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The Neolithic Labyrinth: Social Change at Knossos before the Bronze Age

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Abstract

Neolithic Crete has long been portrayed as a slow-moving backwater. Analysis of data from the large tell site at Knossos challenges this view by demonstrating that the Neolithic settlement underwent a period of rapid growth and sudden cultural change during the earlier fifth millennium. These phenomena are most convincingly interpreted as indications of an internal transformation in Knossos's social structure, and they suggest the emergence of a Neolithic community of some complexity. The methods and conclusions of this study may have implications for approaches to later social change in Bronze Age Crete.

Introduction

When Sir Arthur Evans divided early Cretan prehistory between a New Stone Age and an Early Minoan (EM) precursor of the later palaces, he laid down a distinction that still colours the way we think about the island's Neolithic. In contrast to the intrinsic dynamism attributed to the EM period, the prevailing image of the Neolithic remains one of simple, conservative communities, where change took the form of a creeping gradualism. Yet such behavioural placidity over a period comprising almost half Crete's total history of human occupation seems questionable, especially in view of the radical restructuring now evident within other Neolithic societies (e.g. Hodder 1990), as well as the recent recognition of social complexity among

many quite modestly sized groups (Kramer 1981; Price 1981; Price and Brown 1985; Williams 1987). My aim here is to show that archaeological data from Neolithic Knossos (Fig. 1) can in fact tell a very different story from that imposed by our received nomenclature and its attendant preconceptions.

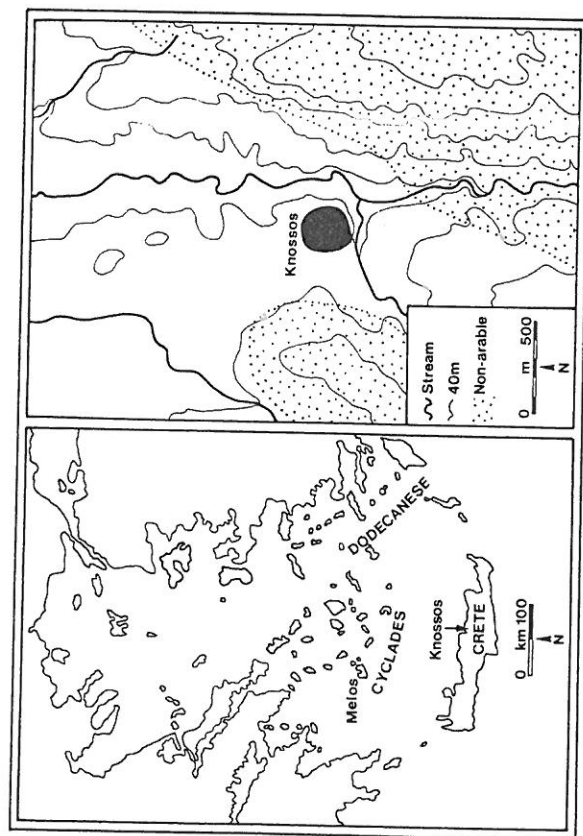


Figure 1: *The Neolithic site of Knossos (limits of arable land after Jarman et al. 1982: 147, fig. 53).*

This analysis concentrates on Knossos for several reasons. The settlement on the Neolithic tell beneath the Minoan palace was certainly an exceptional place. Eventually covering some five hectares and occupied for around 4000 years, Knossos is easily the largest, earliest and longest-lived Neolithic site known on the island, standing entirely distinct from the small hamlets and caves that comprise the remainder of our settlement evidence (Cherry *et al.* 1992; Sakellarakis 1973; Vagnetti and Belli 1978; Zois 1973), and which survey suggests proliferated across the island only during the later Neolithic (Moody 1987; Watrous 1982). By the same criteria, Knossos is indeed one of the outstanding sites in the entire southern Aegean. Moreover, excavation

of the deep, stratified Neolithic levels by Professor John Evans (to whom all future mention of *Evans* refers) provides a rare opportunity for quantitative analysis of changes in site size and material culture (Evans 1964; 1968; 1971; 1973). Lastly, while Evans, who reflects the orthodox view of the period, states that later Neolithic Knossos was only 'about to become transformed into the more highly organised society of the Minoan Bronze Age' (Evans 1971: 114; emphasis added), the seed of an alternative interpretation has already been sown. Both Whitelaw (1983: 340) and Bintliff (1984: 37) have hinted—albeit tantalizingly briefly—that at Knossos some social transformation should in fact belong back in the Neolithic.

This study expands upon Whitelaw's and Bintliff's theme, and examines if, when, and how society at Neolithic Knossos may have changed. Until our knowledge of Neolithic settlement and society throughout Crete is improved, and until we can assess whether Knossos was indeed unique, we can only advance tentative hypotheses as to *why* Knossos expanded, rather than fissioning into small communities of the type common in the early Aegean. Neolithic Crete's external relations are discussed in more detail below, but it will suffice here to stress that during this period a central role for Knossos within the wider Aegean region seems most implausible. Localized and particularist explanations for Knossos's anomalous expansion are in contrast more appropriate, more promising and more intriguing. The site's position on well-watered prime arable land must surely be a contributory factor (Jarman *et al.* 1982: 147; Roberts 1979), but Crete's island status, Knossos's early occupation, and the apparent scarcity of other Cretan sites before the later Neolithic (Cherry 1990: 161) may also prove relevant. If indeed the early concentration of island population that we see is real, and if Knossos did in fact grow in an otherwise sparsely inhabited landscape, this unusual centripetal tendency may be a cultural idiosyncrasy engendered during long years of relative isolation in a favourable niche. The potential of such a model can only be clarified, however, by future research along lines that the current analysis hopes to encourage.

Population and Social Change

Whitelaw's and Bintliff's observations were prompted by their estimates of the number of people living at Neolithic Knossos. Recent criticisms of demographic explanations of social change have argued, with good reason,

that population increase is not a convincing prime mover (e.g. Shanks and Tilley 1987: 140, 145-46). Equally, we do not get very far by correlating levels of population with idealized evolutionary categories of social organization such as band, tribe or chiefdom. Nevertheless, it remains true that population increase is a characteristic component of social change. As long as we remember that we are dealing with probabilities not proofs, a demographic approach provides instructive perspectives on likely concomitant social change at Knossos.

Evans (1971: 116) suggested a population of 1,000-2,000 for Knossos during the later Neolithic, and Whitelaw's figure for the EM settlement, based on a similar site size, lies within the same range (Whitelaw 1983: 339). As Whitelaw and Bintliff point out, cross-cultural evidence suggests that among farming communities of more than a few hundred individuals—threshold levels vary, but a range of about 150-400 is typical (Carneiro 1967; Forge 1972; Johnson 1982)—face-to-face social relations are liable to have been replaced through consensus or conflict by more complex social structures, commonly featuring an increased number of social roles, more asymmetrical power relations, and/or some form of hierarchical organization. Craft specialization may also be encouraged by population growth, as increased demand encourages a shift away from sporadic domestic production (e.g. Arnold 1985: 157). From this point of view, if the above population levels for Knossos are anywhere near correct, considerable social complexity is quite probable by the end of the Neolithic. But how reliable are these levels, how far back in time might such observations apply, and when is any change most liable to have taken place?

Soundings across the tell allowed Evans to estimate the increasing size of Knossos at the end of the Aceramic Neolithic (AcN), Early Neolithic I (EN I), Early Neolithic II (EN II) and Late Neolithic (LN) periods; he suggests in addition an intermediate Middle Neolithic (MN) figure, and demonstrates gradual expansion within the immense span of EN I (Evans 1971). Final Neolithic (FN) levels at Knossos have been heavily damaged by later building (Evans 1971: 113-14; Vagnetti and Belli 1978: 131-32), but their absence from the Royal Road excavations (Hood and Smyth 1981: 6; Warren 1972: 392) argues that the settlement was certainly no larger than its LN predecessor, and it may conceivably have been smaller—a subject to which we shall later return. It should be emphasized that although Evans's figures are naturally approximate, the location of soundings allows for only relatively minor inaccuracies.¹ Moreover, although circumscribed areas may

have temporarily fallen out of use and a few outlying deposits are probably perimeter middens (Evans 1971: 106, 116), there is no evidence to suggest that these overall zones were generated by a far smaller community that drifted across the site. Sterile layers and lacunae are infrequent and localized, and there is a good correlation between the duration of individual periods and the vertical build-up of deposits. Allowing for the probability of some diachronic variability in the density of occupation (Fletcher 1981), it is therefore reasonable to estimate population from settlement area and, from expansion of the latter, to generate a series of images of community growth.

