National Library of Canada
Acquisitions and Bibliographic Services Branch
395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale du Canada
Direction des acquisitions et des services bibliographiques
395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Canada

THE EMERGENCE OF PALATIAL SOCIETY IN LATE BRONZE AGE ARGOLIS

JAN ALEXANDROS ARVANITAKIS

DEPARTMENT OF CLASSICS
MCGILL UNIVERSITY, MONTREAL

AUGUST 5, 1994

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements of the degree of Master of Arts.

ISBN 0-315-99889-X

Canada

The origins of palatial civilization in Late Bronze Age Argolis

ABSTRACT

This thesis proposes to evaluate the impact of factors such as trade, circumscribed resources, and growing militarism upon the development of social complexity in LBA Argolis, and to what extent these factors may be invoked as triggering mechanisms—or prime movers—in the rise of palatial society in the Argive plain towards the end of the 15th century B.C., during the LH III A-B period.

It is argued that the most plausible model for the rise of palatial society in LBA Argolis is one which acknowledges the interrelations and processes of feedback between these factors, of which trade and militarism may have been original motivating factors.

Finally, it is suggested that the need to organize resource procurement and distribution were instrumental in the emergence of the Mycenaean palatial centers of LBA Argolis.

RÉSUMÉ

Cette thèse a pour but d'évaluer l'impact de différents facteurs—tels que le commerce, la circonscription des resources et l'accroissement du militarisme—sur le développement de la complexité sociale dans l'Argolide du BR et de voir dans quelle mesure on peut attribuer à ces facteurs le rôle de déclencheurs—de premier moteurs—dans la naissance de la société palatiale de la plaine d'Argos vers la fin du XVe siècle avant J.-C., plus précisément pendant la période HR III A-B.

On montrera que le modèle le plus plausible qui rende compte de cette naissance met en jeu les interrelations et rétro-actions entre ces différents facteurs, dont le commerce et le militarisme auraient bien pu être les plus déterminants.

Enfin, on suggèrera que la nécéssité d'organiser les moyens d'acquisition et de distribution des resources a contribué à l'apparition des centres palatiaux mycéniens de l'Argolide du BR.

ACKNOWLEDGEMENTS

I wish to thank all the members of the Department of Classics of McGill University who guided and fuelled my fascination and passion for the study of Antiquity, and who inspired me with their dedicated scholarship and pursuit of the highest standards of *paideia*.

Especial thanks are due to my supervisor, Professor John M. Fossey, who tutored me over the years in my study of archaeology, and whose good humour was always appreciated, both inside the classroom and outside.

Finally, I wish to thank my parents for their boundless support, encouragement, and confidence in my academic endeavours.

TABLE OF CONTENTS

List of Figures

Appendices

Abbreviations

General

BA: Bronze Age

LBA: Late Bronze Age

MH: Middle Helladic

LH: Late Helladic

MM: Middle Minoan

LM: Late Minoan

MC: Middle Cypriot

LC: Late Cypriot

Journals

AA: *Archäologischer Anzeiger*

RDAC: *Report of the Department of Antiquities, Cyprus*

AJA: *American Journal of Archaeology*

BCH: *Bulletin de Correspondence Hellénique*

JFA: *Journal of Field Archaeology*

BSA: *Annual of the British School of Archaeology at Athens*

OpAth: *Opuscula Atheniensia*

AM: *Athenische Mitteilungen*

Introduction.

Separated from other fertile regions by mountains up to 1,700 m high, the Argive plain in the northeast Peloponnese is unusual among Greek valleys for its protected position, favourable orientation facing the Aegean, pleasant climate, and extensive arable soil. This valley has been a focal point of Greek culture at various times in the past, in the BA, Geometric, Archaic, Classical, and Frankish periods[1]. Some of its ancient settlements rank among the best known BA sites in Greece. Indeed, the Argive plain has commonly been referred to as the heartland of the Mycenaean culture of Greece: according to C. Renfrew (1972: 47), "the Peloponnese was the leading area of the Mycenaean civilization. Many of its principal sites, such as Mycenae and Tiryns, are in the Argolid", and according to R. Hope-Simpson (1981: 9), "the Argolid, and the Argos plain in particular, was the chief center of Mycenaean Greece". Its preeminence as a center of Mycenaean civilization is highlighted by the fact that it contained two major palatial sites, Mycenae and Tiryns. It is also worth mentioning that two intensive surface surveys have been conducted in the region of the Argolid over the past fifteen years, (1) the Berbati-Limnes Survey[2], and (2) the Southern Argolid Exploration Project[3].

Why did civilization emerge in the Argive plain during the LBA? A large body of scholarship has been devoted to the emergence of palatial civilization on Minoan Crete[4], and of complex

---

[1]For a survey of the history of the Argolid, see R.A. Tomlinson, *Argos and the Argolid from the end of the Bronze Age to the Roman occupation.* London, 1972.

[2]See B. Wells, C.N. Runnels, and E. Zangger, The Berbati-Limnes Archaeological Survey: The 1988 Season, *Opuscula Atheniensia* 18, 1990: 207-38.

[3]See T.H. van Andel, C.N. Runnels, & K. Pope, Five Thousand Years of Land Use and Abuse in the Southern Argolid, Greece, *Hesperia* 55, 1986: 103-28; Runnels & van Andel, The Evolution of Settlement in the Southern Argolid, Greece: An Economic Explanation, *Hesperia* 56, 1987: 303-34; van Andel & Runnels, *Beyond the Acropolis: A Rural Greek Past.* Stanford, 1987.

[4]On the origins of palatial civilization in Minoan Crete, see J.F. Cherry, The emergence of the state in the prehistoric Aegean, in *Proceedings of the Cambridge Philological Society* 210, 1984: 18-48; Cherry, Evolution, revolution, and the origins of complex society in Minoan Crete, in *Minoan Society*, O. Krzyskowski & L. Nixon (eds.), Bristol, 1983.

urban society in Cyprus[5], yet relatively little scholarship has been devoted to this phenomenon on the Greek mainland. In the past, far more scholarship has been devoted to the problem of the dramatic rise in material wealth towards the end of the MH period than to the phenomenon of the appearance of the palaces on the mainland[6]. The present work proposes to evaluate the impact of factors such as trade, circumscribed resources, and growing militarism upon the development of social complexity in LBA Argolis, and to what extent these factors may be invoked as triggering mechanisms—or prime movers—in the rise of palatial society in the Argive plain towards the end of the fifteenth century B.C., during the LH III A-B period. It will be concluded that the most plausible model for the rise of social complexity in LBA Argolis is one which acknowledges the interrelations and processes of feedback between these factors.

