M (date?)

APPENDIX B

SUMMARY OF WORKSHOPS AND INFERRED AND ALLEGED WORKSHOPS

A. MACEDONIA

Workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
A1	Ayios Mamas: Pit D	EBA	kiln	G
A5	Dikili Tash: X30	MN	kiln	G
A6	Dikili Tash: Building 4	LN	3 kilns	A + G
A14	Olynthus: southeastern area	LN?	kiln, pottery	G + C/E

Inferred or alleged workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
A7	Dikili Tash: principal sector	EBA/MBA	metal	I (= AF)
A12	Mandalo	FN	metal	BF, K
A16	Polichrono: outer limit of settlement	EB II-III	kiln	(G) K
A17	Saratse	EBA-MBA	metal	I (= AF)
A18	Sitagroi: Bin Complex	Period II-Vb (LN - EB II)	metal	B (= AF)
A23	Vardaroftsa	EBA+	metal	I (= BF)

B. THESSALY

Workshops

CAT. NO	SITE	DATE	WORKSHOP	ANALYSIS
B7	Dimini: in 3rd and 4th wall, northwest side	LN	kiln	G
B17	Sesklo: 'Potter's workshop', House 11-12	MN	pottery	A

Inferred or alleged workshops

CAT. NO	SITE	DATE	WORKSHOP	ANALYSIS
B15	Pefkakia Magoula: House 316B, Space W	MBA	metal	I (= BF)
B21	Sesklo	MBA (late?)	metal	I (= BF)
B23	Volos Kastro	EBA	metal and copper mine?	AF; mine - date? K, F

C. CENTRAL GREECE

Workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
C10	Eretria (Euboea): Vouratsas Plot	EH?	kiln	G, date?
C16	Kirrha (Phocis): House 2 and Plot B	MH	3 kilns	G
C34	Raphina (Attica): Trenches I-III, and 'waste pit'	EH II	metal	A

Inferred or alleged workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
C2	Askitario (Attica): House E	EH II	metal	I (= BF)
C9	Ayios Nikolaos (Euboea)	MH	metal	(A) K, F
C22	Koropi (Attica): North edge of town	EH II-III	metal	(A) K
C23	Laurion (Attica): village	EH II	metal	(A) K, F
C25	Lepoura Magoula (Euboea)	EH?/(Myc?)	metal	I (= AF) (date?)
C29	Manika (Euboea)	EH II	metal	I = AF
C31	Marathon (Attica): Plasi	MH	kiln	(G) K
C35	Rouf (Attica)	LN/EBA?	metal	(A) K
C36	Territory of Stratos (Acarnania): Valley of the Lepenous	Prehistoric	flint	(A) K
C40	Thorikos (Attica): east slope Velatouri, house	MH	lead	I (= AF)

D. The PELOPONNESE

Workshops

CAT NO.	SITE	DATE	WORKSHOP	ANALYSIS
D8	Franchthi (Argolid): Paralia, Trench L5	EN	shell beads	A
D20	Lerna (Argolid): South Central Area	MH	metal	B
D24	Menelaion (Laconia): Aetos hill	MH	2 kilns	G
D26	Nichoria (Messenia): Area V	MH I	metal	A
D29	Sallou (Ayioritika Mantineias, Arkadia): Alemis' Plot	EH II-MH I	metal	A
D30	Steno (Arkadia): village area	EH	metal	A

Inferred or alleged workshops

CAT NO.	SITE	DATE	WORKSHOP	ANALYSIS
D6	Corinth (Corinthia): Temple Hill	EH	metal	BF
D14	Lerna (Argolid): House BD-47	EH III	metal	I? (= BF)
D19	Lerna (Argolid): Squares G7 & G8	MH	unspecified	(A) K
D27	Perachora (Corinthia): Lake Vouliagmeni	EH II	pottery	BF + GF
D34	Tiryns (Argolid): Room XVI	EH II/III	metal	I (= BF)
D35	Zygouries (Corinthia): House U	EH II	metal	I (= BF)

