PART II

EARLY MEDITERRANEAN ECONOMIES AND THE NEAR EAST

https://doi.org/10.1017/CHOL9780521780537.008 Published online by Cambridge University Press

CHAPTER 7

THE AEGEAN BRONZE AGE

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1 INTRODUCTION

In this chapter, I explore economic activity in the Aegean Bronze Age (c. 3000–1000 BC). I focus on the "palatial" societies of Late Bronze Age Crete and mainland Greece, but offer an outline of prior developments, on which they were based. I emphasize what might be termed the "core" of the Mycenaean world (mainland Greece from southern Thessaly to the southern Peloponnese, the islands of the Aegean, including Crete, plus much of coastal southwest Anatolia). Such a definition is just as deficient for the Bronze Age as it is for the Early Iron Age and later, since it does not "bound" the world in which inhabitants of the Bronze Age Aegean moved or with which they were in contact, as will become apparent in the discussion of exchange.

It is a commonplace to emphasize the agricultural basis for all ancient societies and, for five millennia, this was true of the Aegean region. The standard western Old World cultigens (wheat, barley, and pulses) and domesticated animals (sheep, goats, pigs, and cattle) arrived by 7000 BC (with or without people), in eastern mainland Greece and on Crete, at least at Knossos.[1] For Crete, lack of evidence for prior human settlement strongly suggests deliberate colonization at that time, probably from southwest Anatolia.[2] The Bronze Age in the Aegean officially begins late in the fourth millennium BC,[3] although metalworking is quite common before this, and regular use of tin bronze relatively rare before the later third millennium. By 3000 BC permanent human populations practicing agriculture had reached all but the tiniest Aegean islands,[4] facilitating the formation of an interaction zone comprising the eastern Greek mainland, the northern Aegean, western Anatolia, and Crete. The Aegean is not rich in mineral resources, but obsidian (for chipped stone tools) was available on Melos (and had been exploited since the eleventh millennium BC), while copper ores were exploited on Cythnos and lead and silver on Siphnos in the

[1] Perlès 2001; Halstead 1996; Kotsakis 2001. [2] Broodbank and Strasser 1991.
[3] Manning 2001: 144–5, 217 (c. 3100 BC); Warren and Hankey 1989: 169 (c. 3500 BC).
[4] Cherry 1981; 1990; Broodbank 2000: 107–74.

https://doi.org/10.1017/CHOL9780521780537.008 Published online by Cambridge University Press

third millennium. Naxos provided the abrasive emery and the island of Aegina provided andesite for millstones. To these, we can add the important sources of lead, silver, and probably copper[5] around Laurion in eastern Attica, exploited in the third and second millennium BC.

Reacting to broadly exogenous explanations of culture change current since the origins of Aegean archaeology, Renfrew suggested in his pioneering study of the emergence of social complexity in the Aegean[6] that the transformation of the Aegean in the third millennium was a primarily endogenous, economic phenomenon. Increased agricultural production, made possible by the exploitation of the "Mediterranean triad" (olives, vines, and grain), and the development of metallurgy fueled this process. To these we can add the exploitation of livestock for their "secondary products."[7] According to this interpretation, ox-driven plough[8] agriculture increased grain production and supported non-agricultural specialists producing metals and other exchangeable craft products, such as woolen textiles. Olive oil could be consumed in times of stress or transformed into an exchange commodity, while wine provided another exchange commodity and fueled ritual consumption among the elite. After a millennium of aggregate growth, Cretan "palatial" societies emerged, based on redistribution of surplus staple production, followed, half a millennium later, by those of mainland Greece.

More recent research has challenged this picture.[9] Geoarchaeological work, particularly in the southern Argolid,[10] suggests that overexploitation of slopes to take in additional land to feed growing Early Bronze Age populations may have triggered catastrophic erosion in parts of mainland Greece, ushering in a period of economic collapse in the Middle Bronze Age.[11] The extent of viticulture and oleoculture before the emergence of the Cretan palaces has also been questioned.[12] Some scholars traced the emergence of social complexity to long-standing practices of built-in overproduction, demanded by the ecology of southern Greece.[13] Practices of "social storage," when captured by elites, gave rise to the redistributive economies of the second-millennium BC palaces. Some have also stressed ecological differences between the northern and southern Aegean; the semi-arid, marginal environment of the southern Aegean stimulated social strategies

[5] Kassianidou and Knapp 2004: 220 point out that, although there are copper minerals at Laurion, there is no archaeological evidence for copper extraction in the second millennium BC; the evidence depends on lead isotope analysis of artifacts.

[6] Renfrew 1972. See Barrett and Halstead 2004 for assessments of the impact of Renfrew's publication thirty years on.

[7] Sherratt 1981. [8] Pullen 1992.

[9] Summarized in Halstead 2004. [10] Jameson et al. 1994.

[11] For the further possibility of climate change at this period see Dalfes et al. 1997.

[12] Hansen 1988; Runnels and Hansen 1986; Hamilakis 1996; 1999.

[13] Halstead 1981; Halstead and O'Shea 1989.

to minimize temporal and spatial shortfalls in food.[14] Furthermore, recent research on third-millennium Cretan society suggests greater complexity than was previously envisaged, notably in the production and circulation of ceramics.[15] Equally it is likely that some sites, especially that at Knossos (5 hectares, perhaps 1,000–1,200 people), had already achieved significant size and social complexity several centuries before the end of the third millennium.[16]

Current research tends to take a larger-scale view, emphasizing regional diversity.[17] Moving beyond Renfrew's endogenous and ecological explanations, scholars now emphasize "interactionist" models.[18] A recent study of the third-millennium societies of the Aegean islands, for example, stresses the interconnectedness that was fundamental to their success.[19] These models, broadly operating within world-systems analytical frameworks, reinstate cross-cultural interactions, not in their older diffusionist guise, but emphasizing active strategies and choices within Aegean societies and the fact that different regions show different historical trajectories.[20] In such models the later third millennium BC is crucial; in this period sailing ships from the east became regular visitors to the Aegean, and probably also came into use within the region.[21] The replacement of oar-driven longboats with sailing ships collapsed distance and drew the Aegean into regular and more-or-less direct interaction with the "great powers" of the eastern Mediterranean in the second millennium. This must have played a significant role in the establishment, by 1900 BC, of the first "palatial" societies on the island of Crete,[22] offering elites opportunities to acquire "symbolic capital" in the form of exotic materials, contacts, and knowledge, thereby differentiating themselves from commoners and supporting their authority.[23] This ability to acquire and display exotic materials and knowledge was central to Aegean elite self-representations throughout the second millennium BC.[24]

[14] E.g., Halstead 1994. [15] E.g., Day et al. 1997; Whitelaw et al. 1997; Wilson et al. 2004.

[16] E.g., Whitelaw 1983; 2004b; Day and Wilson 2002. See Whitelaw 2000: 225, Table 1, for the estimated size and population.

[17] E.g., Halstead 1994; Whitelaw 2004b.

[18] Cf. Horden and Purcell 2000. [19] Broodbank 2000.

[20] Undoubtedly part of the stimulus to re-examine the role of "eastern" connections arose from the critique of Bernal (1987; 1991; cf. discussion in *Journal of Mediterranean Archaeology* 3 (1990) 53–137; Lefkowitz and Rogers 1996). While far from accepting Bernal's arguments, the organization of conferences (e.g., Cline and Harris-Cline 1998; Karageorghis and Stampolidis 1998) illustrates the renewed interest in such connections. See now also Laffineur and Greco 2005.

[21] Broodbank 2000: 341–9; Sherratt 2000a: 18–20.

[22] Cf. Sherratt and Sherratt 1991. [23] Cf. Helms 1988.

[24] The dates given in the table, and used in the text, are based on Warren and Hankey 1989; Manning 2001; Wiener 2003; 2007, and, in relation to specific regions and periods, Rutter 2001; Shelmerdine 2001a (mainland); Watrous 2001; Rehak and Younger 2001 (Crete). Relative chronology has been defined in detail through the linkage of deposits of archaeological materials, especially ceramics. In the Early Minoan/Helladic phases, radiometric (^{14}C) dating has been valuable in establishing absolute dates, particularly early in the period. Absolute chronology in the later third and the second millennia has

Table 7.1 *Chronological Table for the Aegean Bronze Age. All absolute dates are approximate and liable to change*

Cultural Label		Crete (Minoan)		Mainland (Helladic)	
Crete	Mainland	Pottery phase	Date range (BC)	Date range (BC)	Pottery phase
Pre-Palatial		EMI	by 3100–2700		EHI
		EMII	2700–2200		EHII
		EMIII	2200–2100	2200–2000	EHIII
		MMIA	2100–1900		
		MMIB	1900–1800		
Proto-Palatial		MMII	1800–1700	2000–1600	MH
		MMIII	1700–1600		
		LMIA	1600–1480	1600–1500	LHI
Neo-Palatial		LMIB	1480–1425	1500–1440	LHIIA
Final-Palatial	Mycenaean	LMII	1425–1390	1440–1390	LHIIB
		LMIIIA1	1390–1370		LHIIIA1
Post–Palatial		LMIIIA2	1370–1300		LHIIIA2
		LMIIIB	1300–1190		LHIIIB
		LMIIIC	1190–1070		LHIIIC
		Subminoan	1070–1000	1070–1015	Submycenaean

II EVIDENCE

For much of the Aegean Bronze Age our primary evidence is archaeological. Systematic archaeological exploration began in 1870 with Schliemann's excavations at Hisarlık (ancient Troy), rapidly followed by excavations on

been determined through material culture links between the Aegean and the eastern Mediterranean, particularly the well-understood "historical" chronology of Egypt (e.g., Kitchen 2000). There are problems in the Late Bronze Age because the absolute chronology depends on dating the eruption of Thera/Santorini (e.g., Friedrich 2000). The "low" Aegean chronology assumes an eruption date for Thera c. 1550–1525 BC on the basis of synchronisms with Egypt. The "high" chronology advocated by some archaeologists (e.g., Manning 2001; Manning et al. 2001; 2002) assumes an eruption date c. 1650 BC based on ^{14}C determinations and on the recognition of annual phenomena affected by a major eruption (tree rings and Greenland ice cores: e.g., Manning 1999; Manning et al. 2001; 2002). These correlations have been challenged (e.g., Buckland et al. 1997), the issues particularly surrounding the inability conclusively to link the Thera/Santorini eruption specifically to indicators either in the dendrochronological or ice core sequences, and to difficulties in assessing radiocarbon determinations in the seventeenth and sixteenth centuries BC due to the shape of the calibration curve in those centuries. For a comprehensive and balanced overview of the *status quo*, see Wiener 2003; 2007. If accepted, the "high" chronology has the effect of raising the date for the beginning of the Late Bronze Age (LMIA/LHI) and the dates for LM/LHI–II by about a century. Dates prior to that are unaffected, compressing the Middle Bronze Age, while the two chronologies more or less come together in the fourteenth century BC. More significantly on a Mediterranean scale, it would correlate the Aegean Late Bronze Age with an earlier stage in Egyptian history (cf. Manning 1999; Kitchen 2000). Because of the general controversy surrounding absolute dates, archaeologists often use pottery phase names, allowing them to be sure that the phenomena under discussion belong within contemporary or earlier/later phases. This chart should assist readers wishing to consult the more specialist literature. The Egyptian 18th dynasty (Ahmose I) begins c. 1540 BC and ends c. 1296 BC.

the Greek mainland. Crete attracted increasing attention after its independence from the Ottoman empire in 1898.[25] The framework behind these first investigations owed much to contemporary classical archaeology, except that researchers like Schliemann sought to elucidate a legendary rather than a historical past.[26] A distinct discipline of prehistoric archaeology developed in the first half of the twentieth century, pioneered by investigators like Blegen and Wace; but Renfrew in the early 1970s turned Aegean archaeology's theoretical gaze towards prehistoric archaeology as practiced elsewhere, separating it from classical archaeology.[27]

In general, excavation in southern mainland Greece and Crete has been biased toward large (mostly "palatial") sites and tombs,[28] but since the 1970s regional studies projects, pioneered by the Minnesota Messenia Expedition and the Southern Argolid Exploration Project,[29] have drawn attention to the broader range of settlement types (and other activities within the landscape), stimulating fuller understanding of non-urban settlement and land-use, and appreciation of analysis at different scales.[30] The introduction of intensive survey techniques in the 1980s[31] improved the resolution of this picture. Data from these surveys are now becoming available, making comparison between regions feasible for this and other periods (Table 7.2).[32]

Aegean survey archaeologists have increasingly deployed scientific techniques, already well established in parallel disciplines, to determine past land use, climate, and geomorphological change.[33] Scientific techniques have also been employed since the 1970s to study archaeological materials, notably in determining the provenance of ceramics and metals.[34] These have become increasingly sophisticated, particularly since the 1990s,

[25] On Troy, see Allen 1998, rightly reinstating Frank Calvert's contributions to the Troy enterprise. More generally, Fitton 1996; McDonald and Thomas 1990. For an up-to-date summary of the state-of-play of prehistoric archaeology throughout Greece, see Cullen 2001, with extensive references. Brown 2001 offers insights into the practice of archaeology in late nineteenth-century Crete.