---

[5]On the origins of complex, urban-oriented society in LBA Cyprus, see A.B. Knapp, Copper production and eastern Mediterranean trade: the rise of complex society on Cyprus, in *State and Society. The emergence and development of social hierarchy and political centralization*, J. Gledhill, B. Bender& M.T. Larsen (eds.), London, 1988: 149-169.

[6]Notable examples include O.T.P.K. Dickinson, *The Origins of Mycenaean Civilization, Studies in Mediterranean Archaeology* 49, Göteborg, 1977: see especially 51-56; G. Karo, *Die Schachtgräber von Mycenae.* Munich, 1930: 334-49; S. Marinatos, *Crete and Mycenae.* Athens, 1960: 181-82. For a recent discussion on the question of the origins of the Shaft Grave wealth, see J.B. Rutter, 1993: 795.

PART I

MYCENAEAN PALATIAL CIVILIZATION

Part 1: Mycenaean palatial civilization.

Before we evaluate the impact of factors such as trade and militarism upon the rise of Mycenaean palatial civilization in LBA Argolis, it is necessary to consider what is meant by the term civilization, and to demonstrate its applicability to the LBA culture of central and southern Greece.

A number of criteria or defining features have been put forward by scholars to distinguish the form of culture known as civilization. Most definitions of civilization today are formulated in polythetic terms, that is, they are based on the presence of a certain number, though not necessarily all, of a series of defining features (Renfrew, 1977: 7). Features which are most commonly accepted as distinguishing early civilizations in different parts of the world include craft specialization, pronounced social stratification, central places with large concentrations of population, monumental public buildings (*e.g.* granaries, palaces, temples/shrines), and the presence of a writing system (*ibid.* : 4-7)[7]. C. Renfrew has provided an elegant, though—from an archaeological standpoint—somewhat impractical definition of civilization[8]. According to Renfrew, "a civilization is a constantly recurring assemblage of artefacts documenting a human environment effectively insulating the individual from the world of nature" (Renfrew, 1972: 13).

Greece in the LBA possessed a type and structure of society that was akin to societies in the Near East and Egypt. The distinction between the civilization of Mycenaean Greece and the early civilizations of the Near East and Egypt, however, must be borne in mind. Mycenaean Greece lacked the major urban centers with monumental architecture and temples, and the literary-historical documents (inscriptions, epic poems, codes of law) of

---

[7]V.G. Childe has compiled a list of ten characteristics of urban civilization: see V. Childe, The Urban Revolution, *The Town Planning Review* 21: 3-17.

[8]See J.F. Cherry, 1984: 23.

Egypt and Mesopotamia. Indeed, the polities of the palace-centered cultures of the Aegean BA were much smaller in scale than the norm in the ancient Near East[9]. Inasmuch as the organization of specialized craft production, overseas resource procurement, and distribution were key aspects of the Mycenaean palaces, however, the Mycenaean palatial system is analogous to contemporary or earlier systems in the Near East and Egypt.

The LBA culture of Greece is conventionally termed Late Helladic (LH) or 'Mycenaean', and encompasses the LH I, LH II, and LH III periods[10]. The early part of the LH covers the period between the appearance of the so-called 'Shaft-Grave culture' and the appearance of the first Mycenaean palaces at some point during the LH II B or LH III A 1 periods in the 15th century B.C. This phase of the LBA is commonly referred to as the early Mycenaean period (LH I-II B, *ca.* 1680-1445/1415 B.C.)[11]. The second part of the LH period begins with the appearance of the Mycenaean palaces in LH II B/III A1 and covers the main part of the LH III period (LH III A-B), its end being marked by the destruction of the palace centers towards the end of the 13th century B.C. This phase is conventionally known as the palatial period (LH II B/III A1-LH III B, *ca.* 1445/1415-1365/1200 B.C.).

The Shaft-Grave era corresponds to the ceramic phases MH III, LH I, and the beginning of LH II A, representing roughly some 100-150 years (Rutter, 1993: 786). The MH culture is distinguished from the earliest stage of the Mycenaean culture by a series of distinctive changes. First, the appearance of enormous wealth in the early Mycenaean tombs at a number of sites in

---

[9]For a discussion on the sizes of the major Aegean BA settlements compared with Near Eastern examples, see C. Renfrew, 1977: 236-44, figs. 14.5, 14.6, 14. 8.

[10]The relative chronology of the Mycenaean period, based on the succession of ceramic phases, was elaborated by A. Furumark: see A. Furumark, *The Mycenaean pottery* I: *Analysis and classification*; II: *Chronology.* Stockholm, 1941.

[11]The chronology adopted here is the high chronology proposed by P.P. Betancourt and S.W. Manning: see P. Betancourt, Dating the Aegean Late Bronze Age with Radiocarbon, *Archaeometry* 20, 1987: 45-49.

central and southern Greece. Second, the strong influence of Minoan fashions in ceramics, certain categories of metalwork (weapons, jewelry, vessels), and possibly in funerary architecture. And finally, by an abundance of pictorial art in numerous media (Rutter, 1993: 774, 789). It is important to note that these changes took place gradually over a period of time[12].

The term Shaft-Grave culture is somewhat of a misnomer. The dramatic rise in material wealth at the transition from the MH period to the LH period was not restricted to Mycenae. Indeed, this phenomenon is equally-well attested in Messenia in the southwestern Peloponnese and in central Greece (*e.g.* Thebes, Thorikos)[13]. In addition, the shaft-grave was not its distinguishing feature. Rather, the pervasive change—in the Argolid as in Messenia—appears to have been the appearance of considerable wealth (Rutter, 1993: 774).

Although the term 'civilization' is often applied to the Mycenaean culture as a whole, it is only properly applicable—in terms of our previous definition—to the second phase of the LBA period of Mainland Greece, namely the palatial period (Renfrew, 1972: 49). Many of the criteria proposed by scholars to distinguish 'civilization' do seem to be present on the Greek mainland during the palatial period (LH III A-B). Indeed, it is during this period that we witness the appearance of a distinctive and unprecedented assemblage of features on the Greek mainland, including monumental architecture, increase in population density, craft specialization, development of religion, writing, and the construction of public works.

---

[12]Indeed, the discovery of the slightly earlier Circle B at Mycenae, overlapping with Circle A, has highlighted the gradual nature of the MH-LH transition; see O. Dickinson, 1977: 51.

[13]For example, the LH I tholoi at Peristeria, Vagenas at Pylos, Osmanaga, Livaditi, Gouvalari, Karpophora, and Nichoria in Messenia contained rich offerings comparable, both in their nature and composition, to the grave goods deposited in the Mycenae Shaft Graves; see O. Dickinson, 1977: 53.