Detailed calculation of population from residence groups is impossible due to the limited excavation area and frustratingly clean floors. Instead, we must use a more general population density range appropriate to the period and the site. The few lateral exposures at Knossos reveal houses that are closely packed by the standards of the Aegean Neolithic (Evans 1971: pl. 7; Sinos 1971). In view of this, Renfrew's proposed density of 200 persons/ha for Neolithic Aegean settlements (Renfrew 1972: 251), though well above average for traditional Near Eastern villages of comparable size, appearance and economy (Hassan 1981; Kramer 1980; Watson 1978), forms a reasonable upper limit for Knossos. A lower limit of 100 persons/ha takes into account the possibility of more modest levels, variation in density, and short-term localized abandonments of areas within the site. Table 1 shows Evans's size estimates and populations derived using a density range of 100-200 persons/ha. The maximum population generated for the Neolithic is low compared with earlier studies, but even these figures indicate a surprising conclusion: the probable population of Knossos lay well within cross-cultural demographic thresholds for social restructuring as early as EN II.

Archaeological Period	Settlement Area (ha)	Population Range
Aceramic Neolithic	0.25	25-50
Early Neolithic I	2.00	200-400
Early Neolithic II	3.00	300-600
Middle Neolithic*	[4.00]	[400-800]
Late Neolithic	5.00	500-1000

* The figures for MN are very approximate.

Table 1: Estimates of settlement area and population range for the major archaeological periods preserved at Neolithic Knossos.

A similar period of stress might be inferred from the limited area of optimal land immediately accessible from the settlement. For the high-quality *rendzina* soils of the Knossos valley, we may use Halstead's estimated Neolithic cereal and pulse yield of 800–1000 kg/ha (Halstead 1981: 318). Allowing c. 220 kg/person to fulfil annual caloric requirements and plant next year's crop (Clark and Haswell 1970), and a biennial fallow (given the long-term cultivation of the catchment), about half a hectare of arable would be needed to support each inhabitant of Knossos for one year. This suggests that an EN I population of 200–400 would require some 100–200 ha of farmland, idealized as a zone of radius c. 560–800 m. Such an area can be accommodated on the valley floor and gentle gradients immediately around the settlement (see Fig. 1). Yet as population grew further, the upland slopes to the east and west would funnel agricultural expansion northward and southward along the valley, away from the settlement and the best watered region at the confluence of the Vlychia and Kairatos. With increasingly unequal land coming under cultivation, both the importance of allocation and the opportunities for manipulation could be expected to rise from around the end of EN I.

Fluctuation in the speed of growth at Knossos is also relevant, for restructuring of social relations may correlate with rapid increases in group size as much as with absolute numbers of participants, and can itself also encourage further expansion (Johnson 1982). Fig. 2 shows a plot of site size against a period chronology derived from calibrated radiocarbon dates and site stratigraphy,² with points joined to produce a best-fit curve simulating community growth (cf. Ammerman *et al.* 1976: 36, fig. 3). The logistic curve we see reveals a crucial point: contrary to Evans's image of steady and uninterrupted growth (Evans 1971: 116), it seems that *Knossos did not expand evenly through the Neolithic*. The acceleration witnessed up to the mid-5th millennium can be explained in terms of the cumulative impact of a relatively constant underlying internal growth rate (Cherry 1980: 265–70), but the practical result was that more new faces had to be incorporated in the community at some times than at others. The years of fastest, accelerating expansion are concentrated in the EN II–MN period, reaching a crescendo in MN around 4600–4400 BC. Expansion was much slower during the AcN and most of EN I, and it is equally striking that LN growth decelerates sharply instead of continuing the earlier trend.

Even allowing for substantially lower populations than those hitherto used, a demographic approach allied to broad cross-cultural expectations suggests

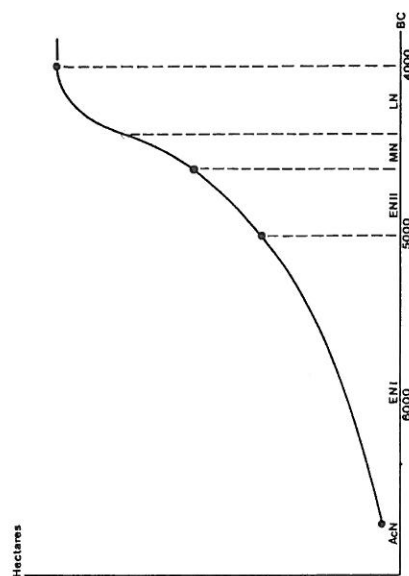


Figure 2. The growth of Neolithic Knossos scaled against an absolute chronology.

that major changes within the Knossos community during the Neolithic are indeed quite probable. An important and counter-intuitive discovery revealed by several avenues of enquiry is that the most likely period of transformation lies not in LN, when the settlement was largest, but as far back as the EN II–MN period. To explore this idea further, and to move beyond probability and towards a more specific and contextual approach, we must look in detail at the material remains at Knossos, and at their interpretation.

Cultural Change and Social Change

How might one find archaeological correlates of social change and complexity at Neolithic Knossos? While there is a flourishing literature on the archaeology of early states and chiefdoms, the recovery of direct evidence of hierarchy and power amongst comparatively small-scale societies can be fraught with problems. Neither need be expressed in ways that are archaeologically visible (White 1985), nor indeed involve centralized leadership (Brown 1981). For instance, from Çatal Hüyük—which, at more than twice the size of Knossos, is the super-site *par excellence* of the western Eurasian Neolithic—there is archaeological evidence for neither central persons nor

central places (Mellaart 1967). Certainly, no spectacular signs of early social inequality have emerged from Knossos, where the problem of recovery and identification is compounded on a practical level by the overlying Minoan palace and the disappearance of possible extra-mural cemetery areas under the vastly expanded palatial town.

Yet to understand and identify restructuring and complexity merely in terms of elites and changes at the top is a limiting and somewhat naive perspective. To pursue the analogy with Çatal Hüyük, Redman (1978: 182-87) has argued persuasively that the settlement's extraordinarily elaborate material culture may itself be a way of structuring complex social relations between kin groups and lineages. Moreover, a community is not simply a passive aggregate, but is composed of diverse and active individuals. Alteration in social relations should therefore be seen less as *diktat* than as discourse, and shifting structures of power as changes imposed, resisted or negotiated by people throughout the community. In addition to shifting interpersonal relations, social change may also involve other types of restructuring in the community, such as increasing craft specialization and control of production.

Once we acknowledge that social change at Knossos would have embraced the life of the entire settlement, the range of evidence is greatly increased, and the probability of complete archaeological invisibility proportionately lessened. At one level, it should be possible to identify changes in the locus and mode of production by looking at the manufacture of items of material culture. And at another level, since the material culture created, used and discarded by all individuals is one of the principal media through which the pattern of their social world is constructed and reconstructed, it is in fact highly improbable that the rich residue recovered at Knossos would bear no surviving testimony if this world was ruptured and reformed—whatever the taphonomic properties of the trappings of power used by any possible elite.

In particular, many studies draw attention to a marked increase in the use and manipulation of symbols and social ritual witnessed during periods of social re-ordering (e.g. Hodder 1979; Hodder 1988; Johnson 1982; Wiessner 1988; Wiessner 1990)—examples being identified for groups as diverse as the seasonal meetings of hunter-gatherer bands and the large populations of early states (e.g. Cherry 1978; Davis 1985; Price 1981). Even if we cannot identify the new life at the top, we may therefore be able to find evidence of the period of social re-structuring and re-negotiation of power that created it. For this emphasis on an increase in symbols and ritual gives us a clear

expectation in terms of chronological patterning. On the one hand, shifts in modes of production should lead to a sustained change in the archaeological record. On the other hand, intensification of symbolic and ritual activity during a period of social change is an essentially transitional phenomenon (since both before and afterwards members of the community would possess stable, if different, social structures) and it should therefore find expression as a temporary peak. The principal task of the analysis of Knossian material culture that follows is the identification of these two patterns among appropriate bodies of data.