E. The CYCLADES

Workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
E3	Keos: Ayia Irini, Area J	EC II	kiln	G
E14	Kythnos: Skouries	EC II	metal	A
E33	Syros: Kastri, Room 11	EC II-III	metal	B

Inferred or alleged workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
E2	Keos: Ayia Irini	FN	metal	I (= BF)
E5	Keos: Ayia Irini, various	EC II-MC	metal	AF
E6	Keos: Ayia Irini, Area A	MC	stone	C (= BF)
E7	Keos: Ayios Simeon, below church	EC?	metal	BF (date?)
E8	Keos: Kephala, Areas D, E, G, L, cemetery	FN	metal	I (= BF)
E12	Keos: Paoura, P45-47	FN	metal	AF
E15	Makronisos: Leondari, House CIX, lower floor	EC	metal	I (= BF)
E17	Melos: Phylakopi, J2	EC II/MC	metal	I (= AF)
E18	Melos: Phylakopi, B5-3, B5-18, C4, Area 1&2	EC-MC I	obsidian	C (= AF)
E26	Paros: Avyssos	EC I-II	metal	BF
E30	Seriphos: near Kephala	EC	metal	BF
E31	Siphnos: Ayios Sostis, northern slope	EC I-II	silver + lead mine and metal	Mine + AF
E34	Syros: Kastri, Room 20	EC II-III	metal	C (= AF)

F. CRETE

Workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
F5	Chrysokamino: Area XA	EM III	metal + copper mine?	A (no mine)
F11	Khania: the Kastello, Trench 1	MM I-II	pottery	B
F29	Mallia: Quartier Mu, Building C, VI	MM II	metal	A
F32	Mallia: Quartier Mu, Atelier de Sceaux	MM II	sealstone	A
F33	Mallia: Quartier Mu, Atelier de Potier	MM II	pottery + stone vases	B + A
F34	Mallia: Quartier Mu, Atelier de Fondeur	MM II	metal	B/A
F35	Mallia: Quartier Mu, Atelier Sud	MM II	stone vases + metal	B + A
F36	Mallia: Quartier Mu, sector J4/5	MM II	stone (seals?)	B
F47	Myrtos Fournou Korifi: Area 8, Rooms 10-12	EM IIA	dyeing	B
F66	Poros Katsambas: Skatzourakis plot	MM IIB	metal	B
F73	Silamos	MM I-II/LM	kiln	G (date?)
F76	Zakro: Harbour Road, area of Space Phi	MM I-II	metal	A

Inferred or alleged workshops

CAT. NO.	SITE	DATE	WORKSHOP	ANALYSIS
F7	Gournia	EM-MM?	metal	I (= AF) (date?)
F15	Knossos: North side of Royal Road	MM	stone	C (= AF)
F16	Knossos: South of site, trenches W and P	MM IB	metal	I (= AF)
F17	Knossos: below miniature frescoes chamber	MM IIA	stone	C (=AF)
F38	Mallia: 'room'	MM I	stone	C/E, K (= BF)
F39	Mallia: NW angle, north of Polythyron III, 7	MM I-II or MM III	stone vases + metal	AF + AF (date?)
F40	Mallia: Room XVII 2	MM I-II?	stone vases	C (= AF) (date?)
F45	Mochlos: Tomb I and elsewhere	MM/LM	stone vase	J? + I (= BF)
F53	Palaikastro: Block Xi and elsewhere	EM/MM?	metal	I (= AF) (date?)
F58	Phaistos: near Rooms LIII-LV?	MM?	metal	I (= BF)
F67	Pyrgos III: North side of hill, cistern, and elsewhere	late MM II/ MM III	metal	I (= BF)
F74	Vasiliki: 'Big House'	EM IIB	metal	I (= BF)
F77	Zakro: Harbour Road, area of Space Phi	MM I-II	stone	AF