Let us now take a closer look at some of the salient features of Mycenaean palatial civilization. Scholars commonly place the appearance of the first true mainland palaces sometime in the LH II B-III A1 period (Rutter, 1993: 796)[14]. A first construction phase is attested at the palace of Tiryns during LH III A1 (Kilian, 1987: 209). The earliest elements at the other mainland palaces (Mycenae, Pylos, Thebes) are of LH III A2 date (Treuil, 1989: 431; Figs. 1-2). No palace of the LH I-II period survives. A few buildings of LH I-III A2 date on the mainland, however, have been designated 'proto-palaces' by some scholars. At the Menelaion in Laconia, for instance, an elaborate LH II B/III A1 building (Mansion 1) has a 'megaron' separated from rooms on either side by two flanking corridors (Fig. 3)[15].

To avoid modern connotations, it is necessary to define the term 'palace' as it is conventionally used by Aegean archaeologists. It is used to designate large-scale agglomerative buildings with recognizable administrative, economic, and religious functions. As J.F. Cherry has recently pointed out, the Mycenaean palaces may be defined, on the one hand, in architectural terms. These monumental architectural complexes were centered on a megaron complex (columned porch—vestibule—hall with fixed hearth, four columns, and a clerestory; Fig. 4)—a distinctly 'Helladic' feature—flanked on either side by a long, narrow corridor which opened onto a number of adjoining rooms (storerooms, living quarters, workshops, baths, etc.)[16].

---

[14]For the appearance of the first mainland palaces, see K. Kilian, L'architecture des résidences mycéniennes: Origine et extension d'une structure de pouvoir politique pendant l'Age du Bronze récent, in E. Lévy (ed.) *Le système palatial en Orient, en Grèce et à Rome.* Leiden, 1987: 203-17.

[15]For the Menelaion, see H.W. Catling, Excavations at the Menelaion, Sparta, 1973-76, *AR* 23, 1977: 24-42.

[16]A few other monumental buildings of LH III date are also worth mentioning. These were large, presumably public buildings which shared certain features with the palaces (*i.e.* fresco fragments, Linear B tablets). Notable examples include the so-called 'house of the Oil Merchant' in the vicinity of Mycenae, a substantial LH III A/III B house at Orchomenos, and a LH III B1 house (House B) at Zygouries (Treuil, 1989: 461, 463).

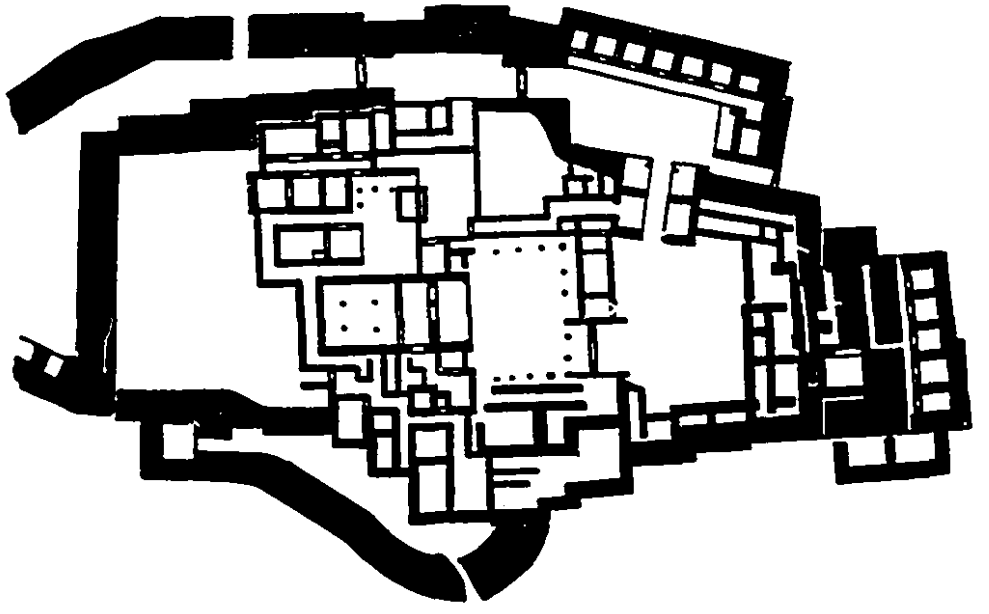


Fig. 1: Upper citadel of Tiryns.