First, however, the proposal that cultural change at Knossos relates to internal changes in the community needs to be weighed against an alternative potential model of cultural diffusion from beyond the island. Overall explanations of culture change during the Knossian Neolithic have not been explicitly delineated in earlier scholarship. Evans's own position is ambiguous, on the one hand acknowledging Crete's apparent isolation, but on the other hand too wedded to the conservative image of the Cretan Neolithic to embrace wholeheartedly the case for internal innovation, and thus still susceptible to explanations of change in terms of foreign contacts (e.g. Evans 1968: 272-76; 1971: 109, 114-15). It is therefore helpful to begin with a panoramic assessment of the strength of early Cretan contacts with the remainder of the Aegean. What level of interaction might we expect, given our understanding of the distribution of people and resources in the areas surrounding Crete during the Neolithic? To what, in more narrowly positivist terms, does the pattern of evidence for such interaction actually amount?

Diffusionist versus Indigenous Models of Culture Change

Although the presence of Crete was almost certainly known even before its colonization (Broodbank and Strasser 1991: 235-36), there is likely to have been as little cause as opportunity for regular social interaction between the island and adjacent areas during much of the Neolithic. As soon as Crete supported a population in the low hundreds (an extremely modest figure), the island would have become self-sufficient in terms of mating networks (cf. Wobst 1974), and even smaller initial founder populations could have survived in isolation (Cherry 1981: 60-61; 1985: 23-24). Self-sufficiency can be extended to agriculture, given Crete's favourable size, rainfall and environmental diversity, while Knossos appears to have made no use of pelagic food resources requiring journeys beyond the island (Shackleton

1968). Until the beginnings of Aegean metallurgy in the FN period, Melian obsidian was the only material not available locally, and the small quantities found (Evans 1964: 231, 233; 1968: 270) suggest only sporadic procurement expeditions. As Melos was not itself regularly inhabited during the Neolithic (Cherry and Torrence 1982), such expeditions might at best have encountered strangers engaged in similar work, with both special-purpose parties so far from their residential milieu that it must be doubtful what impact such contacts would have on each others' homeland culture. The *cordon sanitaire* of empty islands lying between Crete and the mainland during the earlier Neolithic was partially broken in the 5th millennium by the first colonists of the southwestern Dodecanese and southeastern Cyclades (Cherry 1990: 164-45, 169-70), and Cretans must surely have had some knowledge of these pioneers. Yet both island clusters lie 100 km or more from Knossos, and on present evidence it was not for another millennium that Cycladic colonization became firmly established, and FN settlement filled in the expanse of eastern Crete between Knossos and the Dodecanese. In short, until the 4th millennium (the FN period), it is intrinsically quite probable that Crete constituted a largely self-contained world.

We receive the same impression from the evidence of interaction. The earliest object whose acquisition requires some form of exchange with non-Cretan groups is the copper flat-axe found at Knossos in what is now identifiable as a FN context (Vagnetti and Belli 1978: 155; the context and provenance of a few fragments of stone bowls of possible Egyptian origin remain controversial). While a few earlier pottery imports may be hidden in the mass of material from the site, their incidence cannot but be negligible. Coherent and systematic cultural links with the remainder of the Aegean likewise begin only in the FN period, with the appearance in Crete of eastern Aegean forms, red-crusted wares and a proliferation of pouring shapes (Betancourt 1985: 12-15; Vagnetti and Belli 1978: 151-53). Before this, the island lay apart from other groupings (Sampson 1984), and proposed parallels are few and often tendentious.

Evans (1971: 109) made a case for contact in the Knossian MN by comparing the popularity of concave-walled carinated bowls at Knossos and on the contemporary Greek mainland, as well as by emphasizing the presence of fruitstands, chalices and spouts at the site. Yet the bowls and spouts have a local ancestry going back into EN I levels, and the chalices and fruitstands (if not in fact variants of EN I pedestal bowls), as well as the spouts, are extremely low-frequency shapes in relation to the overall assemblage.

Washburn (1983: 146-48) has claimed what may well be genuine—if limited—evidence of interaction in the form of similarities between a few of the many new designs on Knossian EN II pottery and those at the contemporary Cycladic settlement of Saliagos. Yet her argument that the direction of influence ran from the Cyclades to Crete merely reflects the assumptions of the diffusionist paradigm, for the Saliagos designs enjoy no chronological precedence, are equally without clear ancestry, and could just as easily be derived from Crete. In this context, it is striking that the majority of the new Knossian EN II designs have no convincing prototypes outside Crete, an observation that can also be extended to the key MN decorative technique of ripple burnish. Once we go even farther back in time, stylistic 'parallels' involve chronological mismatches millennia in length (Evans 1968: 273-75), and we are simply left with the unsurprising conclusion that Knossos shares some of the broad defining elements of the early Aegean and western Anatolian Neolithic.

If we shed the mental templates of diffusionist thinking and adopt a more sophisticated approach to the nature of innovation (van der Leeuw and Torrence 1990), it also becomes apparent that most of the main technological changes and new categories of data that appear in the Knossian sequence are in fact quite convincingly explained through internal processes. For instance, the earliest fired pottery in Stratum IX is anticipated by the baked clay figurines found in the so-called 'aceramic' Stratum X of the founder settlement (Evans 1971: 102), and it is even possible that non-surviving unfired vessels were used in the Stratum X settlement; this would certainly explain the lack of experimental pieces in Stratum IX. Evans himself suggested that the absence of pottery in Stratum X should be explained more in terms of delay than ignorance (Evans 1968: 271) and, following the model recently proposed by Brown (1990), the appearance of pottery in Stratum IX could alternatively be attributed to economies of production that only favoured pottery over other media for vessel production as population and demand expanded. Similar adjustments precipitated by changing scales of demand also make sense of the shift from fired mudbrick to simpler stone and pisé building methods at Knossos in Stratum VII. Looking at other features, the stone mace-heads that appear in the latest EN I strata are earlier than their comparanda (Evans 1968: 275) and have a good claim to an indigenous origin; likewise, the sherd discs first seen in Stratum VII, the fragments of unworked rock crystal common in MN-LN levels, and the few miniature LN pots are surely all local features. In fact the only convincing

instance of an innovation brought to Crete is the appearance of a complete spinning and weaving technology in late EN II (Evans 1964: 233, 235; 1971: 109), and even here we may still ask what conditions at the receiving end made this innovation acceptable.

The case for local innovation in the context of most of these additions to the repertoire further advances an overwhelming argument for the primacy of models of indigenous change during the millennia of the Neolithic pre-served at Knossos, with cultural diffusionism of limited and secondary significance. Crete followed its own distinct trajectory at least until the FN, and although relations between Knossos and other Cretan settlements remain obscure, the pre-eminent size and position of the former militates strongly against the likelihood that the pace was being set from elsewhere within the island. Yet while the broad chronological range of the innovations already discussed is an important and eloquent testimony to the community's long-term potential for internal cultural change, the temporal pattern and nature of the examples are disappointingly silent concerning social restructuring at the site. There is no clear chronological pattern to be discerned, and the social significance of most new features is obscure. The three innovations in production technology (pottery; pisé and stone architecture; spinning and weaving) tell us nothing about how production was organized, and although we may guess that the unworked rock crystal and the pottery discs were tokens or tallies of some kind, the function of the mace-heads and miniature pots is unclear.

Variability in Material Culture and Social Behaviour

So far, we have looked at cultural change only in terms of new formal elements, and have neglected variability in the frequency, form and usage of long-standing components of the assemblage. It is this latter dimension of change, however, that offers some of the most promising ground for the identification of shifts in social behaviour, for it forces us to consider when and how certain objects and actions varied in popularity and meaning. In these terms, it can be demonstrated that a wide spectrum of Knossian culture did witness an abrupt and chronologically tightly-defined period of major change within the Neolithic. Although individual elements have been identified in earlier work, the breadth, coherence and social significance of this phenomenon has hitherto gone undetected.