[26] Allen 1998; Morris 1994a.

[27] McDonald and Thomas 1990; Renfrew 1980; Snodgrass 1987. See also Barrett and Halstead 2004 on Renfrew's legacy in Aegean archaeology.

[28] For a still useful, but out-of-date summary of prehistoric sites in mainland Greece and the islands, see Hope Simpson and Dickinson 1979, and Hope Simpson 1981. Cavanagh and Mee 1998 offer an exhaustive survey of mainland and island burial evidence. For burial evidence on Crete, see Pini 1968; Löwe 1996.

[29] McDonald and Rapp 1972; Jameson, Runnels and van Andel 1994.

[30] Pioneering in this respect was the Melos project: Renfrew and Wagstaff 1982.

[31] See, e.g., Cherry 1983; 1994; 2003.

[32] See, e.g., Driessen 2001b; Cunningham and Driessen 2004 (for Crete); Cherry and Davis 2001; Wright 2004; Rutter 2001: 97–106, 148–9 (for southern mainland Greece); cf. Alcock 1994 (for similar comparison in the Hellenistic period), and Cherry 2003 (for a broader overview of the contribution of intensive survey to prehistoric Aegean archaeology). The papers in Alcock and Cherry 2004 offer a comparative perspective on survey in the broader Mediterranean.

[33] E.g., Zangger 1993; Zangger et al. 1997; Rackham and Moody 1996; Grove and Rackham 2001.

[34] E.g., Day 1988; 1997; Day et al. 1997; Jones 1986 (ceramics); Gale 1991a; Stos-Gale 2000; 2001 (metals).

Table 7.2 *Regions intensively surveyed in Greece and Crete, showing area covered, number and approximate density of Late Bronze Age sites**

Region	Area surveyed (km²)	No. LBA sites (minimum)	No. LBA sites(/10 km²)
Mainland			
Berbati	25	19	7.6
S. Argolid (SAEP)	44	27	6.1
Methana	10	5	5.0
Skourta plain	32	14	4.4
Boiotia	45	16	3.6
Pylos (PRAP)	40	14	3.5
Nemea Valley (NVAP)	50	10	2.0
Lakonia	70	10	1.4
Asea	33	4	1.2
Oropos	22	2	0.9
Crete			
Ziros	2	6	30.0
Mesara	22	44	20.0
Petras-Ay Fotia	4	6	15.0
Kommos	25	29	11.6
Vrokastro	50	46	9.2
W. Mesara	22	20	9.1
Itanos	30	20	6.7
Akrotiri	171	107	6.3
Kavousi	50	30	6.0
Gournia	24	13	5.4
Praisos	9	4	4.4
Ay Vasileios	38	11	2.9
Malia	40	9	2.3
Lasithi	85	13	1.5
Ayiofarango	20	1	0.5
Kythera	30	88	29.3
Messenia (UMME)	3800	168	0.4

* Data from Cherry and Davis 2001: 154, table 10.2; Driessen 2001b: 51–3, table 4.1; Rutter 2001: 98, table 1; Shelmerdine 2001a: 343, table 2, updated from Cavanagh et al. 1996; Cosmopoulos 2001; Forsén and Forsén 2003; Mee and Forbes 1997; Watrous et al. 2004.

and include residue analyses of ancient ceramics to determine their use.[35] Both the British and American Schools of archaeology in Athens now have archaeological laboratories. Regularly used techniques include the study of ancient plant remains, both macroscopically (archaeobotany) and through pollen analysis (palynology),[36] and of animal bones (zooarchaeology).[37] It is a matter of some embarrassment, however, that skeletal studies of human

[35] E.g., Tzedakis and Martlew 1999: 26–9.

[36] E.g., Hansen 1985; Jones 1987; Sarpaki 2001; Valamoti 2003; also Haldane 1993 for organic materials preserved in wreck contexts.

[37] E.g., Kotjabopoulou et al. 2003; Halstead 1998–9.

disease and demography remain underdeveloped, despite extensive excavation of burials. But this is changing, and stable-isotopic study of human bone is also shedding light on ancient diet.[38]

The "palatial" Bronze Age, beginning with the first palaces on Crete c. 1900 BC, brings the first written sources. Unfortunately the scripts used on administrative (and other) documents before c. 1400 BC, the so-called Cretan Hieroglyphic and Linear A, have not yet been deciphered, so the evidence they offer is limited.[39] Nevertheless, since numbers and many commodities are identifiable, progress has been made in quantifying products within these systems,[40] while detailed study of different types of documents (including tablets and various types of sealings) suggests a basic understanding of Linear A administrative practices[41] and possible administrative hierarchies among sites.[42] The use of Linear A on the islands of the Aegean (Thera, Melos, Keos, Kythera, and Samothrace) and at Miletus in southwest Anatolia is suggestive, and fits with Minoan Cretan cultural dominance there in the later Middle and early Late Bronze Age.[43]

From c. 1400 BC, we have documentary evidence (mostly clay tablets, also seal-impressed clay nodules) in the Linear B script, which Michael Ventris showed in 1952 recorded an early form of Greek.[44] The earliest surviving documents on clay, some 4,000 in number, come from two horizons in the palace at Knossos. One dates to the end of the fifteenth century BC, and the other, preserving more tablets, around the middle of the fourteenth.[45] Most other Linear B documents belong to the later thirteenth century BC, from the major mainland Greek "palatial" centers of Pylos (c. 1,100 documents), Thebes (c. 430), Mycenae (73), Tiryns (24), and Midea (3).[46] The discovery of three Linear B tablets dating to the mid-thirteenth century at Chania

[38] E.g., Tzedakis and Martlew 1999: 210–37; Vaughan and Coulson 2000 (paleodiet); Halstead 1977; McGeorge 1987; Hallager and McGeorge 1992; Triantaphyllou 2001 (skeletal analysis).

[39] Cretan Hieroglyphic: Karnava 2000; Olivier and Godart 1996; Schoep 1996; Younger 1996–7; Linear A: Godart and Olivier 1976–85; Hallager 1996; Schoep 2002.

[40] R. Palmer 1995; Schoep 2002. [41] Hallager 1996; Schoep 2002. [42] Schoep 1999.

[43] Palaima 1982, now updated by Karnava 2007 to include the discovery of administrative documents on Thera (Michailidou 1992–3; Boulotis 1998) and Samothrace (Matsas 1995), and a non-administrative inscription on Kythera (Sakellarakis 1996). For Miletus, see Niemeier 1996.

[44] Ventris and Chadwick 1973 is still the best basic introduction; on the decipherment, see Chadwick 1990; Robinson 2002. For a valuable and concise overview of the use of Linear B documents, see Palaima 2003a.

[45] Driessen (1990; 2000) gives evidence for the earliest Linear B at Knossos from the so-called "Room of the Chariot Tablets," and sketches the implications of the chronological separation of this group of tablets from the rest of the archive in Driessen 2001a. For the possibility of additional minor destructions at Knossos, see Driessen 1997; Firth 2000–1. For full publication of the Knossos texts, see Chadwick et al. 1987–98.

[46] Aravantinos et al. 2001 (recent Thebes tablets); Melena and Olivier 1991 (documents from Tiryns, Thebes, and Mycenae); Bennett and Olivier 1973; Bennett et al. forthcoming (Pylos texts). Midea: Demakopoulou and Divari-Valakou 1994–5. A single tablet recently discovered in a LHIIIA2 context at Mycenae has the distinction of being the earliest example from a securely dated context: Blackman 2001: 29–30; Shelton 2002–3.

in western Crete[47] is significant, showing that Linear B administration continued on Crete beyond the destruction of the palace at Knossos in the mid-fourteenth century. In addition to the more than 5,000 documents on clay, about 160 transport and storage vessels with inscriptions painted before firing (the so-called inscribed stirrup jars) are known, from all the above sites and a few more.[48] The exact relationship of these inscriptions to the archives is not yet fully understood. The vessels were mostly manufactured on Crete, but found in contexts throughout southern mainland Greece, strongly suggesting a link between the inscriptions and their distribution.[49]

Although deciphered, the Linear B documents are limited in scope.[50] Their content is primarily economic and exclusively administrative, not legal, literary, liturgical, or narrative. The administrative transactions recorded, however, include references to cult activity (offerings made by the palaces) and festivals. The information they contain would be more valuable if each site had a time-series of texts. However, at most sites (Knossos excepted[51]), the documents offer no time depth, because they owe their preservation to the fires that burned the buildings in which they were created and stored. Documents seem to refer to regular activities on varying cycles, while explicit references to "this year," "last year," or "next year" on a few tablets suggest an administrative "window" of a little over a year.[52] Possibly information was transferred onto larger, more easily stored media – parchment or papyrus – but such documents do not survive.

Although the Linear B documents offer much information,[53] it is axiomatic in the field that their value can be greatly enhanced by combining them with archaeological evidence.[54] Equally, within Linear B studies (usually called "Mycenaean studies" in the UK and "Mycenology" in the USA), the principle of contextual analysis of sign-groups, rather than etymological interpretation alone, has become standard practice.[55] In addition to internal Aegean textual evidence, Egypt provides some external textual evidence and representations of individuals from Keftiu;[56] some Hittite texts refer to men from Ahhiyawa active in Anatolia;[57] and documents from Ugarit and Mari refer to Aegean merchants.[58]

[47] Hallager, Vlasaki, and Hallager 1992.
[48] Catling et al. 1980; van Alfen 1996–7.
[49] Day and Haskell 1995; Catling et al. 1980.
[50] As noted by Finley 1957: 129.
[51] E.g., Driessen 1990; 1997; 2001a.
[52] See Bennet 2001: 30, fig. 1 for one way of representing the Linear B administrative cycle.
[53] For an exposition of the potential of Linear B for writing the history of the Aegean Late Bronze Age, see Chadwick 1976.
[54] E.g., Bennet 1988a; Driessen 1990; Palaima and Shelmerdine 1984; Shelmerdine and Palaima 1984.
[55] Ventris and Chadwick 1973; L. Palmer 1963: 27–36. An excellent Mycenaean dictionary presents differing interpretations of sign-groups with bibliography: Aura Jorro 1985–93.
[56] E.g., Vercoutter 1956; Helck 1995; Wachsmann 1987; Panagiotopoulos 2001.
[57] E.g., Beckman 1996; Cline 1994: 121–5; Hawkins 1998; Niemeier 1998.
[58] E.g., Heltzer 1988; 1989; Malamat 1971.

III PRE-MYCENAEAN AEGEAN (3000–1400 BC)

(a) *Growth and development*

As noted above, the southern Greek mainland, islands, and Crete diverged from northern Greece in the early third millennium BC. Using data from regional surveys, we can suggest that settlement numbers (and presumably population) increased in all areas in the first half of the third millennium.[59] In many regions settlement expanded into virgin territory as more land was taken in to support increasing populations. We also encounter the first representations of ploughs.[60] Modestly large villages appeared on the mainland, including Lerna (perhaps 1.6 ha.; population c. 300), Tiryns (perhaps 4 ha.; population c. 800), and Kolonna on Aegina (2.5 ha.; c. 500 population). The evidence of architectural differentiation within these settlements is also significant. Large structures known as "corridor houses" appeared, providing evidence of management of storage, possibly of valuable commodities, through clay sealings.[61]

Around 2200–2000 BC, however, a further divergence took place. During this phase settlement numbers fell sharply in most parts of the southern mainland, except Messenia, where they apparently increased. Catastrophic erosion induced by the expansion of agriculture onto unstabilized (i.e. non-terraced) slopes may have been at least a partial factor in the northeast Peloponnese, although it is unclear how far this can be generalized.[62] There is also evidence that settlement became increasingly nucleated, so simply counting site numbers defined by surveys might mask more stable population levels.[63] Some mainland areas, like the Nemea valley, were apparently abandoned in the first half of the second millennium BC.[64] In the Cyclades settlement patterns and organization were restructured; some see this as a gap in settlement.[65] Crete, on the other hand, saw opposite trends, with large increases of site numbers in most areas and, of course, the emergence of distinctive monumental structures conventionally called palaces.[66]

The Minoan "palaces" and their surrounding habitations represent the first settlements in the Aegean which can meaningfully be called "urban."