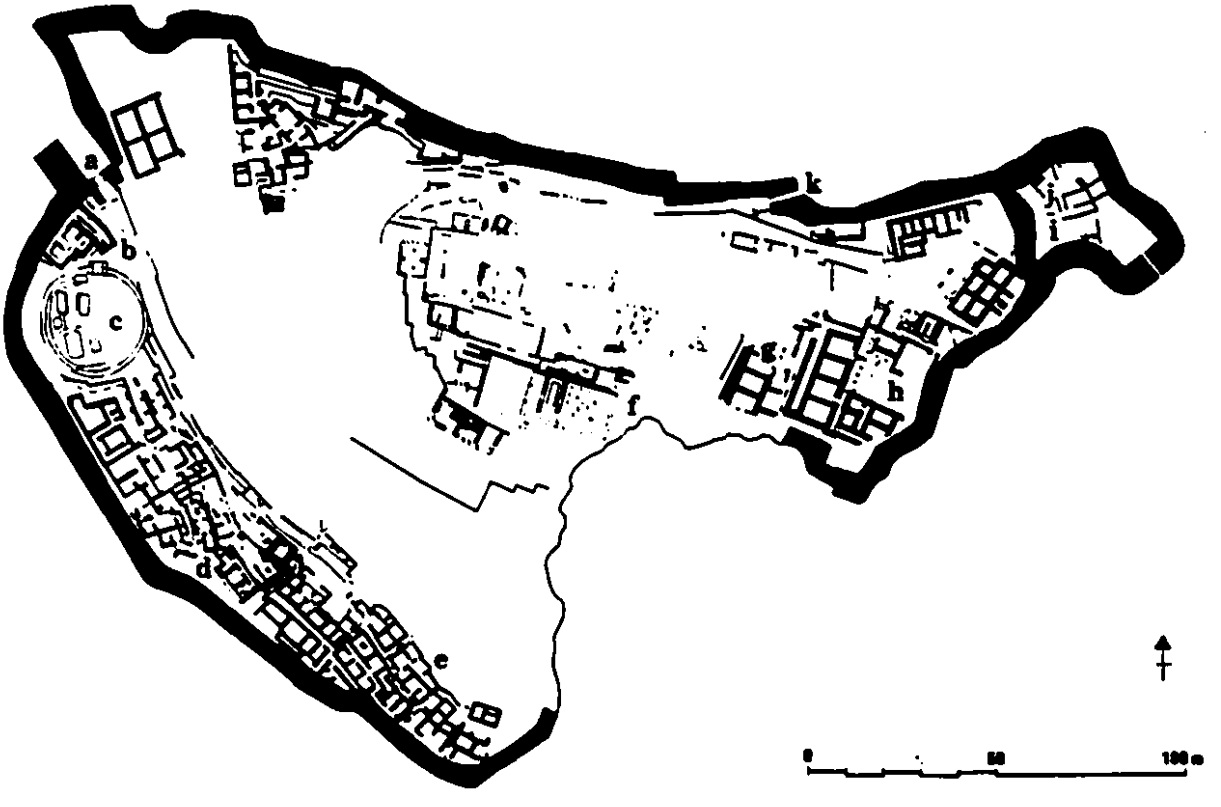


Fig. 2: Citadel of Mycenae. a. Lion Gate, b. Granary, c. Circle A, d. Cult Center, e. Southwest Quarter, f. palace, g. workshops, h. House of the Columns, i. northwest extension, j. underground cistern, k. north gate.

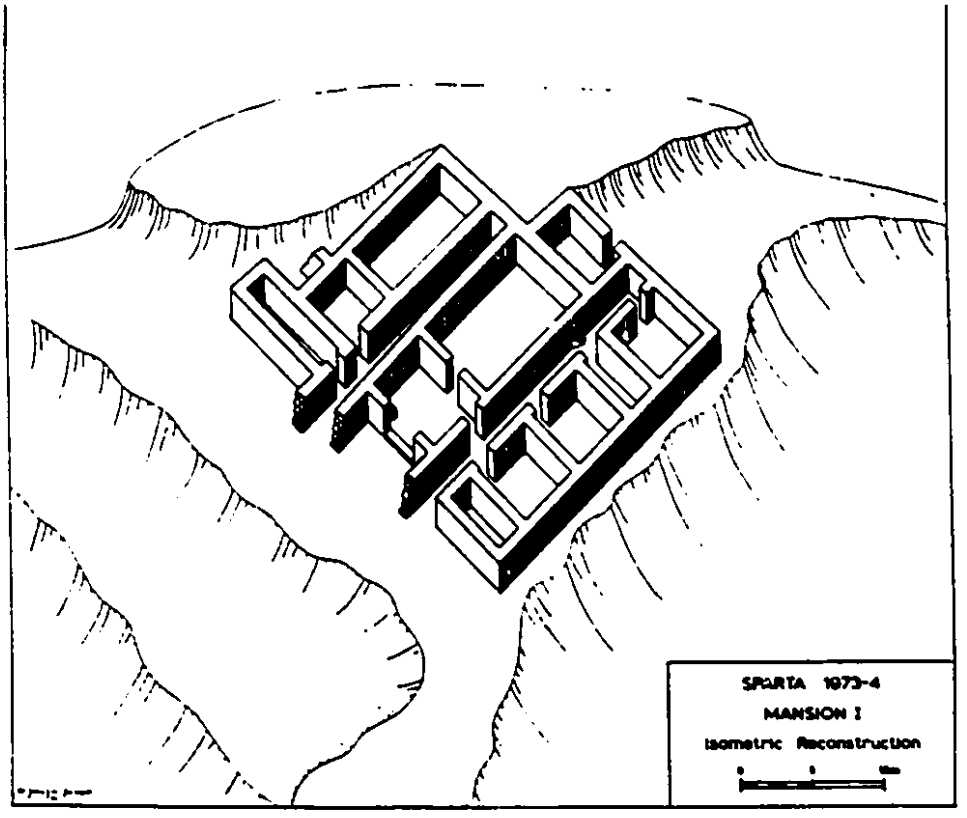


Fig. 3: Menelaion, Mansion I.

Fig. 4: Throne room in the megaron of the palace at Pylos, with central hearth, four columns, and walls decorated with large-scale fresco paintings.

But the palaces may also be defined in terms of their functional aspects. Cherry aptly defines the palaces as "highly bureaucratized institutions for the servicing of an elite and for the production, mobilization, and consumption of commodities" (Cherry, 1984: 22-23).

Two notable examples of Mycenaean monumental architecture include the LH III A-B defensive fortifications and the great vaulted tholos tombs at Mycenae (*i.e.* Atreus, Clytemnestra) and at Thebes in central Greece (*i.e.* Minyas)[17]. The principal Mycenaean fortifications on the mainland—Mycenae, Tiryns, Midea, Gla—were built during the LH III period (Iakovidis, 1983). The acropolis at Tiryns (Upper Citadel) was first fortified in LH III A1 (*ibid.* : 5), while the first sections of the circuit wall at Mycenae are of LH III A2 date (*ibid.* : 27). In LH III B1 the circuit at Mycenae was extended (West wall) and the Lower Citadel at Tiryns was fortified[18]. In LH III B2 defences were reinforced at several sites[19]. Most other Mycenaean fortifications, including those at Midea, Gla, Eutresis, and Araxos (Achaia), belong to the LH III B period (Iakovidis, 1983: 22, 105).

The earlier Mycenaean defences consisted of two facings of massive Cyclopean masonry—*i.e.* minimally dressed polygonal blocks—smoothed and fitted without the use of clay mortar. Later, walls were built of fitted ashlar masonry (*e.g.* area near Lion Gate, and West wall at Mycenae, Lower citadel at Tiryns) with small stones and clay in the interstices. The space between the two facings was usually filled with rubble set in clay (Iakovidis, 1983).

---

[17]The remains of a substantial tholos tomb at Tiryns in the Argolid is of probable LH III date; see K. Müller, *Tiryns VIII, Forschungen und Berichte*, Mainz, 1975: 1-4.

[18]See G. Touchais, Chronoque des fouilles, *BCH* 107, 1983: 758-61; *idem.*, *BCH* 108, 1984: 759.

[19]In LH III B2 the northeast extension at Mycenae was built, the acropolis of Athens was fortified for the first time, and the circuit of the Lower Citadel at Tiryns was extended (Iakovidis, 1983: 27, 86, 12).

The Mycenaean palatial period also witnessed the construction of public works involving large-scale cooperation, notably the hydraulic works in the Copaic basin in central Greece (dykes, canals) and in the Argolid (dam)[20], and the Mycenaean road networks. Remains of Mycenaean roads have been discovered in the Argolid, in Messenia, Boeotia, and Phocis[21].