APPENDIX C

STATISTICS FOR ACTUAL WORKING AREAS IN ALL REGIONS

OBSIDIAN/FLINT BLADES

PERIOD	A/B	D	C/E
EN-MN			2
LN-FN		1	1
NEO		2	
Total Neolithic		**3**	**3**
EB I			
EB II		5	6
EB III			
EBA		3	3
Total EBA		**8**	**9**
MB I		2	1
MB II			
MBA		2	2
Total MBA		**4**	**3**

STONE

PERIOD	A/B	D	C/E
EN-MN			
LN-FN			
NEO			
Total Neolithic			
EB I			
EB II			1
EB III			
EBA			
Total EBA			**1**
MB I			1
MB II	4		1
MBA		1	4
Total MBA	**4**	**1**	**6**

METAL

PERIOD	A/B	D	C/E
EN-MN			
LN-FN	1		
NEO			
Total Neolithic	**1**		
EB I			
EB II	2		1
EB III	1		
EBA	4		2
Total EBA	**7**		**3**
MB I	2		
MB II	4		
MBA	2		2
Total MBA	**8**		**2**

POTTERY

PERIOD	A/B/G	D	C/E/G?
EN-MN	2		4
LN-FN	4		4
NEO			
Total Neolithic	**6**		**8**
EB I			
EB II	1		1
EB III			2
EBA	3		2
Total EBA	**4**		**5**
MB I			
MB II	1		0
MBA	4		4
Total MBA	**5**		**4**

SHELL, MOTHER OF PEARL

PERIOD	A/B	D	C/E
EN-MN LN-FN NEO	1		2
Total Neolithic	**1**		**2**
EB I EB II EB III EBA			
Total EBA			
MB I MB II MBA			
Total MBA			

BONE, HORN, ANTLER, TUSK, IVORY

PERIOD	A/B	D	C/E
EN-MN LN-FN NEO		1	
Total Neolithic		**1**	
EB I EB II EB III EBA			
Total EBA			
MB I MB II MBA			3
Total MBA			**3**

TEXTILES

PERIOD	A/B	D	C/E
EN-MN			
LN-FN		1	1
NEO			
Total Neolithic		**1**	**1**
EB I			
EB II	1	2	1
EB III			
EBA			1
Total EBA	**1**	**2**	**2**
MB I			
MB II			
MBA		1	3
Total MBA		**1**	**3**

ALL CRAFTS

PERIOD	A/B/G	D	C/E/G?	Total Working Areas
EN-MN	3	0	6	9
LN-FN	5	2	8	16
NEO	0	3	0	3
Total Neolithic	**8**	**5**	**14**	**28**
EB I	0	0	0	0
EB II	4	7	10	21
EB III	1	0	2	3
EBA	7	3	8	18
Total EBA	**12**	**10**	**20**	**42**
MB I	2	2	2	6
MB II	9	0	1	10
MBA	6	4	18	28
Total MBA	**17**	**6**	**21**	**44**

APPENDIX D

STATISTICS FOR TOTAL (ACTUAL AND INFERRED) WORKING AREAS IN ALL REGIONS

OBSIDIAN/FLINT BLADES

PERIOD	A/B	D	C/E
EN-MN		3	
LN-FN		2	0
NEO		3	
Total Neolithic		**8**	**0**
EB I			
EB II		11	1
EB III			
EBA	1	7	1
Total EBA	**1**	**18**	**2**
MB I	1	3	
MB II			
MBA		4	
Total MBA	**1**	**7**	

STONE

PERIOD	A/B	D	C/E
EN-MN			
LN-FN		1	
NEO			
Total Neolithic		**1**	
EB I			
EB II			1
EB III			
EBA			
Total EBA			**1**
MB I	1		
MB II	5		
MBA	6	1	1
Total MBA	**12**	**1**	**1**