[59] See Rutter 2001: 97–102, table 1, and 148–9; Wright 2004; Driessen 2001b: 51, table 4.1, for figures.

[60] Pullen 1992; whether we should take this as evidence for its recent introduction (cf. Sherratt 1981) is open to debate.

[61] For sizes: Jameson et al. 1994: 543, table B.1; Pullen 2003: 30–1; Zangger 1994: 202, fig. 8. For the "corridor house" in general, see Shaw 1987. On EHII sealing: e.g., Weingarten 1997 (Lerna); 2000 (Yeraki).

[62] For a skeptical view, see Endfield 1997.

[63] Jameson et al. 1994: 366–8; although they estimate a decline in population in their survey region from c. 1,900 in EH II to 475 in MH (1994: 563, table B.7).

[64] Cherry and Davis 2001: 150–2; Wright 2004: 123–4.

[65] On this question see Broodbank 2000: 320–61; Sherratt 2000a: 20–2.

[66] Driessen 2001b; Cunningham and Driessen 2004.

It is difficult to estimate the size of settlements around the palaces, but Whitelaw estimates that Knossos town covered 33 hectares in the immediately pre-palatial phase (c. 2200–1900 BC), rising to 56 hectares in Protopalatial times (c. 1900–1700 BC). Equally striking is the fact that the site may only have extended to 5 hectares around 2200 BC, implying a tenfold increase in size over three centuries. Immigration, not internal growth, presumably accounts for much of this.[67] Population estimates for Protopalatial Knossos range from 11,200 to 14,000.[68] The other known Cretan palaces at Malia and Phaistos approach this size, but no other contemporary Aegean sites come anywhere near this scale.[69] Using estimates of household size and differential estimates of population density for sectors of the settlement radiating out from center to periphery, it seems that Knossos reached its largest size c. 1500 BC, covering 67 hectares, with a population around 13,400 – 16,750.[70] Only in Roman times, when Gortyn (covering 100 hectares, or 1 km^2) was the island's capital, did Cretan cities regain this scale. It is worth pointing out that these figures are comparable to sites in western Anatolia (e.g., Troy VI: 27 hectares) and Syria (e.g., Ugarit-Ras Shamra: perhaps 28 hectares; Alalakh: c. 22 hectares), since some scholars have argued that Aegean urbanism was on a radically different scale from that in western Asia.[71] In terms of the urban–rural division of population, it has been suggested that 40 to 50 percent of Neo-Palatial Minoans dwelt in cities or towns. Recent survey on the island of Kythera suggests a similar pattern, with much of the population congregated loosely around the major harbor town of Kastri.[72]

With the emergence of the "palaces," Minoan material culture dominated the Aegean. However, we should resist the temptation to regard this as a uniform phenomenon (it is likely, at least in the first half of the second millennium, that each Minoan palace was politically independent and may have formed its own alliances and trade partnerships), or as a "thalassocracy" in Thucydides' terms. Already in the third millennium, there is good evidence for Minoan colonization of Kythera, where settlement patterns strikingly mirror those of Crete into the Late Bronze Age, and an unequivocally Minoan-style peak top sanctuary dominates Kastri.[73] Other

[67] Whitelaw 2000: 225, table 1. [68] Whitelaw 2001a: 21–7.

[69] Whitelaw (2001a: 29, fig. 2.10) estimates Malia's extent in the Neopalatial period as c. 37 hectares, just over half the size of Knossos.

[70] Whitelaw 2000: 225, table 1; cf. 2004a: 153 (14,000–18,000).

[71] Renfrew 1972: 240–4; Whitelaw 2001a: 27–31. This is not to deny that the scale of urban settlement in Late Uruk Mesopotamia was an order of magnitude larger. Crete's palaces were probably in direct contact with eastern Mediterranean states rather than those in Mesopotamia.

[72] Branigan 2001a: 45–9 (Crete); Bevan 2002 (Kythera).

[73] On Kythera: Broodbank 1999b; Sakellarakis 1996; Bevan 2002. Broodbank 2004 is a thoughtful exploration of the issue of "Minoanization" in the Aegean in general; see also Wiener 1990.

islands show differing degrees of affiliation: Minoan styles with a more visible substrate of indigenous material culture, mostly from the mid-second millennium onwards. Kolonna on Aegina was a prominent site through much of the second millennium, with trade links over much of the eastern Greek mainland, and extensive use and imitation of Minoan pottery.[74]

Lead isotope analysis of bronze, silver, and lead artifacts on Crete suggests that the need for metals (copper, lead, and silver) available from Laurion in eastern Attica drove such interconnections.[75] Documentary evidence from Mari, however, suggests that tin came from the eastern Mediterranean, via long-distance exchange networks established in the late third millennium.[76]

Seventeenth-century Crete experienced destructions at the major palaces, probably caused by earthquakes, and immediate reconstruction and remodeling. Some archaeologists suggest that storage facilities in the new palaces were more restricted, implying a smaller palatial role in storing (and redistributing?) staples, balanced, perhaps, by devolution of staple production and storage to rural settlements of varied form, unhappily known by the general term "villas."[77] However, other archaeologists argue that this reduction in palatial storage only happened after c. 1425 BC.[78] Equally, the sixteenth-century emergence in some settlements of distinctive central buildings with architectural features reminiscent of the palaces (especially central courts, leading to a proposal to call such structures "court-centered buildings") has complicated our understanding of political organization in early Late Bronze Age Crete, reflecting either emulation or political fragmentation.[79]

In the LMIA pottery phase (Table 1) the volcano on the island of Thera (Santorini) erupted, preserving for posterity the site of Akrotiri. We can be certain that the eruption did not directly cause the destruction of many palatial and sub-palatial sites on Crete that happened at the end of the following phase, at least 50–100 years later (even on the most conservative of low chronologies). Nevertheless, the eruption surely affected agriculture and settlement (in the short term), trade routes between Crete and its primary metal sources in Attica (in the medium term), and (less tangibly) popular confidence, particularly in rulers and their divine sanction.[80] In any event, a horizon of burnt destructions occurred across Crete c. 1425 BC,

[74] Rutter 2001: 125–30; Kilian-Dirlmeier 1997; Walter 2001.

[75] Stos-Gale and Macdonald 1991; Stos-Gale 2001. [76] E.g., Malamat 1971; Heltzer 1989.

[77] For the idea of devolved storage, see Halstead 1981: 203; Moody 1987: 236–7. For a recent collection of papers on "villas," see Hägg 1997.

[78] Christakis 1999: 123–31; 2004: 307.

[79] Knappett 1999; Hamilakis 1997–8; papers in Driessen et al. 2002. See also Schoep 1999; 2002 on possible fragmentation suggested by different practices in Linear A administration in the LMIB period.

[80] Driessen and Macdonald 1997 discuss these factors. Peatfield 1994 is interesting on possible ideological repercussions.

with only the palace at Knossos escaping. For at least a few generations, it was apparently the sole functioning palace for much of the western three-quarters of the island.[81]

The first signs of the emergence of complex societies on mainland Greece come around 1600 BC, roughly the same period as the construction of the new palaces on Crete. Rather like the situation in Early Iron Age Greece, our primary evidence comes from burials, particularly the shaft graves at Mycenae and the earliest tholos ("beehive") tombs of Messenia.[82] Most regard the groups using these (and other) burials as ancestors of the rulers of the later "Mycenaean" palaces.[83] The quantities of objects with exotic provenances or styles deposited particularly in the Mycenae shaft graves have led to suggestions that the Mycenaeans "got rich quick" as mercenaries, or took the treasure as plunder. However, what we seem to have is a conscious choice by leading groups within these various societies to negotiate their status competitively, by disposing of objects that invoked their broad horizons, extending from the central Mediterranean to Crete, and, through Crete, to the eastern Mediterranean and Egypt. Amber (some Baltic, some Sicilian[84]) appears for the first time in a few tombs, highlighting contacts with (and probably beyond) the central Mediterranean. The occurrence of Late Helladic I pottery at Vivara in the bay of Naples, Filicudi, and the Lipari Islands is consistent with this.[85] Material of the same period is also attested at Toroni in coastal Macedonia.[86] These contacts probably mark the initial emergence of a Mycenaean "margin," a region affected but not transformed by Mycenaean contacts.[87]

Sites that began achieving prominence c. 1600 BC tended to keep growing, becoming the major players of the "heyday" of Mycenaean Greece (c. 1400–1250 BC). This is clear in Messenia, where the growth of Pylos, at the expense of near neighbors and potential competitors, can be demonstrated.[88] Equally, settlement numbers rose throughout mainland Greece in this phase, often reaching or surpassing the levels that had prevailed

[81] For the extent, see Bennet 1985; Driessen 2001a. The existence of the Knossos palace has led to proposals to rename the phase between these destructions and Knossos' destruction (previously referred to as the "Postpalatial") as the "Third Palace" (Dickinson 1994: 13, fig. 1.2) or the "Final Palace" period (Rehak and Younger 2001: 384, 391, table 1).

[82] Cavanagh and Mee 1998: 41–60; Dickinson 1977.

[83] E.g., Kilian 1988; Wright 1995; Palaima 1995.

[84] Beck 1966; Beck et al. 1968; Harding and Hughes-Brock 1974. Most recently Maran 2004.

[85] Vagnetti 1993; 1998; 1999a; 1999b; Graziadio 1998.

[86] Wardle 1993; Cambitoglou and Papadopoulos 1993.

[87] Sherratt and Sherratt 1991; cf. A. Sherratt 1987 on the ideal placement of Mycenae to monitor overland trans-shipment of commodities from the Corinthian to the Argolic Gulfs. See A. Sherratt 1993, with Schneider 1977, for a world-systems view of relations between temperate Europe and the Mediterranean and the concept of the "margin" in addition to "core" and "periphery." For the question of why, with broadly similar ecology, palatial societies did not emerge in the central Mediterranean in the second millennium BC, see Lewthwaite 1983.