In looking at variability at Knossos, it is crucial to remember that all data are samples. Depending on the comparison undertaken, data from a stratum

or period need to be adjusted with regard to the absolute volume of deposit excavated, the proportion of the settlement exposed, and/or the length of time involved. In light of these criteria, the current analysis is based mainly on the published excavations of 1957–60 (Evans 1964; 1968). These comprise a large sounding to bedrock through a complete AcN–LN sequence of yards, houses and domestic middens at the centre of the tell (Trench AC); an adjacent clearance to the MN stratum (Trenches BD and F); and a narrow trench containing predominantly MN and EN II material on the northern periphery of the site (Trench XY). Table 2 gives information concerning nature of the sample in each stratum. The full results of the 1969–70 seasons (Evans 1971) are unpublished, although some information concerning pottery frequencies in the West Court is available (Evans 1973), and no reliable period-by-period data are recorded from the early work of Sir Arthur Evans. As a result, both these latter excavations are useful mainly where presence/absence criteria will suffice.

Stratum	Period	Vol. (cu. m) ¹	% of Total Volume ²	% House ³
I	LN	50	7.3	0
II	LN	185	27.2	5
III	MN	160	23.5	50
IV	EN II	75	11.0	5
V	EN I	47	6.9	5
VI	EN I	47	6.9	0
VII	EN I	39	5.7	60
VIII	EN I	30	4.4	40
IX	EN I	36	5.4	25
X	AcN	11	1.6	0

¹ Volume of soil excavated per stratum

² Percentage of the total excavated volume of soil

³ Percentage of the area in each stratum occupied by house space

Table 2: *Samples provided by the 1957–60 excavations at Knossos (volumes and areas calculated from the published sections, plans and verbal descriptions in Evans 1964).*

The limited scale and concentrated location of the published excavations determine the ways in which we can measure variation, as well as the choice of variables. Temporal trends are much easier to establish than spatial ones—although it will be seen that spatial explanations for some of the

former can nonetheless be proposed—and for certain categories of evidence the sample is simply insufficient. Architecture illustrates the problem, for we cannot assess the significance of the large MN and LN ‘mansions’ found at Knossos when we possess fewer than half a dozen floor plans, and none from earlier periods (Evans 1971: 116); possibly important changes in orientation likewise remain nebulous (cf. Evans 1964: 138; 1968: 267–68). Of those categories of material for which temporal analysis is a more viable possibility, some have been discussed already as new features and currently show little subsequent patterning (i.e. spinning and weaving equipment, mace-heads, rock crystal, miniature pots). On examination, fluctuation in the frequency of tools such as axes, hammers, grinders, pounders and bone points, as well as beads and pendants, displayed oscillations attributable simply to the volume of earth excavated, to the presence or absence of artefact-rich midden deposits, to small sample size, or (in the case of the bone tools in upper strata) to taphonomic factors; in the interests of brevity these cases are not discussed further. Important evidence for real variability in incidence is, however, detectable in six fields of Knossian material culture. The significance of the material and the patterning of the data are first discussed separately in each case.

1. *Pottery style.* Pottery style is central to the exploration of change at Knossos. As the period divisions of the Knossian Neolithic are principally pottery-based, stylistic change in the repertoire implicitly informs the way we think about time at the site. In addition, despite lively debate over precise interpretations (e.g. Conkey and Hastorf 1990), there is broad agreement that style is socially meaningful and that it functions, albeit at differing levels of consciousness (Sackett 1990), as a form of non-verbal message-sending between individuals and groups (e.g. David *et al.* 1988; Fletcher 1989; Hodder 1982; Wiessner 1990). Finally, changes in the design of pottery may allow us to glimpse changes in production. Such observations do not imply that Knossos’s prehistory can be written from its pottery, but they do underline that if we can penetrate beyond the enumeration of typologies, pottery style should reveal rich, though encoded, information concerning social behaviour at Neolithic Knossos.

The pottery consists almost entirely of fragments, mainly from house yards and middens (Evans 1964: 174), although an interesting exception occurs in the form of two MN pits containing crushed but restorable vessels (Evans 1964: 174, 176). There is a close correspondence between relative frequencies of pottery types in Trench AC and preliminary data from the

West Court excavations (Evans 1973), suggesting that the counts in AC are representative of the site. Stylistic change and embellishment is heavily concentrated in open vessels, whose form, size and ubiquity argue strongly that they were used for eating, drinking and serving (and possibly, in the case of certain rare shapes, for other ritual activities) (Evans 1964). Bowl types with a variety of elaborate profiles, and a range of complex handles and lugs associated with open shapes, are highly susceptible to fluctuations in their relative popularity. The rare vessel forms that appear and disappear through the stratigraphic sequence are also open shapes—dishes, trays, troughs, chalices, fruitstands, beakers and ladles. And again it is open shapes, and predominantly bowls, that receive the majority of the decoration (plastic, pointillé, incised and ripple burnish) seen in the Knossian pottery. In contrast, closed storage vessels show little variation and decoration, and food preparation does not appear to have involved pottery vessels to a significant degree (Evans 1964: 196; see also Vitelli 1989). It appears from this emphasis on open shapes, and on bowls in particular, that stylistic change at Knossos was concentrated on high-profile vessels used in the social context of intra-group and possibly inter-group eating and drinking.

Strong patterning emerges in the timing of the major stylistic transitions. The extraordinary homogeneity of the EN I assemblage over more than one and a half millennia is well known, but what is less often emphasized is that the LN period also sees very few changes: wiped wares on coarse fabrics are the only major new feature, and much of the period’s definition comes simply from the decline of various MN traits. By far the most dramatic activity in the pottery styles of Knossos is thus concentrated in the half millennium or so of the EN II–MN period. Evans (1971: 109) saw MN as the period of maximum change. He also recognized earlier shifts in decoration, but it was left to Washburn’s symmetry analysis to make a case for the pre-eminence of EN II (Washburn 1983: 144, 146). Both are correct insofar as they detect elements of a more complex overall process.

In terms of changing vessel forms, both EN II and MN see abrupt extinctions and innovations amongst the rarest shapes—EN II witnessing the cessation of the EN I dishes (but the main period for troughs), and the transition to MN marking the end of the troughs (but the beginning of chalices, fruitstands and beakers). A point not accentuated in earlier studies, however, is that this modest MN increase in the variety of rare shapes is not matched by developments amongst the common open vessel rims, handles and lugs (Fig. 3). It is the EN I and II periods that see the maximum popularity of a

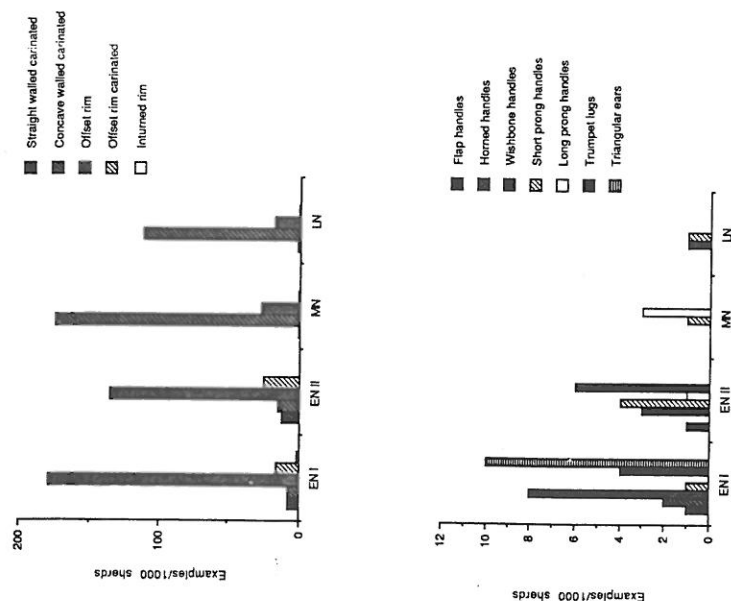


Figure 3. Frequency per period of bowl rim types and handle and lug forms in Trench AC (data from Evans 1973: 139, table 5, 140, table 6; plain-rimmed bowls, tubular lugs and ring handles show little variability and have been omitted).

range of carinated, offset-rim and inturned-rim bowls, together with a variety of elaborate lugs and handles. At the start of MN, a massive boom in concave-walled carinated bowls virtually ousts all rivals, save for the ubiquitous plain-rimmed types, and the range of lug types in use is also drastically diminished, leaving only a few major types for the remainder of the Neolithic. Despite the arrival of a handful of rare forms, therefore, the MN period is in fact characterized by a permanent contraction in the number of types of open shape in common use, and the overwhelming popularity of a single carinated bowl form.