METAL

PERIOD	A/B	D	C/E
EN-MN			1
LN-FN	5		0
NEO			
Total Neolithic	**5**		**1**
EB I			
EB II	7		2
EB III	2		
EBA	18		1
Total EBA	**27**		**3**
MB I	3		1
MB II	5		
MBA	10		2
Total MBA	**18**		**3**

POTTERY

PERIOD	A/B/G	D	C/E/G?
EN-MN	2		4
LN-FN	4		4
NEO		1	
Total Neolithic	**6**	**1**	**8**
EB I			
EB II	3	1	1
EB III			2
EBA	3		2
Total EBA	**6**	**1**	**5**
MB I			1
MB II	1	1	0
MBA	5	1	4
Total MBA	**6**	**2**	**5**

SHELL

PERIOD	A/B	D	C/E
EN-MN	1		
LN-FN		3	
NEO		2	
Total Neolithic	**1**	**5**	
EB I			
EB II			
EB III			
EBA			
Total EBA			
MB I			
MB II			
MBA			
Total MBA			

BONE, HORN, ANTLER, TUSK, IVORY

PERIOD	A/B	D	C/E
EN-MN			
LN-FN			
NEO		1	
Total Neolithic		**1**	
EB I			
EB II			
EB III			
EBA			
Total EBA			
MB I			
MB II			
MBA		1	2
Total MBA		**1**	**2**

TEXTILES

PERIOD	A/B	D	C/E
EN-MN		1	
LN-FN		3	
NEO			
Total Neolithic		**4**	
EB I			
EB II	1	3	
EB III		1	
EBA			1
Total EBA	**1**	**4**	**1**
MB I			
MB II		1	1
MBA		6	3
Total MBA		**7**	**4**

ALL CRAFTS

PERIOD	A/B/G	D	C/E/G?	Total Working Areas
EN-MN	3	4	5	12
LN-FN	9	9	4	22
NEO	0	7	0	7
Total Neolithic	**12**	**20**	**9**	**41**
EB I	0	0	0	0
EB II	11	15	5	31
EB III	2	1	2	5
EBA	22	7	5	34
Total EBA	**35**	**23**	**12**	**70**
MB I	5	3	2	10
MB II	11	2	1	14
MBA	21	13	12	46
Total MBA	**37**	**18**	**15**	**70**

APPENDIX E

NUMBERS OF WORKING AREAS OF THE CRAFTS BY REGION

Macedonia and Thessaly

Actual Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			1	6			
D							1
C/E/G?	2			6	2		

Actual EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G				2			
D							
C/E/G?				3			

Actual MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G							
D							
C/E/G?							1

Possible Total Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			2	6			
D	3	1			5		2
C/E			1	6			

Possible Total EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			4	2			
D							
C/E				3			

Possible Total MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			3				
D							1
C/E							

Central Greece and the Peloponnese

Actual Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G					1		
D							
C/E/G?				2			

Actual EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			4	1			
D	2						1
C/E/G?	7		1	2			1

Actual MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			3	4			
D		1					1
C/E/G?	2		2	2		2	

Possible Total Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G					1		
D	1			1			1
C/E				2			

Possible Total EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			12	3			
D	10						1
C/E	1		2	1			1

Possible Total MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			5	4			
D	2	1				2	3
C/E			2	2			

Cyclades

Actual Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G							
D	3						
C/E/G?	1						

Actual EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			2	1			
D	2	1					
C/E/G?	1						

Actual MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G							
D	2						
C/E/G?	1	1					

Possible Total Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			3				
D	4						
C/E							

Possible Total EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G	1		9	1			
D	2	1					1
C/E							

Possible Total MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G	1	1	1				
D	2						
C/E							

Crete

Actual Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G							
D						1	
C/E/G?							1

Actual EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			1				1
D	4						1
C/E/G?	1		1				1

Actual MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G		4	4	2			
D	2						
C/E/G?		5		3		1	2

Possible Total Neolithic

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G							
D						1	1
C/E							

Possible Total EBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G			2				1
D	7			1			2
C/E			1				