Other aspects of Mycenaean palatial society which merit to be considered as indicators of civilization include (1) large-scale fresco painting, depicting elaborate figured scenes (*e.g.* processions, heraldic animals, hunt scenes, etc.) at Pylos, Mycenae, Tiryns, and Thebes (Fig. 4), and (2) sculpture. Some thirteen preserved relief stelai from the Shaft Graves at Mycenae are the first examples of monumental relief sculpture on the mainland[22]. A further example of monumental sculpture is the famous 'Lion Gate' relief at Mycenae (LH III B).

The palatial period on the Greek mainland also witnessed the introduction of writing, presumably stimulated by the bulk and complexity of the redistributive transactions in the palace economies. Indeed, writing is first attested on the mainland during the LH III period (on clay tablets and vessels). The earliest inscribed Linear B tablets, recording a syllabic script which is commonly accepted as an early form of Greek, are datable to LH III B (Mycenae, Tiryns, Pylos, Thebes)[23]. The largest single find to date—consisting of some 1,200 tablets and fragments—was discovered at Pylos in Messenia in what appears to have been the

---

[20]For the Copais drainage installations and the Tiryns dam, see pp. 75-79.

[21]See J. Crouwel, *Chariots and other means of transport in Bronze Age Greece*, Amsterdam, 1981: 29; J. Fant & W. Loy, in W. McDonald & G. Rapp (eds.) *The Minnesota Messenia Expedition: reconstruction of a Bronze Age regional environment.* Minneapolis, 1972: 25-29.

[22]For the grave stelai at Mycenae, see G. Kopcke, Treasure and Aesthetic Sensibility. The Question of the Shaft Grave Stelai, *Temple University Aegean Symposium* 6, 1981: 39-45.

[23]See M. Ventris & J. Chadwick, *Documents in Mycenaean Greek* (2nd ed.), Cambridge, 1973. For the Mycenae tablets, see J.-P. Olivier, *The Mycenae tablets*, IV: *A revised transliteration.* Leiden, 1969; for the Tiryns tablets, see L. Godart, J. Killen & J.-P. Olivier, Eighteen more fragments of Linear B tablets from Tiryns, *AA* 1983: 413-26.

palace archives (Rooms 7-8)[24]. These documents were essentially economic records (*i.e.* lists of dedications, personnel, land holdings, tribute assessments, palace stores, etc.).

Sixty-three Linear B tablets were found in a palace annex in the Lower Town of Mycenae (House of the Oil Merchant/Sphinxes/Shields complex)[25]. Another ten tablets were recovered from the citadel. Other important groups of Linear B tablets or fragments were found at Thebes (43) and Tiryns (24). The very existence and subject-matter of the tablets implies the existence of a highly bureaucratized system, with scribes, accountants, tax-collectors, and so on, presumably controlled by palace officials who would assess tax liability, distribution needs, and the palace requirements.

No MH or early Mycenaean cult locales or shrines have yet been identified (Rutter, 1993: 794)[26]. This picture changes during the palatial period. Cult houses or shrines have been identified in the citadels at Tiryns (Rooms 110, 110a in the Lower citadel) and at Mycenae ('Cult Center'). The House of the Idols and House of the Frescoes in the so-called 'cult center' at Mycenae have yielded clay figurines, figured frescoes, and an altar (Iakovidis, 1983: 44-48; Fig. 5)[27]. The shrine in the Lower Citadel at Tiryns has yielded a bull's-head rython and elaborately decorated figurines (Iakovidis, 1983: 20; Fig. 6)[28].

The palatial period is also associated with pronounced social stratification, which seems apparent from evidence such as a presumed site hierarchy, large-scale public or ceremonial buildings

---

[24]See C. Blegen & M. Rawson, *The palace of Nestor at Pylos in Western Messenia*, I: *The buildings and their contents*. Princeton, 1966: 5-6.

[25]See J. Killen, in A. Heubeck and G. Neumann (eds.) *Res Mycenaeae*. Göttingen, 1983: 216-33.

[26]A possible candidate for an early Mycenaean open-air sanctuary was found at the Apollo Maleatas sanctuary near Epidauros: see V. Lambrinoudakis, Remains of the Mycenaean period in the Sanctuary of Apollon Maleatas, in R. Hägg & N. Marinatos (eds.) *Sanctuaries and Cults in the Aegean Bronze Age*. Stockholm, 1981: 59-65.

[27]For Mycenae, see E. French, in R. Hägg & N. Marinatos, *idem*. footnote No. 26: 41-48.

[28]For Tiryns, see K. Kilian, in R. Hägg & N. Marinatos, *idem*. footnote No. 26: 49-58.

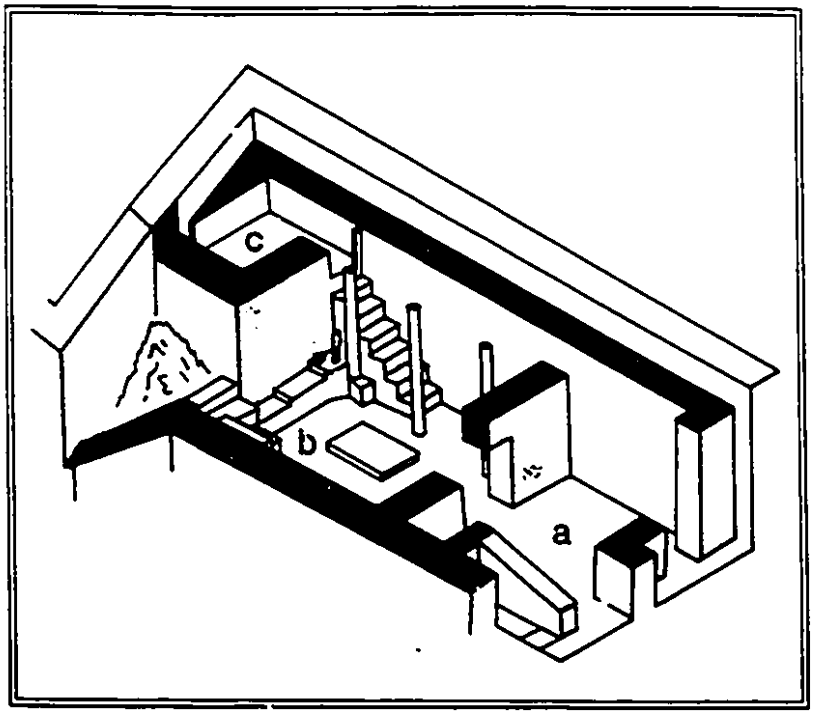


Fig. 5: Isometric reconstruction of the House of Idols at Mycenae.