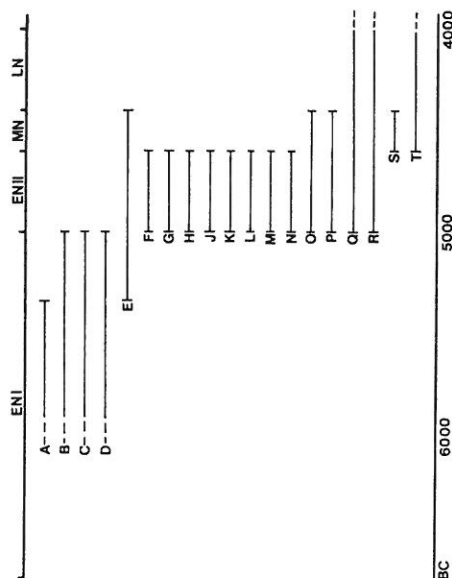


Figure 4. Washburn's 19 decorative designs (designated A-T) scaled against a relative and absolute chronology for Knossos (after Washburn 1983: 146, fig. 9.5, with modifications).

In decoration we find dramatic evidence of separate but comparable changes. Washburn's analysis (Fig. 4) demonstrates how the transition from EN I to EN II is marked by an almost complete discontinuity in designs, a major widening of the repertoire, and a commensurate increase in the number of 'symmetry structures' determining how designs are multiplied to generate patterning on the vessel. In contrast, the MN period witnesses the abrupt disappearance of eight of the EN II designs and only two new introductions, a severe narrowing that extends into LN, when the number is further reduced and there are no introductions. EN II thus emerges as the period of maximum diversity and innovation. Yet symmetry analysis tells but a partial story, for, being only applicable to incised and pointillé decoration, it gives us no information about changes in the more uniform plastic and ripple burnish techniques.

In fact, as Evans established, both the percentages of decoration in each technique and the incidence of decoration itself varies greatly through time (Fig. 5). The popularity of those techniques susceptible to symmetry analysis is dramatically altered between EN II and MN. In EN II 86 per cent of decorated pottery used pointillé or incision, confirming that Washburn's diversity does represent the major feature of the period. But the MN period sees this percentage halved by the astonishing boom in ripple burnish, which first

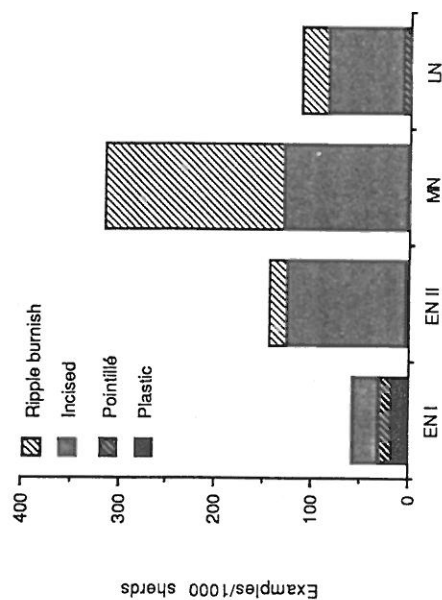


Figure 5. Frequency per period of decorated sherds of all types in Trench AC (data from Evans 1973: 141, table 7).

appears in the latest EN II level, becomes the virtual *leitmotiv* of MN, and then declines rapidly. MN impoverishment of the EN II design repertoire is thus only the negative facet of a period whose positive dimension is the short-lived efflorescence of a very simple and uniform decoration. The parallel with the concave-walled carinated bowls is obvious and not merely conceptual, for ripple burnish is frequently applied to this shape.

As seen in Fig. 5, the incidence of decorated pieces (standardized per 1000 sherds) doubles twice, once between EN I and EN II, and again between EN II and MN; in LN, incidence declines to a level below that of EN II. At its peak in MN, almost one sherd in three was decorated, and nearly one in five ripple burnished. Considering that MN was no more than half the length of the preceding and following periods, it is quite probable that, in absolute terms, the MN discard rate of decorated pottery was in fact around four times that of EN II, and six times that of LN. Whether this implies greater simultaneous usage of decorated vessels or a short-lived custom of deliberate discard and breakage (note that the two pottery pits are also MN in date) is an open question; either way, this brief but extreme peak is remarkable.

To summarize a complex and by no means unitary phenomenon, some of the most visible components of the pottery at Knossos underwent a profound stylistic convulsion during the earlier 5th millennium. This analysis has

identified two dominant trends operating in tandem amongst the major open vessel types. In EN II the key factors are a greatly increased level of decorative diversity and a large rise in the incidence of decoration itself. In MN this diversity is drastically reduced, a few traits rise to overwhelming popularity, the incidence of decoration doubles again, and in real terms the amount of decorated pottery in use at any one time may as much as quadruple. The EN–MN pattern represents a temporary peak in terms of decoration (incidence, the EN II range, and the MN popularity of ripple burnish). Yet the MN also initiates a permanent reduction in EN I–II morphological diversity amongst the common open shapes that continues right through into the LN period.

2. *Figurines*. Clearly identifiable examples of 35 anthropomorphic and 11 animal figurines were found in the 1957–60 excavations (Evans 1964: 226, fig. 60, 237–38). Their exact meanings are uncertain, but there is little doubt that they comprise part of the symbolic apparatus of the settlement (Ucko 1968). Fig. 6 shows that almost half the corpus of anthropomorphic figurines, and the majority of the animal figurines, are concentrated in the EN II stratum.

This distribution is not a product of the excavated volume of earth per stratum. Table 2 shows that the EN II volume is only 11 per cent of the whole, and that an assumption of even figurine usage through time would generate the expectation of maximum finds in the MN and LN levels, and a far narrower margin between EN II and each EN I stratum—predictions that are conspicuously *not* fulfilled. As most of the figurines were found deposited outside houses, context is clearly important, and the counts for Strata VII and III, where house remains dominate the excavated area, may be misleading. Yet although Stratum IV is indeed dominated by open space, it is by no means unique in this respect—Strata X, VI, V and II are also mainly made up of such contexts, but of these only Stratum V produces a small increase in figurine density. Still looking at context, the pattern cannot be explained either by the especially deep levels of refuse found in Stratum IV in Trench AC. Although the same stratum produced the highest pottery totals in AC, the pottery increase is much less dramatic than the figurine peak, and the fact that the anthropomorphic figurines of Stratum IV and Stratum V were located in successive levels of a limited zone within the midden suggests repeated intentional deposition in a specific location rather than accumulation as an unintentional by-product of domestic dumping (Evans 1964: 194, 203, fig. 44, 238).

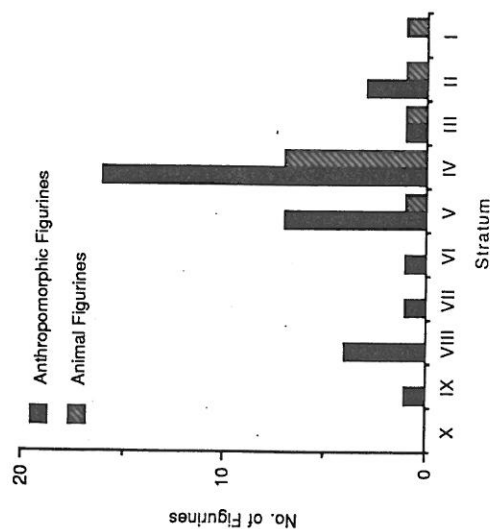


Figure 6. Frequency per stratum of anthropomorphic and animal figurines from the 1957-60 excavations (data from Evans 1964: 226, fig. 60, 237).

There is thus every indication that the sharp peak in figurine frequency during EN II is a real phenomenon and not a product of excavation strategy or fluctuation in the nature of the deposits. It is unfortunate that the MN sample is so heavily skewed by the discovery of major house areas, as the frequency of figurines immediately after EN II might show interesting results. Nonetheless, we can at least say that by Strata I and II frequency had sunk again to a low level.

3. Sherd discs. These small objects made from broken pieces of burnished or decorated pottery can be dealt with briefly (Evans 1964: 235). Evans suggested usage as tallies or gaming pieces, and it is certainly reasonable to see them as signifying tokens of some variety. They first appear in Stratum VII but remain rare until the EN II and MN strata, when their popularity suddenly and sharply increases; by LN times, finds are again uncommon (Fig. 7). The same sampling considerations as discussed above argue that this pattern reflects a real peak in incidence, although as the MN volume of deposit is more than double that of EN II, their actual popularity within these periods may have been much more equal than is suggested by the raw data.