[88] Bennet 1999b; Bennet and Shelmerdine 2001; Shelmerdine 2001b.

before the early second-millennium decline. Settlement numbers throughout much of southern Greece probably reached their highest levels in the fourteenth and thirteenth centuries BC.[89] The spread of settlement in the vicinity of Mycenae (the Nemea and Berbati regions[90]) is an interesting feature of this expansion. At least in the case of Nemea, this was probably a deliberate recolonization to expand cultivated land, perhaps involving some drainage of the Nemea valley.[91]

Mycenae was the largest urban center in mainland Greece c. 1400–1250 BC. Its continuously inhabited "core" extended over 32 hectares and its population perhaps reached 6,400, if we assume a density of 200 people per hectare.[92] The Argolid housed a particularly dense concentration of prominent sites, including not only the fortified sites of Mycenae, Tiryns, and Midea, but also Argos, Lerna, Nauplion, and Asine. Although there has been no systematic intensive survey on the Argive plain itself, it is clear that life here centered on urban settlements. The "presence" of the Argive centers probably affected settlement and economic activity in neighboring regions, such as Berbati and the Nemea valley, even extending into Corinthia.[93]

In Boeotia, Thebes, whose urban topography is difficult to reconstruct because of the substantial modern town that overlies it,[94] might have been almost as extensive as Mycenae, perhaps 28 hectares.[95] Finds of Linear B documents, Linear B inscribed stirrup jars, ivories, and lapis lazuli cylinder seals remind us of Thebes's likely importance, even without recourse to its prominence in later Greek tradition, as reflected in its popularity in fifth-century Athenian tragedy. In Messenia, recent urban survey[96] at Bronze Age Pylos suggests its lower town (beyond the palatial structures themselves) extended over 12–13 hectares at the site's peak in LH IIIB, while the palatial structures themselves occupied about 2 hectares, giving a total of 14–15 hectares, for which a reasonable population estimate is about 3,000.[97] At Pylos, Linear B texts imply that at least 377 (perhaps 460, if restored) dependant female workers – over 10 percent of the archaeologically estimated population – were resident at the center itself.[98]

Extrapolating from these figures for Pylos to the whole region surveyed by the Minnesota Messenia Expedition (multiplied by the Pylos Regional Archaeological Project's "success rate" with prehistoric sites), Whitelaw

[89] E.g., Wright 2004; Davis et al. 1997; Shelmerdine 2001a: 342–6, 379.
[90] Cherry and Davis 2001; Wells and Runnels 1996; Wright 2004. [91] Cherry and Davis 2001.
[92] French 2002: 64, who suggests, however, that the proposed population density of 200/ha. is perhaps too high. Also Iakovides and French 2003: 22.
[93] Cherry and Davis 2001; Morgan 1999; Wright 2004: 123–8.
[94] Dakouri-Hild 2001; Symeonoglou 1985. [95] Whitelaw 2001a: 29, fig. 2.10.
[96] Cf. Alcock 1991; Snodgrass and Bintliff 1991.
[97] Bennet and Shelmerdine 2001, 136; Bennet 1999b; Whitelaw 2001c: 63 (population estimate).
[98] Chadwick 1988: 76.

estimates a total population for the Pylian polity of 50,000.[99] Whitelaw's figures would mean that as many as 16,800 (34 percent) of the population lived in the twenty or so largest settlements (2 hectares in extent or larger). These include Pylos itself, a possible second "capital" at Leuktron, and seventeen second-order centers suggested by the Linear B texts.[100]

We should be wary of generalizing a uniform way of life across all the Mycenaean polities of the fourteenth–thirteenth century BC southern Aegean. Nevertheless, Mycenaean material culture apparently included central Greece as far as modern Volos and Dimini (perhaps to be identified as legendary Iolkos) in southern Thessaly.[101] Beyond this area, there are indications that Macedonia and Epiros lay on the "margin" of this world.

(b) *Institutions*

The major economic organization in Middle and Late Minoan Crete and Late Helladic mainland Greece was something we customarily call the "palace." The presence of large-scale storage facilities for staples and craft products, together with spaces for rituals, evidence of bureaucratic control, and the Minoan palaces' sheer size suggest strongly that they could extract what they wished and manage economic activity over quite large areas (perhaps up to 3,000–4,000 km^2).[102] The palaces were not a short-lived phenomenon, even if we ignore developments prior to the appearance of the specific architectural form. We should not assume that they functioned in the same way from c. 1900 BC to the end of the Bronze Age. Without being able to understand the documentary evidence fully, however, it is difficult to assess the extent to which Minoan "palaces" dominated the economies of their regions, let alone how the balance shifted through time.[103]

[99] Whitelaw 2001c: 63–4, based on McDonald and Rapp 1972: 141; Bennet 1995; 1999a. Chadwick (McDonald and Rapp 1972: 111–13), using Linear B documentary evidence, suggested a total population almost twice as large: 80,000–100,000, close to the population estimate of the region for classical times (112,500) suggested by Roebuck (McDonald and Rapp 1972: 113).

[100] Bennet 1995, with references, on the largest settlements. The figure is based on size estimates given by McDonald and Rapp 1972, superseded by estimates from PRAP (e.g., Bennet 1999b). Since in most instances PRAP's detailed investigation has suggested larger site sizes than those estimated by McDonald and Rapp (1972), it is likely that the figures for the total area and therefore population of the larger sites are underestimates. However, it is harder to ascertain whether further increases would change the *proportion* of urban to rural, or simply increase the overall population estimate. On Leuktron, see Bennet 1998–9.

[101] Hope Simpson and Dickinson 1979: 272–98. On a Mycenaean palace at Dimini, see Adrymi-Sismani 2000. Feuer (1983) explicitly examined the Mycenaean northern boundary, but his publication needs updating.

[102] Bennet 1990.

[103] See Knappett 1999 for a perceptive discussion of problems in understanding the polities just of the Protopalatial period. He particularly notes that economic, political, and cultural spheres need not be coterminous. Driessen and Macdonald 1997 discuss possible changes within the Late Bronze Age on Crete; see Knappett and Schoep 2000; Schoep 1999, for the Middle and Late Bronze Ages.

We can say more about the Mycenaean "palaces," since we can read the Linear B documents (see below). Authority in the earliest mainland polities may have been kin-based, only becoming institutionalized after a period of intense competitive display and negotiation.[104] We may associate this development with the construction of the first true "palaces" (in the sense of building complexes embodying administrative, economic, and ritual functions with regional significance), a phenomenon that belongs only in the late fifteenth to early fourteenth centuries BC. It is possible that the bureaucratic techniques familiar from Linear B were first developed at Knossos in the second half of the fifteenth century BC and only then introduced on the mainland.[105]

It is worth noting the differences between palatial organization on Crete and the mainland in the Late Bronze Age. On Crete, the system attested at Knossos was apparently an adaptation of earlier power structures and administration. The evidence of place-names mentioned in the Knossos archive – only about one hundred for an area of perhaps 3,000–4,000 km^2 – suggests that Knossos dealt primarily with relatively high-level places. By contrast, over 200 place-names appear in the archive from Pylos, which probably dealt with sites much lower in any hierarchy of settlements, suggesting a more centralized system. Further a combination of archaeological and textual evidence suggests that the Pylos system expanded from west to east by incorporating competing early Mycenaean centers.[106]

The presence of deciphered texts on the mainland creates a danger of overestimating the role played by "palaces" in regional economies and underestimating differences between practices at different "palaces" or through time at individual "palaces."[107] Within their final century, for example, the physical structures at Bronze Age Pylos were remodeled considerably, restricting and modifying access to the central buildings.[108] Although the different histories of excavation may have affected the finds, it is worth noting that almost all administrative documents discovered at Pylos were within the palatial structures, whereas at Mycenae most were recovered from structures outside the fortifications. But we do not know whether this was a result of different practice in the two sites or of diachronic changes between

[104] E.g., Wright 1995; cf. Voutsaki 1995; 2001.

[105] Implied by Driessen 2000; see also Palaima 1988b. It is also possible that Linear B was developed on the mainland and then taken to Crete, but this reconstruction depends partly on assuming an essentialist identity – Greek script can only have been devised in Greece – and the idea that intrusive Mycenaeans introduced the script to Crete in the wake of the c. 1425 BC destructions (for a more complex view, see, e.g., Preston 1999). For others, the fact that proper "palaces" were barely known on the mainland before c. 1400 BC militates against the bureaucratic system being developed there.

[106] Bennet 1995; 1999a; 1999b.

[107] For a summary account of differences in administrative practice, for example, see Shelmerdine 1999; for differences across time at Knossos, see Driessen 2001a.

[108] Shelmerdine 1987; 2001a: 337–9 (recent work at Pylos suggests several phases within the final palace: Nelson 2001); Wright 1984.

mid-thirteenth-century Mycenae and late thirteenth-century Pylos. In any event, we should remember that the picture afforded by the Knossos documents is probably 150 years earlier than that suggested by the Pylos tablets.

In general, the type of palatial institutions we envisage in the Mycenaean polities is broadly similar to those of contemporary Mesopotamia. Finley proposed just such a comparison in an early review of *Documents in Mycenaean Greek*, rejecting analogies with later (especially "Homeric") Greece. He described the palatial economy as "a massive redistributive operation."[109] He drew here on Polanyi's characterization of redistribution in early economies as "appropriational movements towards a center and out of it again."[110] But while the Mycenaean economy clearly fits into this broad model, it covers a range of types of economic organization. Killen, in an authoritative overview, reinforces Finley's point about the similarity with Near Eastern economies, but suggests that the nature of Mycenaean "redistribution" needs to be made more precise.[111] A better term is "mobilization," he argues, citing Earle's definition: "the recruitment of goods and services for the benefit of a group not coterminous with the contributing members."[112] This better captures the way we now understand the selective nature of palatial interest – seeking to acquire commodities essential to the support and maintenance of the ruling elite – while reinforcing the essential point: the ability of the palatial economy to centralize control of those aspects of the economy it chose to manage.

More recently, archaeologists and textual scholars alike have emphasized forces operating alongside the palatial sector – the "para-palatial" economy, as I will call it, to reflect its coexistence with the palatial system. However we understand the institution of the "palace" in the LHIII Aegean, we should not think of it as controlling all economic activity within its region, despite its ability to exercise central control over some aspects; nor, necessarily, as existing within a distinct, clearly bounded territory.

IV MYCENAEAN AEGEAN (1400–1200 BC)

The workings of Aegean economies and their intersection with those of other regions are clearest in the fourteenth and thirteenth centuries BC. By this time, the entire southern Aegean was linked to long-distance exchange routes extending from southern Europe to Mesopotamia and Egypt. The "palatial" societies of first Crete and then southern mainland Greece transformed themselves into producers and consumers of materials (particularly

[109] Finley 1957: 135. [110] Polanyi 1957: 250.

[111] Killen 1985: 241–3 (updated as Killen 2007). For a systematic examination of parallels with Near Eastern systems, see de Fidio 1992.

[112] Earle 2002: 83. In his chapter "A reappraisal of redistribution," Earle distinguishes four types – leveling mechanisms; householding; share-out; and mobilization (Earle 2002: 81–96).

metals) and goods whose value was broadly shared and understood throughout the eastern Mediterranean.[113] The political economy operated by those in charge of "palaces" was articulated toward acquiring exotic raw materials and products and creating value-added products (most obviously cloth and perfumed oil) for exchange in the eastern Mediterranean circuit.

Exchange with the central Mediterranean most likely involved transferring manufactured goods from the Aegean *across* boundaries of shared value in exchange for raw materials (and perhaps people) for local Aegean consumption and trans-shipment into the east Mediterranean. There is evidence that Mycenaean material objects and associated behaviors (especially consumption of intoxicating beverages) were exploited by elites in Sicily and Macedonia.[114]

The rise to prominence of Late Bronze Age copper-producing centers on Cyprus reveals a re-articulation of exchange routes. Their products were shipped throughout the Mediterranean, from Sardinia to the Levant, in the trade-mark ox-hide shaped ingot,[115] despite the continued use of copper sources at Laurion in Attica, in Sardinia, and elsewhere.[116] The "palaces" probably monopolized such exchange, as the only organizations with sufficient capital and political authority to acquire and move high-value commodities and raw materials in the eastern Mediterranean.[117] However, shipwrecks spanning the late fourteenth through early twelfth centuries BC and the increasingly directional pattern of the distribution in Cyprus and the Levant of pottery manufactured in the Argolid region, both suggest that palatial monopolies were breaking down toward the late thirteenth century.[118]

The fall of the Hittite empire, retraction of Egyptian presence in Syria-Palestine, destruction of Ugarit, and rise of the Middle Assyrian empire in the early twelfth century had important repercussions for Aegean palatial elites, much of whose legitimacy lay in connections with the east Mediterranean. The development (centered on Cyprus) of ironworking, which did not depend on acquiring ores through long-distance exchange meant that, within the Aegean at least, such exchange monopolies and large political units would not return until Hellenistic times, close to a millennium later.[119]

[113] Sherratt and Sherratt 1991, with an elegant diagram, 385, fig. 1.

[114] D'Agata 2000 (Sicily); Andreou 2001; Kiriatzi 2000; Kiriatzi et al. 1997 (Macedonia).

[115] Steel 2004: 149–86; more generally, Knapp 1997. [116] Stos-Gale 2000.

[117] The Amarna letters (Moran 1992) give a flavor of the types of transactions involved, admittedly between Egypt and other major eastern Mediterranean "states," not the Aegean polities. The existence of an Aegean entity (or entities) recognized as such is perhaps implied by the references (collected in Cline 1994: 121–5; see also Beckman 1996) in fourteenth- and thirteenth-century Hittite sources to Ahhiyawa: see, e.g., Hawkins 1998; Niemeier 1998; and Finkelberg 1988, for the possible relation between Achaea (home of Homer's Akhaioi [Achaeans]) and Ahhiyawa as a term for fourteenth–thirteenth century Greece.

[118] E.g., Sherratt 1999; 2000b; 2001. [119] Sherratt 1994; 2000b.