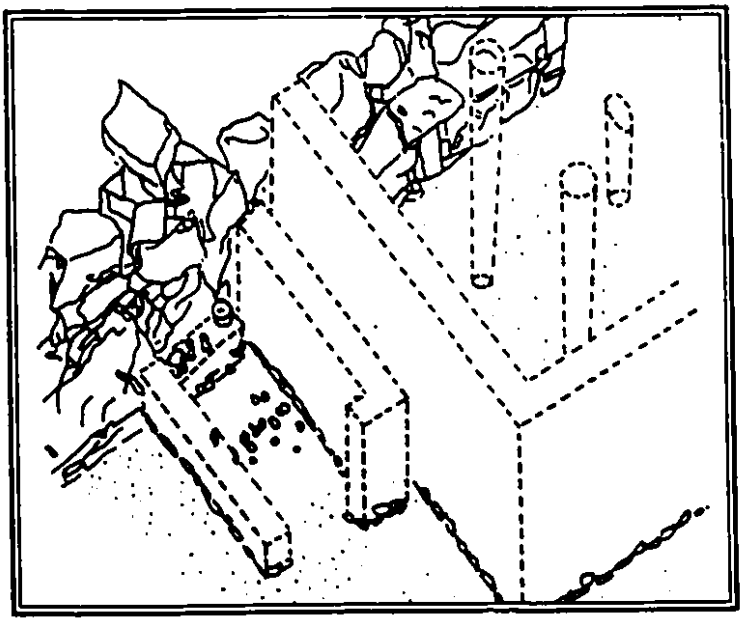


Fig. 6: Isometric reconstruction of the Shrine at Tiryns.

(*i.e.* palaces), graves with extraordinary richness, and prestige objects that encapsulate rare materials and high-quality workmanship[29]. Other aspects of palatial society include specialized and intensified craft production, and the establishment of extensive interregional systems of exchange[30].

Although the terms 'state' and 'civilization' are often used interchangeably, it is important to distinguish between the two. Whereas the state designates a geopolitical entity, civilization refers to a specific level of socio-cultural complexity or development and is more clearly archaeologically definable[31]; indeed, a given culture either possesses monumental buildings, writing, or graves with extraordinary richness, or does not. On the other hand, many of the complex and specialized institutions and political functions of the state are by their very nature intangible, and as such are difficult to describe in a strictly material, archaeological manner (Cherry, 1984: 23). J.F. Cherry has aptly described the Minoan and Mycenaean states as "small-scale yet autonomous polities of roughly equivalent size, situated close to each other within a single geographical region" (Cherry, 1984: 39).

Perhaps the most useful model for the form of socio-political organization current in LBA Greece is that of the Early State Module (ESM) proposed by C. Renfrew[32]. Renfrew envisaged early states as independent territorial units with their administrative centers, which together constitute what is often termed a 'civilization'. Thus, a civilization is seen as a group or cluster of states sharing a number of common features which together define a region of cultural homogeneity (*i.e.* same material culture, political institutions, system of writing, etc.). As typical

---

[29]See Part 3, section 5 (Militarism).

[30]See Part 3, section 3 (Trade).

[31]For a discussion on the definition of the state, especially within an Aegean context, see J. Cherry, 1984: 23-24, 39; for a discussion on the concept of civilization, again within an Aegean context, see C. Renfrew, 1972: 3-14.

[32]See C. Renfrew, Peer polity interaction and socio-political change, in C. Renfrew & J. Cherry (eds.) *Peer Polity Interaction*. Cambridge, 1986: 1-18.

examples of ESMs, Renfrew cites the ceremonial centers of the Maya, the Etruscan city-states, and indeed the palace organizations of Minoan and Mycenaean Greece.

Finally, let us briefly define the terms 'prime mover' and 'Aegean' which are used frequently in this work. A prime mover conventionally designates a factor or mechanism (*e.g.* trade, population pressure) operating within a given society, and which is demonstrably involved in a process of social evolution within that society[33]. The term 'Aegean'—as in 'Aegean civilization'—is used to refer collectively to the civilizations of Mycenaean Greece and Minoan Crete.

[33]See K. Flannery, 1972: 404.

PART II

EXPLANATORY MODELS FOR THE RISE OF SOCIAL COMPLEXITY

Part 2: Explanatory models for the rise of social complexity.

Various theories on the origin and early development of civilization and complex societies have been expounded by scholars such as Carneiro, Adams, Wittfogel, and Renfrew[34]. Each of these major models will be presented and discussed in this section, and will provide a helpful basis for the discussion of Part 3, in which it it proposed to evaluate what impact factors such as trade, militarism, and resource circumscription may have had on the rise of social complexity in LBA Argolis.

These various explanatory models for the rise of the state each focus on a different 'prime mover' as the main causal factor (*e.g.* 'Environmental Circumscription', the 'Hydraulic Hypothesis', etc.). Each of these theories presents a different perspective of the manner in which complex societies began and concentrates on one or more factors as being most important. As Redman has rightfully pointed out, however, it is not a matter of whether one hypothesis is correct and the others false. Rather, each one is a source of insight into the question of which factors influenced the rise of civilization in different parts of the world (Redman, 1978: 223) .

2.1 Environmental Circumscription and Conflict Hypothesis.

Carneiro (1972) formulated a broad hypothesis for the formation of a state that relies on conflict as a major causal variable. Coercive theories such as Carneiro's adhere to the view that the mechanisms of conflict or warfare stimulate the growth of powerful administrative organizations and that population

---

[34]See R. Carneiro, A theory of the origin of the state, *Science* 169, 1970: 733-38.

pressure and economic factors are the most pervasive conditions for causing conflicts (Redman 1978: 224).

In expounding his theory, Carneiro formulates a critique of voluntaristic theories of state origins, which hold that during the course of their history, certain peoples automatically and voluntarily gave up their individual autonomy and united with other communities to form larger political units (states). Carneiro refers to the so-called 'automatic theory' associated most frequently with V. Gordon Childe as one of the most widely accepted modern voluntaristic theories. According to this theory, the invention of agriculture automatically brought into being a surplus of food, enabling some individuals to divorce themselves entirely from food production, thus creating an extensive division of labor. Out of this occupational specialization there developed a political integration which united a number of previously independent communities into a state. Carneiro points to the fact, however, that many agricultural peoples around the world did not feel compelled to produce food above their own needs, although the technical means for generating such a surplus were available—it was the social mechanisms needed to actualize it which were lacking (Carneiro, 1970: 734). Carneiro thus proclaims that autonomous political units are unlikely to relinquish their sovereignty in the absence of overriding external constraints and warfare.