4. Intramural child burial. The interpretation of the burials found within the settlement provides a fine example of how normative assumptions of

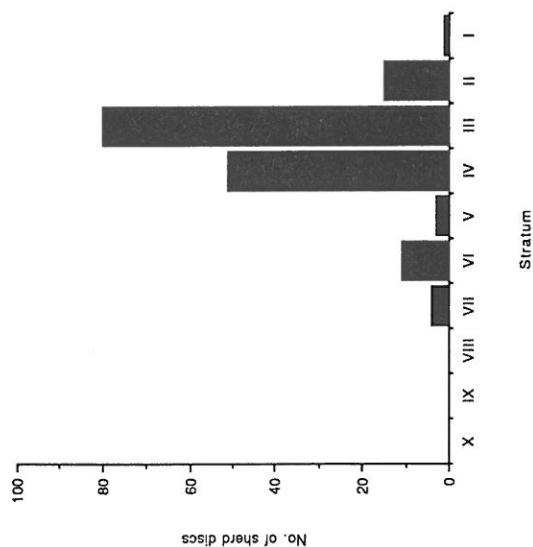


Figure 7. Frequency per stratum of sherd discs from the 1957-60 excavations (data from Evans 1964: 235).

cultural continuity can obscure an attested pattern of chronological variation. Although there is as yet no trace of adult interments at Knossos, seven child burials dating to the AcN were found in the 1957-60 excavations (Evans 1964: 140, 142), and a small (but unspecified) number of further examples emerged during the 1969-70 seasons in the EN II and MN levels (Evans 1971: 111, 116). Yet despite the fact that these periods comprise less than one third of the entire AcN-LN span, Evans concluded that 'the custom of intramural burial for children was continued for most, if not all, of the Neolithic' (Evans 1971: 116). This not only runs against current evidence, but also rests on the questionable assumption that burial customs form a necessarily conservative and passive element of social behaviour.

The hypothesis that intramural child burials from the EN I and LN periods have simply not been discovered may be checked against the area of the settlement opened up for each period. Including Sir Arthur Evans's work on the LN Central Court houses, which detected no burials (A.J. Evans 1928: 8-21), an approximate assessment from published plans from all seasons suggests that around one per cent of the LN, MN and EN I settlements has been cleared (some 500 sq m, 400 sq m and 100 sq m, respectively; a median size

for the EN I settlement was used in this calculation, although due to settlement growth the actual range from Stratum V-IX falls between about 0.5 and over 2 per cent). For EN II the figure is much lower (roughly 0.33 per cent), because the absolute excavated area is little different from that of EN I, while the settlement is considerably larger. Ironically, in view of its basal position, the AcN settlement is proportionately the best known of all, with an excavated area of some 70 sq m within a settlement of about one quarter of a hectare in size (and thus a sample size of about 2.8 per cent). In short, while the AcN is comparatively well sampled, there is little to choose between MN (with burials), and LN and EN I (without burials), whilst EN II (again with burials) is the worst sampled of all. The number of burials is inadequate to support statistical tests, but we can at least say that hypothetical LN and EN I burials stood as good a chance of detection as any save those of the AcN period. Until there is evidence to prove otherwise, we do best to conclude that there are only two short horizons of child burial at Knossos—one in the founder settlement and another, after a long hiatus, in the EN II-MN period.

These horizons may also represent two different types of behaviour. The AcN burials were dug in open space (Evans 1964: 140, 142), while at least some of the MN burials were placed within buildings (Evans 1971: 111, 116). Equally, seven burials were recovered from 70 sq m of the AcN settlement, yet only a handful were spread over the much larger combined excavated area of the EN II and MN settlements. Although caution is required, considering the limited spatial information at our disposal and the incompleteness of the available information concerning the EN II-MN burials, we can explore heuristically the possibility that this last disparity derives from the fact that different proportions of the deceased child population were given formal burial during each horizon.

Extrapolated to cover the AcN settlement area, the seven burials belonging to this period imply a total of some 250 interments or—calculating on the basis of 400 years as the duration of the AcN, and a 20-year generation span—some 12-13 per generation. Neolithic mortuary data from mainland Greece and the Near East suggest that deaths within the 0-7 year age group (the range attested in the Knossos sample) should account for some 30 to 60 per cent of all deceased (Angel 1971; 1977). Thus the number of deaths per generation calculated above should relate to a living population of about 20-43 at AcN Knossos, a close fit with the independent assessment of 25-50 estimated earlier from occupation densities. Contrasting with this is the EN II-MN situation. Allowing 600 years for these combined periods, a

mean population of 600, and assuming the same death rates and generation length, we would anticipate a grand total of some 5400-10,800 EN II-MN mortalities in the 0-7 age group. From a sample of between 0.33 and one per cent of the settlement, we might expect to have recovered some 16-108 interments—which is clearly not the case.

On the basis of this admittedly speculative investigation, it can be suggested that during the earliest years of the Knossos settlement all dead children received formal burial, but that the second EN II-MN horizon saw instead the selective burial of only a limited number of children. Interpretation of mortuary data is notoriously complex, but two possible reasons for a heightened interest in the survival or demise of children at these periods may be proposed. For the tiny founder population, the fate of each child would substantially affect the fate of the entire community. In the large EN II-MN settlement this can hardly be the case, but we might rather see the importance of children in relation to the survival, status or rights of a few families or lineages. In this context, the discovery of burials within a MN house may be significant.

5. *Faunal remains.* Fluctuation in the relative importance of the main domesticates from the 1957-60 and 1969-70 excavations at Knossos reveals a bizarre divergence from the normal southern Aegean pattern of ovicaprid predominance. Sheep and goats do indeed constitute the main component throughout the first two millennia of the Neolithic, despite an upward trend in the proportion of cattle between the AcN (6.5 per cent) and late EN I (22.7 per cent) (Jarman and Jarman 1968). In MN, however, cattle come to comprise as much as half the total assemblage, largely at the expense of the ovicaprids (Jarman *et al.* 1982: 148); although exact data are not available, this process already seems well advanced in EN II (Halstead 1981: 321, fig. 11.2). In the LN period we witness what is now becoming a familiar pattern—the collapse of an earlier 5th millennium peak as the cattle component declined and ovicaprid predominance reasserted itself (Jarman *et al.* 1982: 147).

Jarman *et al.* (1982: 147-48) state that this preponderance of cattle runs contrary to environmental and ecological common sense in Crete. In practice, the climate of the island's central lowlands allows some latitude in stock-breeding strategies, and modern Crete supports one of the highest cattle densities in the Aegean (Kenfrew 1972: 276, fig. 15.4). Yet they are still correct to emphasize that, in empirical terms, the expansion of the cattle component is very abnormal. The rise is certainly far too high to be

explained by demands for traction animals, and any increased emphasis on secondary dairy products should also have included ovicaprids. So what caused the cattle boom? Jarman *et al.* proposed four models: (1) differential deposition of bones on site; (2) LN micro-environmental change adverse to cattle; (3) a cultural preference for beef, unconstrained in an island environment until the LN; and (4) Knossian regional hegemony, allowing it to draw upon the herds of dependent communities. While all these provide useful perspectives on the realities that may lie behind observed faunal changes, in terms of explaining the precise phenomenon in question none actually isolate the EN II–MN peak as an aberration whose timing should be of significance. An alternative solution can be offered which incorporates elements of the above, but orders them differently.

If we look for other clues relevant to changing roles for animals at Knossos, we find two intriguing details. First, the appearance of spinning and weaving technology at exactly the time when the sheep and goat component goes into sharpest decline represents an extremely suspicious mismatch between two types of data. The most economical explanation is that the faunal sample is not telling the whole truth about animal management in the earlier 5th millennium, that it is indeed biased by depositional factors, and that overall ovicaprid predominance may well have continued throughout the period. But why should more cattle remains have been disposed of within the settled area during the earlier 5th millennium than before or afterwards? Here the animal figurines provide a second clue. Earlier, we saw that almost all those found at Knossos derive from the EN II stratum; the majority appear to be representations of cattle (Evans 1964: 238). Although information concerning MN figurine usage is obscured by the dominance of house remains of cattle should coincide with a period when these animals also achieve representational prominence. It is plausible that at EN II–MN Knossos the importance of cattle rose not in quantity, but in quality—as symbols, possessions, and prestige food for conspicuous on-site butchery, consumption and discard.