Possible Total MBA

Working area	Obsidian	Stone	Metal	Pottery	Shell	Bone	Textiles
A/B/G		11	9	2			
D	3			1			3
C/E		1	1	4		1	3

APPENDIX F

DIMENSIONS OF WORKSHOPS

Class	Dimensions (m.)	Workshop	Date	No.
A	3.85 (diameter)	Metal	EC II	E14
B	c. 2 or 3 (diameter)	Metal	EC II-III	E33
A	2.6 by 3.5	Metal	EM III	F5
A	3 by 3	Sealstones	MM II	F32
A	2.9 by 3.4	Stone vases	MM II	F33
B	2.9 by 3.4	Pottery	MM II	F33
B/A	1.6 by 4.4	Metal	MM II	F34
A	0.7-1.5 by 6.7	Metal	MM II	F35
B	0.7-1.5 by 6.7	Stone vases	MM II	F35
C/D[1]	1.32-2.54 by 4.4+	Obsidian	EM IIA	F14
C/D	3-4 by 3-4	Obsidian	EM II	F25
D[2]	c. 2.45-2.75 by 4.45-4.6	Obsidian	EH II	C5
D[3]	c. 2 by 2	Obsidian	EM II	F10
C (= AF)	c. 1.5 by 1.5	Metal	EC II-III	E34
C (= AF)	100-150 by 100-150	Obsidian	EC - MC I	E18
C (= AF)	1.15-1.35 by 3.55	Stone vases	MM I-II?	F40
C	2.8 by 5	Metal	MH	D23
M (= CF/DF)[4]	1.08 by 2.08	Pottery	EM IIA	F49
M (= CF/DF)[5]	c. 4.3 by 5.8	Weaving	MM II	F18
AF + AF	c. 5 by 10	Stone vases and metal	MM I-III	F39

[1] Warren called it A (1972: 393); Broodbank (1992: 64) referred to it as A and D; Torrence called it E/M (dump) (1986: 153), and Evely agrees (1993: 132).

[2] Mylonas indirectly calls this A (1959: 31).

[3] Platon (1988: 304) lists this as A; Tzedakis and Hallager (1983: 7) call it C.

[4] Both Warren and Branigan term this a "potter's workshop" (Warren 1972: 18; Branigan 1988a: 48).

[5] L. Platon (1988: 363-4) called this a textiles workshop (A).

APPENDIX G

MINES

Cat. No.	Site	Material	Date	Dubious?	Primary Source
B23	Near Gatzea, east of Volos Kastro (Thessaly)	copper	EH	yes	Davies (1929)
C15	Kirrha (Phocis)	tin	EH-MH	yes	Davies (1929)
C39	Thorikos, mine 3 (Attica)	lead/silver +copper?	EH II	no	Spitaels (1984)
E13	Ayios Ioannis (Kythnos)	copper	EC II	no	Hadjianastasiou & MacGillivray (1988)
in E14 and E30	Kondouro (Seriphos)	copper	EC?	yes	Gale and Stos-Gale (1981)
E27	Naoussa (Paros)	copper	BA?	yes	Davies (1935)
E31	Ayios Sostis (Siphnos)	lead/silver	EC I-II	no	Wagner et al. (1980)
E32	Chalandriani (Syros)	cinnabar	EC II?	yes	Davies (1935)
in E34	Komito (Syros)	lead/silver	EC?	yes	Gale and Stos-Gale (1981)
in E34	Rozos (Syros)	lead/silver	EC II?	yes	Gale and Stos-Gale (1981)
F5	Chrysokamino (Crete)	copper	EM+?	yes	Mosso (1910)
F6	Gavdos (off Crete)	copper	EM-MM?	yes	Mosso (1910)
F23	Lebena (Crete)	copper	EM?	yes	Faure (1966); Branigan (1974)
F72	Selino (Crete)	copper	?	yes	Forbes (1950)

Mines classified as dubious are most unlikely to have been used as mines in the periods considered here.