(a) *Production*

In order to understand palatial production, we must take into account the institutions involved.[120] The Linear B tablets reveal that the leading figure ("king") bore the title *wanax* (Myc. *wa-na-ka*; later Greek *anax*, "lord," often applied to deities).[121] This word, lacking a plausible Indo-European etymology, may have originated in Minoan Crete. It, and some of the institutions of rulership that went with it, may have been part of the early Mycenaean elite's appropriation of exotic materials and knowledge.[122] The adjective derived from *wanax*, *wanaktero-* (presumably "royal"), is applied to some examples of various products (e.g., cloth, javelin shafts, oil or wine contained in stirrup jars) and to certain craftspeople at Pylos (the "royal" fuller and potter are attested, for example, among those holding land). The term probably refers to the "king" in his official capacity, since at Pylos there are a few references by name to an individual who can possibly be identified with the *wanax*: the name *e-ke-ra*$_2$*-wo*[123] appears in the same position in Er 880 as the *wa-na-ka-te-ro, te-me-no* does on the parallel document Er 312. These could be references to the ruler's private wealth as a member of the elite. In effect, therefore, the terms *wanax* and *wanaktero-* can be regarded as synonymous with "palace" or "palatial."

Contrasted with the *wanax* is the *lawage(r)tas*, a more transparently Greek term, with the sense "leader" (*lawagetas*) or "assembler (*lawagertas*) of the host." We have a smaller number of attestations of the adjective derived from this term (*lawage(r)sio-*), but the contrast is clear in Pylos Er 312, in which the "estate" (*temenos*) of the *wanax* is three times larger than that of the *lawage(r)tas*. As well as this land, some individuals are described by the same adjective. In thirteenth-century BC Pylos, at least, a reasonable case can be made for the *lawage(r)tas* being the polity's "second-in-command," possibly based in the complex surrounding the palace's secondary megaron (Room 65), or Southwest Building.[124]

A group termed the *hek*^{w}*etai* (Myc. *e-qe-ta*) was probably also affiliated with the center. Their function is unclear, although the term's etymology ("followers," perhaps of the *wanax*) suggests that it might have been military.[125] Among other contexts, *hek*^{w}*etai* appear on documents (the *o-ka* tablets: Pylos An 657, 654, 656, 519, and 661) listing contingents

[120] On the question of this terminology and its relationship to later Greek, see, e.g., Morpurgo Davies 1979.

[121] Carlier 1984; 1998. For Linear B terms used throughout, see Aura Jorro 1985–93, s.vv., with bibliographic references.

[122] Palaima 1995; Wright 1995; see Kilian 1988 for the idea that the origins of *wanax*-style rulership can be traced back to the Shaft Grave period.

[123] Palaima 1998–9: 215–21, who realizes the name as *Hekhellawon*; see also Aura Jorro 1985–93: vol. 1, s.v., for other possibilities.

[124] Hiller 1987; also Davis and Bennet 1999. [125] Deger Jalkotzy 1978.

watching the Pylian coast. They accompany some of the contingents and their names – unusually for the Linear B corpus – include a patronymic, hinting at elite status. In other contexts, cloth (Knossos Ld[1] series) and chariot wheels (Pylos Sa series) are called *e-qe-si-jo* ("of or pertaining to *hek*^{w}*etai*"). It is possible (Pylos Wa 917) that a prominent individual (and administrative official) at Pylos – Alxoitas – was a *hek*^{w}*etas*.

Local communities within the Pylos polity seem to have been termed *da-mo* (*damoi*; esp. Pylos Cn 608). At the level of these communities, we have evidence for officials, particularly the *ko-re-te* and *po-ro-ko-re-te* (attested on Pylos Jn 829 at each district within the polity). Although we cannot interpret the main term, the *po-ro-* prefix seems to have the function of "sub-" or "vice-*ko-re-te*." At least one of their roles was insuring that communities met their obligations to the center (such as providing bronze, as on Pylos Jn 829).

The *g*^{w}*asileus* (Myc. *qa-si-re-u*, equivalent to later Greek *basileús*) was a titled official more deeply connected with local affairs.[126] Their exact role is unclear, but it may have involved supervising craft production at the local level, at least in the Pylos bronze industry.[127]

In societies of this type, ownership and control of land are crucial, and the Mycenaean documents offer tantalizing glimpses.[128] Once again, Pylos provides most evidence, although there are documents relating to land from Knossos, Thebes, and even among the small number of texts from Tiryns. These documents do not explicitly say that the state owned all land in the polities. The pair of documents Pylos Er 312 and 880 show that the *wanax*, *lawage(r)tas*, and other members of the elite at Pylos held land – described as a *temenos* (Myc. *te-me-no*) – at a place called *sa-ra-pe-da*; that this fact required recording might mean that the state (i.e., the *wanax*) did not own all land in the polity.

We have some detailed documentation of land-holding at Pylos: this land, its area measured in "seed" (Myc. *pe-mo*) grain, was at five locations, arguably all quite close to the center.[129] Two paired sets of documents (Pylos Eb and Eo; En and Ep) list those enjoying the use – the term "lease" is often used for want of a more precise translation of the Mycenaean *o-na-to* – of land at *pa-ki-ja-ne*, probably near the palace itself, some of which may ultimately belong to the state, some of which is definitely said to belong to the "community" (Myc. *da-mo*).[130] A similar series (Pylos Ea), perhaps in

[126] E.g., Carlier 1995; Lenz 1993.

[127] Smith 1992–3: 182. There are numerous other titled officials; for a discussion of those in the Pylos archive, see Lindgren 1973.

[128] For a summary, see Killen 1985: 243–50, with some changes of view reflected in Killen 1998b; also Duhoux 1976: 7–65; R. Palmer 1998–9.

[129] Killen 1985: 243–50; Lejeune 1974.

[130] Killen has recently argued that much of the land was in fact owned by the *damos* (Killen 1998b).

https://doi.org/10.1017/CHOL9780521780537.008 Published online by Cambridge University Press

progress at the time of the destruction, records landholding at an unknown location.

Individuals probably held land in return for services rendered to the center, to judge from references to the royal potter and fuller and to other producers, such as the unguent boiler Eumedes, or "slaves of the deity," presumably servants in a shrine.[131] There are also links between groups with land under flax recorded in the Pylos Na series and service in the An (*o-ka*) tablets.[132]

A final document (Pylos Eq 213) appears to record a palace official's tour of inspection of land at a number of locations, including *a-ke-re-wa*, a district capital probably not far from Pylos itself. Pylos An 830 lists land at locations in the Pylian further province, suggesting the palace could document control over parcels at some distance, perhaps again in return for services provided locally. Although less clear than those at Pylos, references to landholding in the Knossos documents mention a number of locations, although most may be close to the center.

We can therefore see some of the polity's productive capacity (and presumably the benefits from it) apportioned to distinct sectors among the ruling elite and to service-providers. In most cases, however, production records do not explicitly indicate "ownership" or "benefit accrued." In these cases, we assume that the palace is the owner or beneficiary.

However, there are two cases in which "ownership" or "benefit" is assigned to another entity or individuals. First, some productive areas are said to belong to a deity, in particular the female deity Potnia (*po-ti-ni-ja*). Some of the sheep flocks at Knossos and "bronze smiths" (Myc. *ka-ke-we khalkewes*) at Pylos are described in this way, as well as a perfumer.[133] The documents do not explain exactly how this arrangement worked, but we can imagine that the benefits accrued supported religious personnel and/or establishments associated with the goddess. It is worth noting, however, that the overall productive capacity in commodities assigned to Potnia in the Linear B documents in this way is quite small, about 4–7 percent.[134]

Second, more productive capacity seems to have been allocated to specific, named members of the elite. In the Knossian Linear B records dealing with the production of woolen textiles, while the majority (around 70 percent) deals with flocks directly responsible to the palatial authority, we have references in the remaining 30 percent to a few individuals (around fifteen) who appear to have enjoyed the benefit from these flocks. A parallel situation perhaps existed at Pylos, where four individuals are involved in a similar way with flock management. Their occurrence elsewhere in the

[131] It is worth distinguishing between this arrangement and compensation for labor, normally provided by the palace as food rations: e.g., R. Palmer 1989.

[132] Killen 1985: 248–9. [133] E.g., Killen 1976: 123; Smith 1992–3: 183–4; Shelmerdine 1985: 42–3.

[134] Bendall 2001a; 2001b: 449.

archive suggests high status. At Pylos, the names are associated with the term *agora* (*a-ko-ra*), probably meaning "collection" and, in one instance (Pylos Cc 660), with the verb *ageirei* (*a-ke-re*), "[he] collects." This has led to this group of individuals at Knossos and Pylos being called "collectors."[135]

A fundamental point about this system of allocating productive capacity is the fact that it was recorded on central documents. This strongly suggests that those enjoying the benefits were not independent economic or political entities, but parts of the ruling elite at each Mycenaean polity where they are attested. It has therefore been argued that these individuals were members of the royal elite to whom elements of the polity's productive capacity were allocated, and so the term "beneficiary," possibly "owner," might be appropriate. The fact that some of the names occur in records from more than one Mycenaean center may be consistent with them belonging to an elite with common naming traditions, or possibly to an inter-polity ruling class.[136] Another view, perhaps most plausible for the Knossos polity, is that they represent members of local elites, distributed throughout the polity, more common at some distance from the center at Knossos.[137]

More significantly, these individuals have been identified at other stages of textile production, notably as workshop owners, and in other areas of the palatial economy. In particular, perfumed oil production at Knossos shows a 70:30 percent division between "palatial" and "collector" manufacture, just like wool production; and the individual named Kyprios (*ku-pi-ri-jo*) may have been a prominent "collector" of perfumed oil. "Collectors" were possibly also involved in acquiring and distributing exchange commodities.[138]

These observations demonstrate the potential for Linear B texts to reveal complexity within what might otherwise seem a monolithic "palatial" economy. Nevertheless, we should remember that the texts take the perspective of a central authority, however internally diversified that authority might have been. It is more difficult for us to assess the palatial center's "reach" into the overall economy.

Linear B scholars have recognized for some time that the palaces did not control the entire economy, even allowing for the incomplete preservation of the documents from any one center.[139] For example, palaces apparently took no direct interest in the *process* of ceramic production, although they consumed ceramics in large quantities, as attested by documents (Knossos

[135] For extensive discussion of "collectors," with references to earlier literature, see Bennet 1992; Carlier 1992; Driessen 1992; Godart 1992.

[136] Killen 1979, vigorously restated by Olivier 2001.

[137] An observation first made by Hart (1965), followed by L. Palmer (e.g., 1972: 34), and later developed by Bennet (e.g., 1992).

[138] Both suggestions in Killen 1995.

[139] H. Morris (1986) carried out pioneering research; Galaty and Parkinson (1999) provide papers and discussion along these lines. Killen's cautionary comments should be noted (Killen 1999b).

K 700; 778) and by excavations (the pottery stores at Pylos contained thousands of consumption vessels).[140] So too agricultural production: although botanical remains are rarely systematically conserved and studied, they represent a broader range of cereals than the two types attested in the documents. The apparent absence of pulses in the texts is particularly noticeable.[141] Further, although there are references in the documents to large amounts of agricultural produce (notably the 10,000 + units of grain, around 775 tons, attested on Knossos F(2) 852, apparently glossed with the term "harvest" [*a-ma*]),[142] these fall well short of the likely total production of the territories surrounding the centers. It seems unlikely that the "palaces" controlled all agriculture in their regions.

In general, the economy outside palatial control is, almost by definition, difficult to observe, since it is "textually invisible." Archaeology fills in some of the gaps in the records, but it is perhaps the tensions between the texts and archaeological finds that shed most light on palatial – para-palatial economic relationships.[143]

As an example of palatial production, we can take the system by which the palace at Knossos produced elaborate woolen textiles, at least partly for export. By chance, the various stages of this "industry" are well documented, but we owe our understanding largely to Killen's research.[144] Our documents begin with about 600 censuses of individual flocks (the Knossos Da-Dg and Dv series). Each of these elongated or palm-leaf shaped records, all written by the same scribe, comprises a personal name in majuscule at the left, followed by one of about thirty place-names in smaller signs, usually in the lower half of the tablet. Roughly 30 percent of documents have a second personal name in smaller signs, drawn from the limited repertoire of so-called "collector" names. There then follow quantities of male and female sheep, typically totaling to a round number (often 100, 150, or 200), and predominantly male. This apparently unwise imbalance can be explained if the males were castrated males (wethers), who would provide more wool than females. In each series the round number totals are made up in slightly different ways: male and female variants of the sheep logogram (presumably mature animals), plus sheep differentiated by various abbreviations, such as "old" (*pa* = *palaio-*), as "yearlings" (*pe* = *perusinwo-*, "last year's"), or as simply "missing/owed" (*o* = *ophelos*, "[a thing] owing"). Around 66,000

[140] Whitelaw 2001c attempts to quantify the palace's annual consumption of ceramic vessels. See Blegen and Rawson 1966: pls. 94–101, for ceramics stored in the palace at its destruction.