Carneiro's hypothesis is based on what he observes to be a general regularity about the environmental settings of early civilizations throughout the world. Areas of the world in which the primary civilizations emerged—such as Mesopotamia, the Nile Valley, and the Indus Valley—have one thing in common, namely, they are all geographically circumscribed areas, such as a mountain-ringed valley, or a limited but fertile flood plain. Herein lies the premise of Carneiro's theory of state origins. Each area was surrounded by mountains, seas, or deserts—geographical

features that sharply delimited the area which simple farming villages could have occupied and cultivated (Redman,1978: 224).

Carneiro bases his study on the archaeological evidence of Peruvian coastal valleys (Carneiro, 1970). His scenario begins at the stage where small and autonomous agricultural communities were widely dispersed over the surrounding ccuntryside. Although the population density for the Peruvian coast as a whole was low, villages here were confined to a number of narrow valleys circumscribed by mountains and the sea. As with neolithic communities generally, the peoples inhabiting these valleys prospered and their villages tended to grow in size. When these autonomous villages reached a certain limit beyond which integration was no longer feasible, they tended to fission into smaller groups, as long as land was available for the settlement of new communities. This increase in the number of villages probably continued until they became scattered over the entire valley landscape and all the readily arable land in the valley was being farmed. As the population continued to expand, alternative techniques of food production had to be developed to overcome the threat of land shortage and famine.

At this point, according to Carneiro, the farming communities were compelled to intensify their production on the lands already being used. In addition, new agricultural techniques, such as irrigation and terracing, were introduced, bringing previously unusable land under cultivation and creating new areas of rich alluvial soil (*ibid.* : 735). As a result of such intensified land use, the various communities began competing with one another over land and military conflicts between groups became more frequent. In response to limited land acreage, the major incentive for warfare became the need to acquire land (Carneiro, 1970: 735).

Carneiro then suggests what the consequences of this type of warfare may have been for inhabitants of defeated villages in

Peru. If the survivors of a defeated village were permitted to remain on their own land, instead of being deported to a hinterland, they were incorporated into the political unit dominated by the victor. Naturally, this assimilation into the winner's society entailed political subordination; the vanquished inhabitants became a lower class and were compelled to pay tribute or taxes in kind. Thus, successful militarists were rewarded by economic wealth, new land, and a conquered class of workers (Redman,1978: 224)[35]. The adaptive advantages of organizing and controlling successful military operations rapidly led to the institutionalization of warfare. Through the recurrence of warfare of this type, there emerged in coastal Peru a number of integrated territorial units transcending the village in size and in degree of administrative complexity. Eventually, the entire valley was unified under a single autonomous political entity that was sufficiently centralized and complex to be called a state. Thus, for Carneiro, the state had thus emerged in Peru as a result of conquests and warfare (Carneiro, 1970: 736).

For Carneiro, the aggregation of villages into increasingly larger political units was associated with drastic structural changes and social evolution (*ibid.* : 738). The expansion of successful states brought within their borders vast resources and conquered peoples which had to be administered. The need to administer and allocate newly acquired resources eventually led to the estabiishment of a body of rulers and officials. Besides maintaining law and order and collecting taxes, this class of administrators provided the management needed to carry out large-scale public projects such as irrigation agriculture, or the construction of roads, palaces, and temples. These individuals became the nucleus of a state government and upper class, while a lower class emerged from the inhabitants of conquered villages. The elite could extract an economic surplus from conquered

---

[35]An apparent problem here, however, is that if the defeated population of a village was assimilated into the victor's group, then the land shortage remained the same and the population pressure was not reduced.

villages through taxation, which went to support their own interests and improve their standard of living. Such elites thus had the privilege of divorcing themselves completely from food production. Thus, according to Carneiro, there is a direct correlation between warfare and the rise of social stratification (Carneiro, 1970: 736).

In his circumscription and conflict hypothesis, Carneiro has thus made population pressure the determinant of war and conquest and, in turn, warfare the prime mover of evolution towards statehood. In addition, he argued that these factors were mechanisms that would produce the state only under certain specific conditions (*i.e.* environmental circumscription). There is an attractive simplicity to Carneiro's hypothesis of state origins but recent attempts to test it against archaeological evidence have produced negative results. Most importantly, the processes leading to the formation of early state societies appear to have been much more complex than just warfare between competing groups arising from the need to acquire land.

Moreover, theories such as Carneiro's using population growth as a prime mover do not go very far toward explaining why population should grow in the first place. Indeed, none of the various population-pressure theories attempts to explain why primitive farmers may have began producing more food (Cherry, 1984: 28). Moreover, it is doubtful whether warfare can be universally admitted as a primary cause of civilization, since in some cultures large-scale conflicts appear to have been a result of the state, rather than a direct cause of it (Flannery, 1972: 405).

2.2 Trade and Exchange Networks

Several theorists have suggested that the development of complex, large-scale trading networks stimulated the growth of urban society and the formation of the state. The origin and

evolution of complex societies in different parts of the world have long been associated with the development of trade in essential raw materials such as metals, or in luxury goods of all types. Among the factors outlined by Childe as having promoted the rise of early forms of urbanism, long-distance trade on a large scale was regarded as one of the primary factors[36]. Several of the areas where early civilizations arose are lacking in raw materials thought to be essential to daily life. A lack of many raw materials, such as metal ores, timber, building stone, or stone for tools in southern Mesopotamia was long held to be responsible for stimulating trade in that area (Flannery, 1972: 408). Thus the inhabitants of Mesopotamia substituted available resources, such as clay, for unavailable materials. According to this hypothesis, the advent of large-scale trade necessitated an administrative organization capable of controlling the procurement, production and distribution of such goods (Redman, 1978: 225); the growth of a powerful administrative organization stimulated the formation of a state. Such an organization would have had access to a major source of wealth in the community, such as the central management of the distribution of surplus wealth, to ensure the successful operation of long-distance trade. Indeed, trading on a large scale was an expensive process; capital had to be available to support professional traders, as well as a police force to secure trade routes. Redman suggests (1978: 225) that by controlling such a source of wealth, the power of such an organization might have been extended to other aspects of society, thereby contributing toward the rise of a single-centered government and the formation of a state.