APPENDIX H

KILNS

Cat. No.	Place	Date	Dubious?	Primary Source
A1	Ayios Mamas (Chalcidice)	EBA	no	Heurtley (1939)
A5	Dikili Tash (Macedonia)	MN	no	Treuil (1992)
A6	Dikili Tash (Macedonia) (3)	LN	no	Koukouli-Chrysanthaki, cited in *AR* 42 (1995-1996) 29.
A13	Nea Nikomedeia (Macedonia) (2)	EN/MN	probably ovens	Demoule & Perlès (1993)
A14	Olynthus (Macedonia)	LN?	no	Mylonas (1929); Heurtley (1939)
A16	Polichrono (Macedonia)	EB II	alleged kiln	Andreou et al. (1996: 583)
A20	Sitagroi (Macedonia)	EB II (Phase Va)	probably oven	Renfrew (1972; 1986)
A22	Toumba Nea Anchialos (Macedonia)	EBA	possible, alleged kiln	Andreou et al. (1996: 581)
B7	Dimini (Thessaly)	LN	no	Hourmouziades (1977)
B20	Sesklo (Thessaly)	EBA?	oven?	Cook (1961)
C10	Eretria (Euboea)	EH?	doubts over date	*AR* 28 (1981-1982) 18; Davis (1992: 719)
C16	Kirra (Phocis) (3)	MH	no	Chatzimichail-Skorda (1989: 205-7)
C20	Kolonna V (Aigina)	EH III	yes: probably oven	Rutter (1993b)
C21	Kolonna (Aigina)	EH III-MH	'perhaps'	Felten and Hiller, cited in *AR* 40 (1993-1994) 13
C31	Marathon (Attica)	MH	alleged kiln	Marinatos (1970a; 1970b; 1970c)
D12	Kastria (Achaea)	LN I	yes	Sampson (1992: 690-1)
D21	Lerna (Argolid) (2)	MH	ovens?	Caskey (1956)
D24	Menelaion (Laconia) (2)	MH	no	Catling, in *AR* 27 (1980-1981) 16-17
E3	Ayia Irini (Keos)	EC II	no	Caskey (1971)
F37	Mallia, Quartier Θ (Crete)	MM I-II	perhaps	H. & M. van Effenterre (1976)
F52	Palaikastro (Crete)	MM/LM	doubts over date	MacGillivray (1987); Davaras (1980)
F73	Silamos (Crete)	MM I-II/LM	doubts over date	MacGillivray (1987: 276)

APPENDIX I

CRAFTSMAN'S GRAVES

Cat. no.	Site	Craft	Date	Primary Source
D17	Lerna	weaving	MH	Angel (1971)
D18	?Lerna	metal	MH	Angel (1971)
D25	?Midea	copper	MH	Åström (1983)
E20	Aila	wood/leather	MBA?	Renfrew (1972)
E21	Apollona	wood	EC II	Renfrew (1972)
F1	Ayia Kyriaki	metal	EM	Branigan (1974; 1995); Blackman & Branigan (1982)
F2	?Ayia Photia	metal	EM I-IIa	Branigan (1988a: 239)
F8	?Region of Ierapetra	wood?	(?pre-) MM I-II	Mosso (1910); Branigan (1969)
F20	?Koumasa	metal	EM-MM?	Branigan (1974: 202)
F21	Koumasa	wood	EM-MM	Xanthoudides (1971); Branigan (1995: 37)
F42	Marathokephalon	leather	EM I-MMI	Branigan (1968a: 91; 1995: 37)
F44	?Mochlos	metal	EM-MM	Branigan (1968a: 91; 1974: 198)
F45	?Mochlos: Tomb I	stone vase	MM/LM	Seager (1912: 20); Branigan (1991: 99ff.)
F61	?Platanos	weaving	EM-MM	Branigan (1995)
F63	?Platanos	stone vase	EM-MM	Xanthoudides (1971); Branigan (1995: 37)

? indicates a doubtful indication of a craftsman.