[141] E.g., Halstead 1995a. Conventionally Linear B logogram **120* denotes wheat, and **121* barley, but R. Palmer 1992 proposes the opposite identification; see Halstead 1995b; Killen 2004.

[142] E.g., Killen 1998b.

[143] For an extensive treatment of this topic in relation to osteological versus textual evidence for animal exploitation, see Halstead 1998–9.

[144] Killen 1963; 1964; 1966; 1979. Killen 1984a is a concise summary contrasting the processes of textile production at Pylos and Knossos.

sheep are recorded in this way, possibly representing a total "flock" of up to 100,000.[145] There are also totaling documents (Dn series) that gave totals by place-name and by "collector."[146]

The flocks thus inventoried were clipped or plucked (Dk series), with each male sheep expected to produce about 750 grams of wool. A few of these documents, by another group of hands, are preserved, but some clearly refer to the same flocks as the Da-Dg records. There are also some records of breeding flocks (Dl), but interestingly, these are insufficient to make up the shortages attested among the Da-Dg and Dv inventories. The shortfalls among the Da-Dg records are greater than we would expect from natural wastage and are also unevenly distributed among flocks, although "collector" flocks tend to display greater "losses." This pattern may imply the removal of animals, probably for local consumption.[147]

This argument seems convincing, and has an important implication for the status of the animals recorded on the documents. Rather than being animals directly owned by the palace and managed by local shepherds, in fact the animals were locally owned and managed, and the palace merely claimed the wool on round numbers ("flocks") of animals. A further implication is that the palatial authorities at Knossos had taken over a pre-existing system of flock management, in order to acquire raw material (wool) for transformation into value-added finished products for redistribution and exchange.[148]

Another scribal hand recorded the distribution of wool to female textile manufacturing groups, the targets for these groups (apparently one piece of cloth per member), and their provisioning with rations. As noted above, some of these groups were under the control or ownership of a "collector," while others were spread throughout the area of Knossos' control, mostly central and west-central Crete, with a few in the west, around modern Chania.

Only in the final stages of production did finished pieces of cloth converge on Knossos itself. We have records of cloth arriving there, some being subjected to further processing ("finishing"[149]), and finally cloth in storage (Ld(1)) in bales of 25 to 35 pieces. The records of stored cloth describe its appearance ("red," "with white fringes," etc.) and, occasionally its destination: *e-qe-si-ja* (for *hek^{w}etai*) or *ke-se-nu-wi-ja* (*xenwia*, "for *xenoi*, foreigners," i.e. presumably "for export").[150]

Textile production had a long history prior to its manifestation under palatial control in fourteenth-century Knossos, and Linear A texts include

[145] See Olivier 1988 for a detailed presentation of the figures.
[146] Olivier 1967b; 1972. [147] Halstead 2001, summarizing and amplifying earlier work.
[148] On the adoption of pre-existing structures by the Knossos administration more generally, see, for example, Bennet 1985.
[149] The Mycenaean term seems to have been *o-pa* (*hopa*): Killen 1999b. [150] Killen 1985: 263–4.

the cloth logogram.[151] However, its capture by the palaces and the application of palatial labor redirected it, probably in pre-Linear B times, toward production for exchange.

In mid-fourteenth-century Knossos, therefore, we see one way in which palatial production was organized. Acquisition and initial processing of raw materials were carried out at the local level, across the polity. Still at the local level, but perhaps at fewer locations, raw materials were transformed into a basic product, cloth. Targets, it seems, were controlled by weighing out, a system called *talasia* (Myc. *ta-ra-si-ja*) in Linear B, apparently similar to the Latin term *pensum*, whereby a weighed amount of a raw material was distributed in the expectation that the same weight would be returned with value added, as a finished product. Late thirteenth-century Pylos used this same system for bronze working; (bronze) smiths are described as "having a *talasia*" (Myc. *ta-ra-si-ja e-ko-te*) or "*talasia*-less" (Myc. *a-ta-ra-si-jo*).[152] Mycenaean Greek leaves unclear whether they produced bronze from copper, since the word *khalkos* (Myc. *ka-ko*) is used for both metals, although it seems more likely that they were allocated bronze for working, not copper for bronze production.

By contrast, palatial authorities seem not to have captured the equally ancient craft of pottery production in the same way. At least partly, this is due to the abundant resource – clay – and relative simplicity of labor and know-how involved. The primarily archaeological evidence from late thirteenth-century Pylos offers us a picture of ceramic production and how it related to the palatial system.[153]

Direct references to ceramics in Linear B are rare. Two Knossos tablets (K 700; K 778) list 1,800 and 180 stirrup jars respectively, while a Pylos document (Fr 1184) lists 38 stirrup jars (Myc. *ka-ra-re-we*) either containing or to be filled with just over 500 liters of (perfumed) oil. Finally, seven sealings (Wt 501–507) from the House of the Sphinxes at Mycenae bear names of vessels, some of which also appear on tablet Ue 611, fallen from an upper storey of the same structure, and some of which are attested *in corpore* in the same basement storage room. In addition, the term "potter" (*ke-ra-me-u*) appears several times in Pylian landholding documents, once with the adjective *wa-na-ka-te-ro* ("royal"),[154] but none of these references is in the context of ceramic production.

The reference to a "royal" potter suggests that the palace could call upon a particular individual's products. More striking is the number of

[151] In general, Barber 1991: 311–57.

[152] On the Pylos bronze records, see Smith 1992–3. Killen 2001 offers a concise exploration of the *talasia* system, also noting that (at least some aspects of) chariot-production might have been organized in this way. See also Duhoux 1976: 67–115; Nosch 2001; Ventris and Chadwick 1973, Glossary s.v.: "An amount [of a raw material] weighed out and issued for processing."

[153] This section draws on the analysis of Whitelaw 2001c.

[154] Palaima 1997; Lindgren 1973: 77–8.

standardized vessels in storage in the palace at Pylos. Whitelaw has calculated that 8,540 vessels, 95 percent of those found in the final palace, were stored in four room complexes (Rooms 9; 18–22; 60; and 67–8). Rooms 18–22 alone contained over 6,500 vessels (predominantly *kylikes*, the Mycenaean drinking vessel *par excellence*).

Using these figures, plus an additional requirement of vessels for transporting perfumed oil, Whitelaw suggests that the palace consumed around 12,000 vessels per annum. Drawing on ethnographic parallels, he suggests that this represents the annual production of one or two full-time or two to four part-time potters. This is not inconsistent with the fabric and shapes of the vessels, which show limited variation. Extrapolating these consumption figures to the entire polity, a total consumption of around 75,000 vessels per annum is plausible, which could be produced by 100–200 full- or up to 500 part-time potters.

The implications of this study are that a relatively small workforce could produce seemingly huge quantities of ceramics, and that the palatial center's share of Messenian production might represent 2 percent at most. Moreover, the palace might have been self-sufficient in ceramics through "dedicated" or "attached" potters, but could acquire an abundant product without investing heavily in production. Indeed, it may be significant that the potter described as "royal" appears in a landholding document, suggesting that he enjoyed this benefit in return for services to the palace.

We cannot necessarily extend this picture to other parts of the Mycenaean world. Messenian ceramics were regionally distinctive, and most vessels at late thirteenth-century Pylos were plain or simply decorated. The Argolid, by contrast, was home to the production of high-quality, highly decorated ceramics, some of which seem targeted at "eastern" consumers, in Cyprus or east Mediterranean cities like Ugarit.[155] We cannot verify whether palatial authorities monitored such production more closely, but the Mycenae documents cited above (Ue 611; Wt 501–7) might hint at this.

Palatial production of textiles and bronze probably captured pre-existing practices and personnel, since both crafts had deep histories in the Aegean, long pre-dating the first Cretan palaces at the beginning of the second millennium BC.[156] The centers perhaps controlled other systems, such as the transformation of olive oil into perfumed oil through the addition by maceration of various fragrances,[157] more closely. Despite recent reassessments

[155] Vermeule and Karageorghis 1982 (on pictorial pottery); Sherratt 1999, with bibliography; on the kiln at Berbati near Mycenae: Schallin 1997; on ceramics at Ugarit: Yon et al. 2000; van Wijngaarden 1999a; on consumption and value more generally in Mediterranean: van Wijngaarden 1999b; 2002; on consumption at other Levantine sites: e.g., Leonard 1994; Steel 2002.

[156] We might classify bronze as an exotic good (see below), since tin had to be brought long distances, but the Pylos texts suggest otherwise, since they probably refer to bronze, not copper allocations. This, again, may be a function of the date of the Pylos texts.

[157] Shelmerdine 1985 is the most comprehensive treatment for Pylos; for Knossos, see Foster 1977.

of the probable extent of Bronze Age olive cultivation, the raw material was probably fairly widespread within palatial territories, but its processing seems to have been quite closely controlled by the centers. This is particularly clear at late thirteenth-century Pylos, where one of the four "collectors" (*a-ko-so-ta*; perhaps *Alxoitas*) was involved in distributing ingredients for maceration (Pylos Un 267).[158]

In fourteenth-century Knossos, at least a century before the Pylos documents, a more devolved system may have operated, especially if stirrup jars from west Crete and marked in Linear B before firing were in fact part of a distribution system centered on Knossos.[159]

Killen distinguishes between the mode of production of perfumed oil – where it would be difficult to verify the issue and return of weighed amounts of a commodity – and the *talasia* system used for producing textiles, bronze, and perhaps chariot components.[160] He suggests perfumed oil production was more narrowly confined to the immediate vicinity of the palace at Pylos and probably managed through trusted individuals, perhaps of high status, like Alxoitas mentioned above.

A more extreme version of this system seems to have been used for palace-sponsored production of items from more exotic materials, such as ivory[161] (Myc. *e-re-pa*, *elephas*) or blue glass (Myc. *ku-wa-no*, *kuwanos*).[162] These raw materials were not locally available, but were acquired, perhaps through palatial monopoly, in long-distance exchange. No texts detail the stages of production of such elite objects as inlaid furniture from these materials; we merely have inventories of them (notably the Pylos Ta series[163]) and occasional references to their producers' receipt of foodstuffs (e.g., "gold workers," *khrusoworgoi*; "*kuwanos*-workers," *kuwanoworgoi*; etc.).

The composite nature of these products, often combining exotic materials (gold, blue glass, ivory, for example) on the same object, is striking; they were *tours de force* of "conspicuous production," only possible for the palatial elite. The archaeological distribution of such materials and objects, distinctly focused on the palatial centers, bears out this picture of restricted access. Blue glass required a new process, only developed in Mesopotamia (and possibly Egypt) in the sixteenth century. The basic material was probably never produced in the Aegean, but acquired effectively as a raw material in the form of bun ingots, like those recovered from the late fourteenth-century BC Uluburun shipwreck.[164]

[158] The same individual is clearly a major administrative functionary, receiving commodities on behalf of the palace (Pylos Pa 30) and carrying out a tour of inspection of land (Pylos Eq 213). It is possible that he is one of the major administrators of the palace, writing documents attributed to scribal hand 1 (Palaima 1988a), as suggested by Bennet 2001 and Kyriakidis 1996–7.

[159] Van Alfen 1996–7. [160] Killen 2001. [161] E.g., Burns 2000.

[162] Assuming the Mycenaean word *ku-wa-no* refers to blue glass: Aura Jorro 1985, s.v.

[163] E.g., Killen 1998a.

[164] See Pulak 1998: 202–3, for c. 175 glass bun ingots, presumably destined for the Aegean. On glass and vitreous products in general: Panagiotaki et al. 2004.