6. Chipped stone. The chipped stone from the 1957–60 excavations comprises Melian obsidian and infrequent local cherts, mainly in the form of unretouched chips (88.4 per cent), together with a minor component of finished tools (Evans 1964: 231, 233). Most of the 1957–60 chips are probably débitage from nearby working. Fig. 8 shows the quantity of chipped stone per stratum, weighted to take account of the volume of excavated soil.

We see erratic fluctuation up until the end of EN I, followed by a substantial and sustained collapse from EN II onwards. Comparison with Table 2 reveals a close correlation during the AcN and EN I periods between low counts and strata where house space dominates the excavated area, the low count in open Stratum VI being only a temporary aberration from this pattern. House floors were simply kept clean of sharp debris, and there is little evidence that the frequency of discard itself changed. Yet this only makes the sudden reduction in quantities during the 5th millennium all the more striking. For although the dominance of house space in Stratum III renders the MN figure questionable, both EN II and LN deposits consist of outdoor refuse contexts exactly like those that produced the peaks of Strata IX, VI and V.

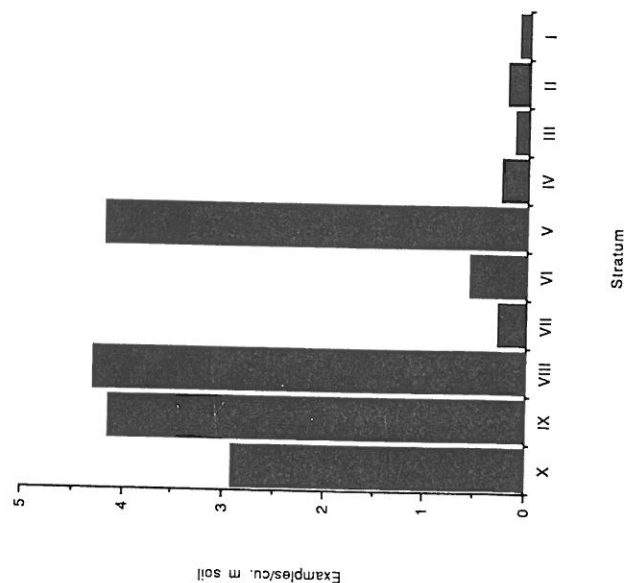


Figure 8. Frequency per cubic metre of excavated soil of chipped stone in the 1957–60 excavations (data from Evans 1964).

Literal interpretation of this 5th millennium pattern as evidence for a collapse in usage is absurd, given the lack of alternative materials and the popularity of obsidian tools well into the Bronze Age. More specifically, a

decline in the conditions of access to the Melian obsidian sources is unconvincing as an explanation, because local cherts remain as rare as before. Here again, therefore, we seem to be dealing with a changing depositional pattern. As most of the chipped stone is unworked debris, and the sample is heavily biased towards the centre of the tell, the most obvious possibility is that knapping and discard were relocated to the peripheries of the settlement. Only sampling of perimeter deposits could substantiate this hypothesis, but it may be relevant that the one known *in situ* lithic activity-area that has been found in a pre-palatial (EM IIA) context at Knossos did indeed lie near the edge of contemporary settlement (Warren 1972: 393; Torrence 1979: 77-78), while a parallel for the institution of a formal discard zone is the great obsidian dump at Phylakopi on Melos (Torrence 1986: 147-50). The termination of the practice of knapping and discarding chipped stone within the defined production and dumping zones on the settlement periphery, both strongly suggest a transition from casual household manufacture to more specialized production, and such spatial concentration may also indicate tighter control over this activity.

A World Turned Upside-Down: Explaining the EN II-MN Cultural Revolution

It is clear that something of a revolution occurred amongst a broad, if selective, spectrum of material culture during the EN II-MN period at Knossos. Future work may extend the range of variables and dimensions in which this process can be observed, perhaps by establishing the novelty of the MN 'mansions', or improving our understanding of the symbolic patterning of residues (cf. Moore 1982), or providing better contextual resolution for such contemporary introductions as spinning and weaving. Yet even with the data currently available, the fluctuations observed have a close bearing on the question of social change at the site.

All six variables examined either comprise material with a symbolic or ritual dimension, or else are associated with manufacture; the pattern seen in each case fits earlier predictions of a temporary increase in symbolism and ritual, but a sustained shift in production. Thus the peaks in figurines and discs, intramural child burial and on-site cattle deposition are confined to the EN II-MN period, whilst the sudden fall-off in the quantities of chipped

stone from the centre of the site is permanent. Stylistic change in pottery is more complex: the peak in decoration follows the pattern of temporary increase, but the permanent simplification of the repertoire in the MN-LN periods, as well as reflecting a return to greater stylistic conformity, could hint at more standardized modes of production. Closer analysis of production technology might substantiate this last suggestion, and it is noteworthy that Evans (1964: 219, 225) remarked on the thin walls and superior firing of the later Neolithic pottery.

As we have recovered them, the meanings of these symbols and rituals of early Knossos are largely garbled. We register the great increase in 'feather-waving' during the earlier 5th millennium, but we understand only dimly the significance of each feather. Style, moreover, permits ambiguity, multiple readings and misrepresentation, quite as much as verbal language does (Braithwaite 1982; Hodder 1982; Welbourn 1984; Sterner 1989). Yet thinking of cultural change as a participant in social change, one possible, and in the context plausible, reading of the stylistic trends seen in EN II and MN pottery decoration at Knossos may be offered tentatively. Wiessner (1989) argues that changing relations between the individual and society may be reflected by levels of stylistic homogeneity and heterogeneity in material culture. The social conditions she proposes for the former include the need for social cooperation and the imposition of new authority; those for the latter comprise periods of internal competition and the breakdown of social order. Macdonald (1990) strikes a similar note with his distinction between panache and propriety as twin poles of social behaviour and style. Although Hodder (1989) warns correctly that a correlation between social and stylistic cohesion should not be assumed, Wiessner's model has much to recommend it in the context of EN II-MN Knossos.

The contrast between EN II diversity and MN high-volume uniformity might be read in terms of a period of social crisis followed by one of restructured social order. Specifically, the EN II rejection of the EN I stylistic vocabulary and its replacement by a far wider and more flexible range would suggest that existing formulae no longer sufficed to mediate all social relations, and, metaphorically, that all inhabitants were no longer using the same language. The sharp decrease in diversity and the huge increase in the usage of a relatively uniform decoration during the MN would correlate, in contrast, with a new ideological emphasis on cohesion. In particular, if such ideology sought stylistic expression during the critical period of its initial establishment, we might have an explanation for the

strange mixture of brief life and intense popularity exhibited by ripple-burnish decoration, which describes a profile quite unlike that of any other technique at Knossos. Stylistic overlaps such as the few new MN designs, or the late EN II origins of ripple burnish, could indicate the presence of ambiguous undercurrents, suggesting that in both social and cultural terms the transformation was less smooth and universally accepted than the overall trends indicate.

Whatever the validity of this particular reading, the general pattern we have seen is entirely compatible with our expectations of a period of internal social restructuring and changing modes of production at Neolithic Knossos. Compatibility does not, of course, constitute proof, but how far can one strain coincidence? Up until now, the analysis of cultural change has been kept deliberately separate from the preceding analysis of demography, in order to allow both to be evaluated in their own terms. Yet when these avenues of exploration are finally brought together, the elements combine to form an overall picture that, if not conclusive, is very compelling.

Summarizing the 5th millennium at Knossos, Evans (1971: 115) concluded that 'the evidence we have at present does not indicate that any great changes came about in the pattern of life as a whole'. This view now seems hard to sustain. During the EN II-MN period, when interaction between Crete and the remainder of the southern Aegean was at best sporadic, the population of Knossos expanded much more rapidly than before or afterwards. By this time it appears likely that the high-quality arable land immediately around the settlement no longer sufficed to support all its inhabitants, and cross-cultural parallels suggest that the community was also passing beyond the upper limits feasible for populations functioning through face-to-face social relations. Simultaneously we witness a massive but temporary surge in evidence for social rituals and the employment of symbols. And again at the same time we have hints of changing patterns of production. We may never know when the first physical labyrinth was erected at Knossos, yet the argument for a social transformation well within the Neolithic—indirect, tortuous, yet ultimately convergent as it is—provides compensation enough.