APPENDIX J

CRAFTSMEN'S HOUSES

Cat. No.	Site	Date	Dubious?	Source
B17	Sesklo, House 11-12 (Thessaly)	MN	Yes	Tsountas 1908
C14	Eutresis, House E (Boeotia)	MH level II	Yes	Goldman 1931
C18	Kolonna III, Dyer's House (Aegina)	EH II-III	Yes	Walter 1983
F24	Magasa (Crete)	LN	Perhaps	Sakellarakis 1973
F32	Mallia, Atelier de Sceaux (Crete)	MM II	No	Poursat 1996
F33	Mallia, Atelier de Potier (Crete)	MM II	No	Poursat 1996
F34	Mallia, Atelier de Fondeur (Crete)	MM II	No	Poursat 1996
F35	Mallia, Atelier Sud (Crete)	MM II	No	Poursat 1996

APPENDIX K

HOARDS

Cat. No.	Site	Date	Analysis
A15	Petralona	EB II	H
B18	Sesklo	LN	H?
B22	Tsangli: House P and T	MN	D/H
C12	Eutresis (Boeotia): Pit V	EH II	H
C37	Thebes (Boeotia)	EH II/III	H
D1	Alepotrypa (Laconia): cave	LN (Phase V)	H?
E23	Naxos: Zas Cave	FN	H?
E24	Naxos: location unspecified	EC(-MC)	H?
E25	Naxos: 'Kythnos hoard', location unknown	EC II	H?
F8	region of Ierapetra	up to MM I-II	H? J?
F9	Khamaizi: Area 1	MM IA	H
F27	Mallia: Quartier Mu, Building A, I 9	MM II	H
F28	Mallia: Quartier Mu, Building B, IV 4	MM II	H
F30	Mallia: Quartier Mu, Building D, VII 4	MM II	H
F46	Mokhos: location unspecified	EM II/MM I-II	H/I
F70	Samba	EM II-MM II/ (LBA?)	H? (date?)
F71	Selakanos	EM II-MM II	H?

APPENDIX L

WORKSHOP ASSESSMENT CONFIDENCE CRITERIA

Categories of working area	Score Detail
WORKSHOP	
Confidence Level Score = 12 and above	
Specialised permanent production installation	12
Unfinished goods + raw material	8 + 4 = 12
Unfinished goods + production debris	8 + 4 = 12
Unfinished goods + tools	8 + 4 = 12
Raw material + production debris + tools	4 + 4 + 4 = 12
The inclusion of additional factors would provide a higher Confidence Level.	
PROBABLE WORKSHOP	
Confidence Level Score: Max = 11 Min = 8	
Higher Probability Combination:	
Unfinished goods + indicators 6,7,8	8 + 1 + 1 + 1 = 11
Raw material + production debris + indicators 6,7,8	4 + 4 + 1 + 1 + 1 = 11
Raw material + tools + indicators 6,7,8	4 + 4 + 1 + 1 + 1 = 11
Production debris + tools + indicators 6,7,8	4 + 4 + 1 + 1 + 1 = 11
Lower Probability Combination:	
Unifinished goods	8
Raw material + production debris	4 + 4 = 8
Raw material + tools	4 + 4 = 8
Tools + production debris	4 + 4 = 8
POSSIBLE WORKSHOP	
Confidence Level Score = 7 and below	
Raw material + indicators 6,7,8	4 + 1 + 1 + 1 = 7
Production debris + indicators 6,7,8	4 + 1 + 1 + 1 = 7
Tools + indicators 6,7,8	4 + 1 + 1 + 1 = 7

NOTE
Indicator 6 = Finished goods
Indicator 7 = Non-specialised permanent equipment
Indicator 8 = Associated store-rooms

Table to show how the Workshop Confidence Level Values and Indicator Score weights have been reached.