Some products in materials like glass are distributed outside the palatial elite, but in a very limited range of forms. Mould-made blue-glass relief beads, for example, are common in sub-elite tombs, but only within the Aegean,[165] and may have functioned as "materialized relationships" with the palatial elite. The material and the technology, both unavailable outside the sphere of the palatial elite, would mark off such products, as would their replication in identical form through manufacture in moulds, emphasizing their "palatial" nature.[166]

(b) *Distribution*

The core problem with understanding past exchange patterns is that objects tend to be recovered archaeologically in contexts where they were consumed, not in the process of distribution, or even at their point of arrival. Moving from archaeological patterns to understanding distribution in action and its organization is difficult.[167] The fourteenth- /thirteenth-century BC Aegean is no exception. Elite self-definition through exotic materials and knowledge is characteristic of Mycenaean civilization from the Shaft Grave period onward. Therefore appreciating the movement of commodities, both within and beyond the Aegean, is important to understanding how the palaces functioned.

The Linear B documents virtually never explicitly mention exchange,[168] while archaeological evidence is distorted not only by selective deposition by users in the past, but also by taphonomic processes that remove some materials, particularly organic ones, skewing patterns toward durable residues, especially ceramics.[169]

Taking the texts first, our only direct evidence of a commodity being moved from one center to another is Mycenae text X 508. It records a type of cloth destined for Thebes (Myc. *te-qa-de*; "*Theg*^{w}*ansde*"), presumably that in Boeotia,[170] indicating intra-Aegean exchange. Parallel to this, but without explicit references to movement, might be those texts that list stirrup jars (Knossos K 700; K 778). Two Pylos texts (An 35.5–6; Un 443.1) appear to represent commodities given to individuals as payment (Myc. *o-no*) for alum (Myc. *tu-ru-pte-ri-ja*; *strupteria*).[171] Finally, there are the

[165] Hughes-Brock 1998: 264–6; 1999.

[166] On the restriction of access to valuable materials in the LHIIIA–B period, see Voutsaki 2001: 199–207.

[167] E.g., Knapp and Cherry 1994: 123–55; Gale 1991a. On ceramic evidence in general, see Zerner 1993.

[168] Killen 1985: 262–70.

[169] On ceramics in historical times, see also Osborne, this volume.

[170] The presence of the same sign-group, in various forms, on texts found at Thebes makes it likely that this refers to Boeotian Thebes: see Aravantinos et al. 2002. The construction of roads for wheeled transport facilitated overland shipping: Jansen 2002; Lavery 1990; 1995; McDonald 1964.

[171] It is worth noting here that there is no indication of an equivalent akin to currency in such transactions. The ability to "translate" commodities into similar values within the east Mediterranean metrological systems is attested by weights attested archaeologically and the units used in Linear B: see, e.g., de Fidio 1998–9 for a thorough overview.

references, on just four documents in the Knossos Ld(1) series, to *xenwia* cloth, probably cloth "for export."

The obvious archaeological evidence of non-local materials and products in the Aegean means there must be some reason for the paucity of explicit references in the texts.[172] Survival of over 5,000 documents, spread over at least seven sites, suggests that it is not simply due to accidents of preservation. One possibility is that such activities (and therefore records) were seasonal, or irregular, occurrences. Alternatively, such arrangements may have taken place at a higher administrative level than the clay documents preserved.[173] They might have been recorded on other media, like parchment or papyrus, or not at all, if concluded personally at the highest level. The Pylos *o-no* texts, probably "contingent" documents written when needed and with only a short "shelf life" because they were not archived,[174] may mean that we are not missing many more documents of this type than would have existed at any one time.

This paucity of Linear B evidence elevates the importance of archaeological data in understanding distribution. Fortunately, we can "directly" observe distribution *in process* from three Late Bronze Age shipwrecks. Two lie off the southern coast of modern Turkey, quite close to each other: one at Uluburun, also referred to as Kaş in the earlier literature (probably shortly before 1300 BC), the other off Cape Gelidonya (c. 1200 BC). A third ship (also c. 1200 BC), least well preserved, sank off Point Iria in the southern Argolid.[175] The Uluburun ship was the largest, perhaps 16–17 meters long. Its cargo included 10 tons of copper in the form of 354 ox-hide and 121 bun ingots, plus about a ton of tin in ingot form; 175 blue glass ingots; over 150 Canaanite jars, some containing resin; ivory, both hippopotamus and elephant; and 10 large ceramic containers (pithoi), containing over 100 pieces of Cypriot fine-ware pottery.

Lead isotope analysis indicates that the copper ingots came from Cyprus. This and the Cypriot fineware pottery suggest that the ship was traveling west from Cyprus toward the Aegean when it sank, and the ivory and blue glass may mean that it had previously docked in Syria and probably Egypt. The large amount of high-value cargo, particularly the glass, copper, and tin, mirror references to inter-polity exchange mentioned in the near-contemporary Amarna letters.[176] In these letters, such exchange is presented as gift-exchange between fictive kin, a "fiction" that reminds us

[172] Discussed by Killen 1985: 265–70.

[173] On the status of our clay records, see, e.g., Driessen 1994–5; Palaima 2003a; cf. Bennet 2001. It is less likely that exchange was funneled through a single center, such as Mycenae, where documents would have existed, but have not survived.

[174] Halstead 1999b: 37–8.

[175] Pulak 1998 (Uluburun); Bass 1967 (Gelidonya); Phelps et al. 1999 (Iria). Bass (1991) summarizes the earlier two wrecks and their implications.

[176] Moran 1992.

of the Mycenaean term *xenwios/-ia* applied to cloth.[177] These objects, plus a broken gold scarab of Nefertiti (probably valuable scrap) and a wooden diptych writing tablet strongly suggest that this vessel represents materials moving at the highest level, probably under state sponsorship. We can imagine it taking on Aegean products (such as cloth and perfumed oil, plus Aegean fine-ware pottery) at a port like Kommos in Crete, before returning across open sea to North Africa west of the Nile Delta.[178] Finds on land of the same materials as in the wreck, in similar proportions (after episodes of consumption), suggest that the Aegean was one of its destinations.[179] We cannot determine the crew's "ethnicity." Mycenaean, Syrian, and Canaanite have all been suggested on the basis of weapons or tools deemed to have formed part of the ship's equipment, not cargo, reflecting the international nature of east Mediterranean interaction at the time.

Although shipwrecks offer rare insights into the *process* of distribution, we should be cautious in reconstructing large narratives from single, highly productive sites that represent only a tiny sample of the journeys made in the Late Bronze Age eastern Mediterranean. However, it is worth noting the contrasts between Uluburun and the Gelidonya and Iria wrecks of a century later. The Gelidonya ship was perhaps only 9–10 meters long (Iria probably smaller still) and contained at least 34 ox-hide copper ingots (c. 1 ton), plus 20 bun and 19 slab ingots of bronze, and over 250 pieces of bronze scrap. There were possibly three ingots of tin on board. This gives the impression of a crew trading independently, without state sponsorship, offering not only raw materials – copper and tin – but also bronze in ingots and as scrap. The Iria wreck site only preserves non-local ceramics from Crete, mainland Greece, and Cyprus, probably moving for their contents. It may represent intra-Aegean exchange.

It has been argued convincingly that late-thirteenth- and twelfth-century east Mediterranean exchange networks were largely free of state monopoly, and increasingly centered on Cyprus, which avoided the worst disruptions of the years around 1200 BC.[180] Cypriot manufacturers and traders introduced the first known manufactured iron objects into the Aegean, particularly daggers with bronze rivets. Reliable iron production was probably a

[177] See Sherratt and Sherratt 1991 generally, and Panagiotopoulos 1999; 2001, more specifically, on the nature of such high-level exchange.

[178] On Kommos and its international connections in the fourteenth and early-thirteenth centuries BC, see, e.g., Rutter 1999. Sherratt (2001) thinks that vessels this size did not make it into the Aegean proper, but offloaded their cargoes on islands like Rhodes or Crete.

[179] Cline 1994: 100–5.

[180] Sherratt 1994; 1998. For a parallel argument from consumption patterns for the breakdown of elite monopolies on exchange in the late-thirteenth and twelfth centuries BC, see Voutsaki 2001: 208–13. The evidence for Cypriot predominance comes from increased amounts of Cypriot pottery in the Aegean (and central Mediterranean) in this period, and the presence of Aegean pottery in Cyprus and the Levant (e.g. Ugarit), some of it marked after firing with signs like those of the Cypro-Minoan script: Sherratt 1999; Hirschfeld 1992; 1993; 1996; van Wijngaarden 1999b; Yon et al. 2000.

side-effect of smelting iron-rich copper ores on Cyprus. For a century or so, these circulated as prestige objects among the more diverse, small-scale, and unstable elites of the eastern Mediterranean.[181]

The presence of Mycenaean pottery in Sicily, southern Italy, and Sardinia marks the other end of Aegean involvement in exchange that brought objects and materials from temperate Europe into the Mediterranean.[182] Again, patterns seem to shift in the late-thirteenth and twelfth centuries, with more European metalwork forms attested in the Mediterranean, and local manufacture of Aegean-style pottery in the central Mediterranean, plus increasing Cypriot finds there.[183] Routes through the Aegean may also have shifted in this period, bypassing the western Peloponnese either by sailing straight from Crete to the central Mediterranean or trans-shipping between the Saronic and Corinthian gulfs.[184]

Within the Aegean, we might suggest that inter-polity exchange took the form of similar commodities, if Mycenae tablet X 508 (mentioned above) is typical in documenting the exchange of cloth between Mycenae and Thebes. Archaeological evidence, combined with chemical and petrographic analyses, confirms the widespread distribution of coarse-ware stirrup jars of c. 14 liters capacity, particularly between western Crete and mainland centers like Thebes, Mycenae, and Tiryns. Some were painted before firing with Linear B inscriptions. They probably contained perfumed oil, but some may have contained wine.[185]

(c) *Consumption*

The previous sections emphasized the importance for the Aegean elite's authority of acquiring exotic materials and producing manufactured objects to exchange within this framework. In early Mycenaean times these commodities were apparently used prominently in mortuary contexts, being displayed and removed from circulation, for example, in the Mycenae Shaft Graves. The palatial elites' conspicuous consumption in mortuary contexts seems to have lessened in the fourteenth and thirteenth centuries BC, although they seem to have controlled deposition.[186] By the fourteenth and thirteenth centuries, Mycenaean palatial elites seem to have invested more heavily in elaborating palatial authority through architectural complexes with figured wall-paintings, often behind monumental walls, most visible to us now at Mycenae, Tiryns, and Gla.

[181] Sherratt 1994. [182] Vagnetti 1993; 1998; 1999a.
[183] Sherratt 1994; 2000b; Vagnetti 1999b. [184] Sherratt 2001.
[185] Catling et al. 1980; Day and Haskell 1995; van Alfen 1996–7. Capacity: Shelmerdine 1985: 146–7. Some analyses of contents have been carried out, indicating wine: e.g., Tzedakis and Martlew 1999: 152. See R. Palmer 1994 for an overview of wine in the Mycenaean economy.
[186] E.g., Voutsaki 1995; 2001: 195–207.

Such displays were not confined to the palatial centers themselves; larger projects inscribed palatial power on the landscape. Around Mycenae, for example, the latest tholos tombs ("Atreus" and "Clytemnestra") share materials with its main entrance complex, while the Lion Gate itself has a "relieving triangle" above it, like the tholos tombs.[187]

There were also "public works" projects, like the drainage of the Kopaïs basin and a fortified storage facility at Gla; an extensive network of roads for wheeled vehicles, well attested around Mycenae; a dam to divert a stream that caused flood damage to the east of Tiryns in the late-thirteenth century; and probably a port basin on the coast west of Pylos.[188] Such projects probably used corvée labor of the type attested in Linear B documents, either in return for rations or as a condition of landholding.[189]

Within these architectural contexts, the palaces sponsored large feasts, perhaps simultaneously promoting social cohesion and reinforcing ranking. At Pylos the combination of Linear B evidence, archaeological evidence from large numbers of consumption vessels (see above), iconography, and zooarchaeological data on the actual animals consumed, suggests feasts for over 1,000 people. Diners may have been ranked by location, the highest level within the main megaron, others within courts 63–88 (still within the palace, but outside the main complex), and still others outside the main entrance to the palace.[190] Feasts might have been occasions when palatial products – *e-qe-si-jo* cloth and glass beads, for example – were redistributed.