Parting Perspectives

What is the relevance for later Knossian and Cretan prehistory of our case for early social restructuring within the Neolithic? It now certainly appears

probable that some form of social complexity existed on Crete long before the palaces, although it is also manifest that one comparatively modest transformation in the earlier 5th millennium in no sense predicts or explains the second far more dramatic, regional process of state formation two and a half millennia later. Fig. 9 continues the growth curve of Knossos through to the 2nd millennium, when the site was occupied by the largest palace centre on Crete. As well as illustrating the enormous scalar differences involved (not only in spatial terms, for the 2nd millennium town appears as comparatively transitory as it is large), Fig. 9 helps to focus our attention on two issues of particular interest.

Relatively short and defined periods of fast growth and accompanying social change occur twice at Knossos, once during the earlier 5th millen-

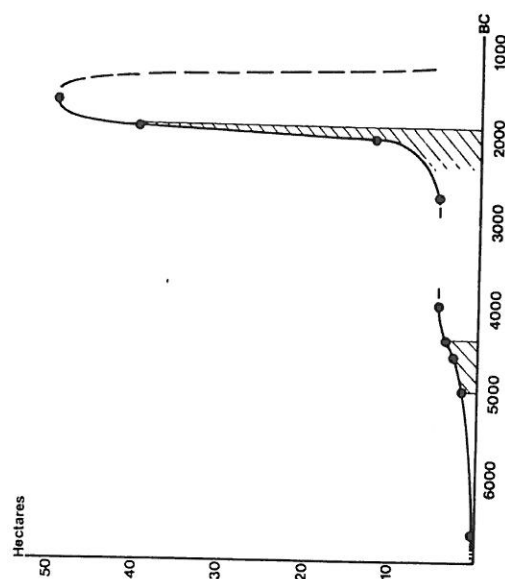


Figure 9. Settlement size of Knossos during the Neolithic and Bronze Age, with periods of suggested major social change shaded (the exact size and the chronology of decline of the Late Bronze Age town are disputed, and the figures here should be taken as approximate. Post-Neolithic data from Hood and Smyth 1981; Renfrew 1972; Warren 1987; Whitelaw 1983.)

nium, and again at the end of the 3rd millennium. This repeated pattern provides support for Cherry's case that models of rapid, revolutionary change be seriously considered in a Cretan context (Cherry 1983). However, the parallel between the two periods also indicates a method through which

the question of possible earlier 3rd millennium social change could be addressed. For although the Middle Minoan (MM) IB palace provides an undisputed end-point, there are persistent hints of earlier monumental construction at Knossos during the preceding EM III and MM IA periods (Hood and Smyth 1981: 8; Warren 1987: 49), and traces of major remodelling go back to EM II (Evans 1972; Wilson 1985: 292-93). As with the later Neolithic 'mansions', these architectural remains are themselves too few and vestigial to shed much light on contemporary social change, but a broader, multi-dimensional analysis of Knossian material culture during the 3rd millennium could well prove as productive as that undertaken for the Neolithic.

The second and final issue is a question of history. What happened to the Neolithic 'super-site'? The hiatus through the 4th and early 3rd millennium seen in Fig. 9 reflects our ignorance of the FN-EM transition at Knossos. We have just enough pottery to establish continuous occupation, but all spatial resolution is lost. Although the subsequent EM II site appears to have been broadly comparable in size to its Neolithic predecessor (Hood and Smyth 1981: 6; Whitelaw 1983: 339), the connection between the two, and hence the contribution of the Neolithic settlement to the location and society of one of Crete's key later pre- and proto-palatial centres, is frustratingly obscure. In part this is due to subsequent remodelling, and it is possible that the Knossos settlement did indeed maintain its size from the LN to the EM period. The paucity of even unstratified 4th and earlier 3rd millennium material, however, could equally be used to support an alternative model of substantial settlement regression, followed in EM II by renewed growth under very different regional and interregional conditions from those obtaining during the initial Neolithic expansion. Although further investigation of basal levels at other substantial EM sites such as Phaistos and Malia is desirable, these settlements clearly do not rest upon high Neolithic tells like that at Knossos. Moreover, from a broad Near Eastern perspective, the collapse of a Neolithic 'super-site' is in fact a more normal sequel than its eventual transformation into a Bronze Age palace.

But whichever model is preferred, Neolithic growth from LN onwards clearly failed to maintain the earlier EN II-MN pattern of acceleration. And whatever the full social and ecological explanation of this watershed, it is surely inseparable from the simultaneous and belated expansion of small LN and FN settlements across the island. Paradoxically, whilst the phase of accelerating growth at Knossos appears to correspond with low island-wide

population densities, the later Neolithic deceleration at Knossos coincides with the take-off of settlement over Crete as a whole. The centripetal pattern of Cretan residence postulated earlier was, it seems, superseded towards the end of the Neolithic by an opposing centrifugalism, at Knossos presumably involving new social controls over reproduction, or alternatively heavy out-migration.

The close of the Neolithic, and of this study, thus returns to the question of Knossos's role in the wider settlement and society of Neolithic Crete. In doing so, it illustrates the need for future work both at and beyond Knossos, so that the image constructed for that site may be expanded, but also integrated into a model for the early settlement of the entire island. Yet such research, we have seen, can only be fruitful if we dispel the assumptions inherent in a nomenclature now approaching its centenary, and instead maintain an open mind concerning the interpretation of Crete's occupation before the Bronze Age. It may be some time before a convincing general model for the Cretan Neolithic can be constructed, but with respect to the period's 'prehistoriography', we may finally be standing at the end of the beginning.

Acknowledgments

It was a suggestive phrase in the concluding remarks of Todd Whitelaw's paper 'The settlement of Fournou Korifi Myrtos and aspects of Early Minoan social organization' (1983) that first put me on the track of Neolithic Knossos: to Todd I am particularly grateful both for this initial inspiration and for subsequent discussions. My other principal debt is to John Evans, without whose exemplary publication of the 1957-60 excavations at Knossos this analysis would not have been possible. This text and its author have also benefited from the criticism and encouragement of John Bennet, Jane Cocking, John Cherry, Oliver Dickinson, Paul Halstead, Sinclair Hood, Bernard Knapp, Kostas Kotsakis, Sturt Manning, Curtis Runnels, Jeremy Rutter, Andrew Sherratt, Robin Skeates, Tom Strasser, Kadde Vitelli, Peter Warren, David Wilson, Nick Winder and Kostas Zachos.

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Notes

1. The steep slope of the tell down to the Vlychia and Kairatos streams defines site edges to the east and southeast, mitigating the loss of information for post-EN I levels caused by palatial remodelling (Furness 1953: 100). To the west, excavation beneath the West Court and Royal Road provides control over Neolithic expansion across the gentler ground in this direction. To the north, the absence of EN I material in sounding XY sets a limit to northward spread during this period (Evans 1964); whilst there is a 'blind spot' beyond XY, the fact that the earliest material from soundings at Knossos Survey Points 225 and 226 dates to MM IA (Hood and Smyth 1981: 52) suggests that expansion north of XY is unlikely to have been very different from that to the west. Taken together, these figures support the view that even the maximum potential area of the Neolithic settlement could not have exceeded some five to six ha.
2. Calibrated radiocarbon dates suggest an EN I span from the early-middle 7th to the end of the 6th millennium, leaving the first centuries of the 7th millennium (and probably the last of the 8th) to be assigned to the AcN period (Manning 1992). After EN I, radiocarbon dates for the EN II, MN and LN levels show a degree of overlap that renders them of limited assistance. The number of building phases attributed to each of these periods can be used instead to establish their relative lengths, with a date of about 4000 Cal BC for the transition to the (largely destroyed) FN marking an end-point. Of the seven phases identified, three belong to EN II, one (substantial and subdivided) to MN, and three to LN (Evans 1971), suggesting that MN is a brief period at the site (Evans 1964: 219, 1971: 109)—a fact which may also explain its poor resolution in terms of radiocarbon dates. Accordingly, the 5th millennium may be roughly divided into 400 years of EN II, 200 years of MN and 400 years of LN. All these durations are of course approximate, but the patterning to be analysed in conjunction with this chronological framework is sufficiently robust to survive moderate readjustments.

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