Some aspects of Mycenaean palatial feasting closely resemble sacrifice. Indeed, a recently excavated sanctuary in Methana has evidence of sacrifice very like the Pylos data.[191] The consumption of agricultural products (e.g., oil, grain, and honey) as offerings to deities is closely related to feasting. These are attested in Linear B documents, especially at Knossos, Pylos, and Thebes.[192] The presence of month names on some of these records implies a sacred calendar of offerings. Between the two areas of feasting and sacrifice lie the grain apparently offered by members of the Pylian elite to various figures, including Poseidon, based on their landholdings.[193] However, we

[187] Wright 1987; Santillo-Frizell 1998.

[188] On fortifications in general: Iakovides 1983; on the Kopaïs drainage: Knauss 1990; Iakovides 2001: 148, 154–7; on roads: Lavery 1990; 1995; Jansen 2002; McDonald 1964; on the Tiryns dam: Zangger 1994; on the Pylos port basin: Zangger et al. 1997: 613–23.

[189] Pylos An 35, for example, appears to list construction workers (Myc. *to-ko-do-mo*) at several places, admittedly in small numbers, so perhaps supervisors rather than laborers. Bendall 2003 suggests that one function for the Northeastern Building at Pylos was to organize labor of this type.

[190] On feasting in general, see Wright 2004; Halstead and Barrett 2004; Killen 1994; Piteros et al. 1990. On Pylos, see Davis and Bennet 1999; Shelmerdine 1998 (general); Isaakidou et al. 2002 (zooarchaeological); Bendall 2004 (hierarchical feasting).

[191] Hamilakis and Konsolaki 2004; cf. Isaakidou et al. 2002.

[192] On the new evidence from Thebes, see Aravantinos et al. 2001, with reviews by Palaima: 2000–01; 2003b.

[193] de Fidio 1977.

https://doi.org/10.1017/CHOL9780521780537.008 Published online by Cambridge University Press

should bear in mind that the amounts attested in these religious or quasi-religious areas are small relative to the overall quantities attested in palatial records, certainly less than 10 percent.[194]

A final example of consumption by the palatial authorities – although it is difficult to disassociate it from production and distribution – is the direct acquisition of commodities through a process normally termed "taxation."[195] As we have seen, the palaces mobilized certain resources (wool, grain, oil, flax, etc.) for use in palatial production. The regions' staples were acquired from varied, depending on ease of transportation for bulky commodities (e.g., grain), or environmental factors (e.g., flax).

A limited set of texts, however, documents polity wide mobilization of products. The Pylos Ma texts offer the clearest example. They record, for each district within the Pylos polity, assessments of six commodities in a fixed ratio to each other. Three basic types of texts are attested, but only one document per district: assessments, actual contributions (with shortfall), and assessments with an indication of missing quantities from the previous year (Myc. *pe-ru-si-nu-wa*). Unfortunately only two commodities are plausibly identifiable: logogram **146*, a type of plain cloth, produced outside the palatial system and contributed as a finished item (possibly a tunic of some sort); and **152*, an animal hide.[196] A key point here is that all districts are asked to contribute all six commodities, suggesting that neither ecology nor transport restricted availability.

The widespread availability of these products places emphasis on compliance with the demand for, not so much on the acquisition of, the material. This implies that the process was as much symbolic – of palatial authority and ability to insure compliance – as practical. Equally, the fact that these products were present in local, possibly domestic, economies indicates an attempt to claim rights to production within individual communities. Two texts (Pylos Mn 162; 456) that break down contributions of **146*-cloth for specific communities within two of the polity's districts (*ro-u-so* and *a-si-ja-ti-ja*) support this notion.[197]

Our overall picture of the Aegean economy in the fourteenth and thirteenth centuries BC presents the institutions we term "palaces" as predominant in their ability to direct economic activity. Their dominance and the paucity of texts indicating equivalence transactions indicate that the term "command economy" applies to them. Although the nature of the palace-centered economy is broadly "redistributive," the form this takes suggests a

[194] Bendall 1998–9; 2001a; 2001b.

[195] For overviews, see Duhoux 1976: 151–94; Killen 1985: 270–2, and Perna 2004, who summarizes and discusses the important earlier research of de Fidio 1982; 1987; Shelmerdine 1973; 1989; Killen 1984b; 1996 and others.

[196] For suggested identifications of the other four commodities, see Perna 2004: 15–61.

[197] Killen 1996.

high degree of selection of interests geared primarily to supporting palatial activities. "Mobilization" therefore best describes the specific nature.

At the beginning of this chapter, I referred to agriculture as underpinning ancient economies in general. It is clear that the Aegean Late Bronze Age saw high settlement and population levels, no doubt facilitated by successful agricultural regimes that are largely invisible in the Linear B documents. We can, however, overestimate the role of subsistence in seeking to situate ancient societies at a lower level in an evolutionary trajectory than those of the modern world. However, in terms of economic life as a whole in the Aegean Late Bronze Age, it seems that palatial activities were significant. Indeed we see palatial involvement in agriculture, for example, in the provision of plough cattle (Knossos Ch series) or the massive procurement of wool. Given this, perturbations in the palatial economy may have had repercussions throughout their regions.

One final point bears repeating. Pylos has figured prominently in this discussion because there we can combine texts and archaeology. We need to remember, though, that Knossos shows some differences from Pylos, no doubt due to the historical contingencies surrounding its operation on Crete, after the apparent collapse of multiple palatial polities of the fifteenth century BC, some 150–200 years earlier than Pylos. Closer to home, however, the economic situation we would reconstruct if we had more texts from mid-thirteenth-century Mycenae or Thebes might also differ, even if only in degree or emphasis. Ceramic production (see above) might be a case in point.

V EPILOGUE: TRANSITION TO THE EARLY IRON AGE (1200–1000 BC)

Archaeological evidence attests the destruction and abandonment of Mycenaean sites between 1250 and 1150 BC.[198] Around 1250, the citadel at Tiryns and the "houses" outside the citadel wall at Mycenae show evidence of destruction. This has been attributed to earthquake, particularly at Tiryns. In the period immediately following, fortifications at both sites were extended, and facilities to access water from within added toward the end of the century. New walls were built at Midea and Athens. There is some evidence of destruction within the complex site of Thebes in the mid-thirteenth century.

At the end of the century, the major centers in the Argolid (Mycenae, Tiryns, Midea) were destroyed, along with those in Laconia (Menelaion), Messenia (Pylos), Achaea (Teichos Dymaion), and Boeotia (Thebes, Orchomenos). Other sites were abandoned in the same archaeological phase

[198] Helpfully summarized in Shelmerdine 2001a: 371–6, 381.

in the Argolid and Corinthia (Berbati, Prosymna, Zygouries, and Tzoungiza), Laconia (Ayios Stefanos), Messenia (Nichoria), Attica (Brauron), and Boeotia (Eutresis).

However, not all these sites were abandoned after destructions. Continuing habitation after 1200 is attested at Mycenae, Tiryns, Midea, and Argos in the Argolid and at Athens. A few sites were more prominent in the twelfth century: the settlements of Teichos Dymaion (Achaea); Asine (Argolid); Panakton (Boeotia); Elateia (Locris); and the cemeteries at Perati in Attica and Palaiokastro in Arcadia.

Survey data present a similar pattern. Site numbers in the twelfth through ninth centuries BC tend to be very low. However, not all areas show the same pattern: Messenia shows a particularly sharp decline, losing perhaps 75 percent of its settlements, while Achaea, although not intensively surveyed, shows stability, and there is some continuity in the Argolid. While part of this decline might be due to the relative "invisibility" (to archaeologists) of the non-palatial settlements that continue to be occupied, it seems inescapable that the mainland and Crete experienced considerable population decline in the twelfth century.

If we examine the twelfth-century situation closely, however, we see continuity at some sites. Athens, Knossos, and Argos, for example, seem to remain nuclei of settlement down into the eighth century, even if this is largely attested by cemeteries, perhaps retaining populations in the hundreds.[199] At Tiryns a smaller "megaron" was built in the twelfth century within the remains of the main thirteenth-century "megaron."[200] At this period the citadel had gone out of use, but there was an extensive settlement, perhaps as large as 25 hectares, in and around the lower town. This structure implies that the relationship between those who continued to occupy Tiryns (and to maintain exchange connections with Cyprus) and the "palatial" organization of the thirteenth century had changed. They rejected monumental architecture, figured wall-paintings, and writing, yet retained a certain reverence for the home of ancestral authority.[201]

The importance of long-distance exchange to the Aegean palatial elites' self-definition, discussed above, must have played an important role in the re-alignment of authority around 1200 BC. Cyprus' increasing prominence in exchange in the later thirteenth and twelfth centuries at least partly reflects the collapse of major eastern Mediterranean powers. The Hittite empire fell apart early in the twelfth century, fragmenting into neo-Hittite successor kingdoms. The city state of Ugarit was apparently destroyed

[199] E.g., Morris 1991.

[200] Maran 2000. On the possibility of a similar date for a structure built over the court in front of the main "megaron" at Mycenae, see French 2002: 136–8.

[201] On the notion of rejecting Mycenaean culture, including a different response at nearby Asine, where burials take place within the settlement, see, e.g., Morris 2000: 195–207.

c. 1182 BC, and Egyptian influence in Syria and Palestine waned across the twelfth century. Cypriot exchange, undermining palatial monopolies, combined with a compromised ability to bring in exotic materials, must have affected the authority of palatial elites in the Aegean.

Whether natural forces affected Aegean polities in this period is difficult to determine, since such factors can rarely be dated so closely. Earthquakes, at least at Tiryns and Mycenae, may have been a factor in the late thirteenth century. Interannual variations in rainfall can produce poor, even catastrophic agricultural yields in the southern Aegean on an unpredictable basis. Some inkling of this might be seen in the draining of the Kopaïs basin to increase agricultural land (if the goal was not production for export), possibly also in the early Mycenaean colonization of the Nemea valley close to Mycenae. Given the relatively densely packed landscape – in most areas of the mainland, as densely packed as it had ever been – a run of poor years might have caused food shortages quite quickly. These, too, might have destabilized palace-dominated societies.

There is no conclusive evidence, at the right time (around 1200 BC), for invasions bringing in new populations, despite the later Greek tradition of the Dorian invasion. We need, therefore, to understand the destruction and abandonment as primarily local phenomena directed against the palatial centers, either precipitated by local shortages, combined with earthquakes and perhaps concomitant disease, or by the ruling elite's inability to maintain their authority staked on external connections. More likely, both sets of factors operated, and determining cause and effect, is impossible given the poor chronological resolution of the data. Given the selective nature of palatial involvement outlined above, the impact on the bulk of the rural population may have been less catastrophic than has been imagined.

It is clear that by the end of the twelfth century, when Cyprus too dropped out of the picture, political and economic authority in the Aegean was no longer organized around monopolistic, centralizing palaces. Authority resided, perhaps on a shifting basis, at the local level, the top level having disappeared with the buildings we refer to as "palaces."[202] Rural landscapes, particularly in areas like Messenia, were much less densely settled for several centuries. But the loss of authority would not have been universal, since certain sites remained relatively large, notably Athens.

There are two ways of conceiving the relationship between the Aegean Bronze Age and later periods of Greek history. The first suggests a radical discontinuity: with the palaces went a way of life and economic behavior entirely unconnected with those of later periods. The second imagines a seamless continuity, with much prefigured in the "Bronze Age" poetry of

[202] For this "decapitation" model of the loss of palatial authority, see, Lenz 1993; on the transformation of terminology, Morpurgo Davies 1979; Carlier 1984.

Homer.[203] Neither polar extreme is likely to be accurate, but it is certainly incorrect to isolate the Bronze Age with artificial barriers between the modern disciplines of history and prehistory. Life continued, however much it had changed, in most areas of the Aegean from the Late Bronze to the Early Iron Age. Those living at the time, at whatever level of society, would have been aware of their past and had views of their future.[204] In a sense, the Homeric and Hesiodic corpora represent versions of such "world views" appropriate to the eighth century BC (or thereabouts); they are privileged because they are the only versions now accessible to us. That there were others of the eighth century, no longer preserved, and that there were earlier examples, seems likely beyond reasonable doubt, since the epic tradition itself extended back into the Late Bronze Age.[205]

These observations suggest that, whatever changes took place over the period 1200 to 800 BC and whatever new factors came into play, they represented a transformation of prevailing practices of the Late Bronze Age.

[203] For an extreme recent statement of this view, see Mylonas Shear 2004.
[204] Morris 2000. [205] Sherratt 1990; Bennet 1997.