Such hypotheses, however, do not explain the rise of civilization in areas which were seemingly not lacking in 'essential' raw materials (Flannery, 1972: 407). In fact, Flannery has pointed out that in at least one case, in southern Mesopotamia, a significant increase in the amount of trading actually followed

---

[36]See V.G. Childe, The Urban Revolution, *The Town Planning Review* 21, 1950: 3-17.

the formation of the state, rather than preceeding and causing it (*ibid.*). It is certain that trade was important in the early civilizations, and that it constituted a major contributing factor toward their formation. As in the case of warfare, however, it is unclear whether it was a cause of the rise of civilization or an effect of an administrative elite that already existed (Redman, 1978: 225). Once again, we are faced with a mechanism that may have been important in some areas and not in others, thus lacking universality.

2.3 The Hydraulic Hypothesis

Most scholars agree that the introduction of intensive forms of agriculture was among the most important developments in the rise of civilization. The shift to such intensive forms of food production as irrigation agriculture made possible the large-scale concentration of people, establishing the conditions under which a complex state could have come into being. It was Wittfogel (1957) who originally proposed irrigation as a prime mover in the development of the state. He believed that water was a resource of unusual qualities because, unlike other environmental factors essential to agriculture (*e.g.* temperature and soil fertility) it could be manipulated and agglomerated in bulk by human societies (Redman, 1978: 221). He believed that the effective management of large volumes of water made an efficient organization indispensable. Water management was especially important in places where rainfall was insufficient, as in semiarid river valleys such as the floodplain of the Tigris and the Euphrates rivers. To make water-deficient areas fertile, people had to create large-scale irrigation works. Artificially constructed dams and ditches allowed them to bring water to the fields so that they could be cultivated effectively. These were usually operated by a body of rulers and officials who provided the management needed to carry out such large-scale enterprises. . Once this organization existed, according to Wittfogel, a 'hydraulic economy' inevitably

developed, characterized by an extensive division of labor and intensive cultivation and cooperation on a large scale (Claessen-Skalnik, 1978: 11). The state bureaucracy had a monopoly over hydraulic facilities and created what Wittfogel has called the 'Hydraulic State'. Wittfogel also describes the range of activities necessary to carry out irrigation on a large scale. They include the planning and construction of irrigation works, the mobilization of huge labor forces, the maintenance of canals, and the defence of canals from hostile neighbors (Redman, 1978: 222). The bureaucratic organizations which organize and control the irrigation systems, upon which an expanding population has come to depend, have virtually unlimited power over the primary producers. They could, for example, coerce the farmers into producing a substantial agricultural surplus. This might precipitate the growth of new patterns of appropriation and consumption, and indeed new forms of interpersonal relationships, involving the managers of water freed from the responsibilities of food production. Moreover, the central government could further increase their power and influence by gradually extending their monopoly to include all the segments of society: trade, production, religion, etc.

Carneiro (1970) and Adams (1966), while granting the importance of irrigation in some regions of the world, reject it as a general mechanism for the formation of states because there are many examples of state organization without irrigation works, and conversely of irrigation not leading to the development of the state at all (Claessen-Skalnik, 1978: 11). Carneiro has pointed to the fact that archaeological evidence has now revealed the existence of full-fledged states in Mesopotamia, China, and Mexico well before the development of large-scale irrigation (1970: 734). Conversely, Flannery maintains that many states, such as the ancient Maya, arose in areas where irrigation was of limited to negligible importance (1972: 405). If this is true, the introduction of great irrigation works should be viewed as a consequence rather than as a cause of state formation.

2.4 Multivariant Causality.

In the foregoing hypotheses, each theorist has attempted to single out one or two major factors that contributed the most toward the rise of the state and civilization in different parts of the world. All of them seem to agree that they came into existence gradually, during a period of major social and economic change. However, there is a growing tendency among anthropologists to reject the earlier linear explanations invoking irrigation, warfare, or trade as major causes for civilization. Indeed, current research stresses a systems approach to the origins of civilization and the state, regarding the emergence of complex societies as a gradual process caused by many interacting variables (Redman. 1978: 226). Scholars such as Adams, Flannery, and Renfrew[37] emphasize the complexity of the process of state formation and urge us to examine the mechanisms by which political evolution took place. They argue that complex societies are not susceptible to simple analysis and that there were many causes of cultural change. Thus, for Adams and Flannery there are no 'prime movers', but rather a whole series of important variables with complex interrelations between them.

Adams has played an important role in promoting the growing trend toward looking at multiple causes of state formation. On the basis of evidence from Mesopotamia, he argued that irrigation agriculture, increased warfare, and local resource variability were three major factors that contributed towards its initiation. More importantly, he has presented a convincing argument supporting the complexity of the process by discussing several important transformations in the rise of the state (Redman, 1978: 228). The first of these was the integration of several ecological zones, each producing a different food as a main product, into a stable food base that allowed the population to increase in size. The redistribution of the food produced was

---

[37]See C. Renfrew, 1972: 36-44.

managed by members of the temple community. The centralization of the means of redistribution gave the temple elite the power to coerce the farmers into producing an agricultural surplus. Adams maintains that the accumulation of such a surplus involved the elaboration of complex institutional mechanisms for concentrating and reallocating it, by which a complex state came into being (Adams, 1966: 46). The second major transformation Adams has identified was the shift from an essentially classless, kin-based society to class-structured one. The monopoly over good land by a limited social segment, who controlled production and redistribution, resulted in the acquisition by a few families of great wealth and power. It is likely that these groups attempted to protect their wealth and power by creating a system of stratified social relations that would institutionalize the economic differences that had emerged (Redman, 1978: 227).

Thus, in recent years, scholars such as Flannery and Adams have emphasized a more systems-oriented approach to the origins of civilization, regarding the emergence of complex societies as a gradual process caused by many interacting factors. Indeed, they have rejected the earlier linear explanations invoking such prime movers as warfare and population pressure in favor of a multivariant approach, which urges us to look at the multiple causes of state formation.

PART III

THE RISE OF PALATIAL SOCIETY IN LATE BRONZE AGE ARGOLIS

Part 3: The rise of palatial society in Late Bronze Age Argolis.

In this section, it is proposed to examine to what extent factors such as trade, growing militarism, and environmental circumscription may be invoked as prime movers in the rise of palatial society in the Argive plain towards the end of the fifteenth century B.C., during the LH III A-B period. This will be preceded by a discussion of the physical setting of the Argolid (3.1) and a discussion of the settlement history (from N to Sub-Myc.) of the region (3.2).

In the past, scholars have sought to account for the rise of the Mycenaean civilization in terms of either 'diffusionist' or 'migrationist' explanations[38]. According to the former approach, the key features of the LH culture were introduced as a result of the civilizing influence of the New Palace period in Crete, while the latter would attribute these same features to the arrival of a new population (Renfrew , 1972: 55; Cherry, 1984: 20-21). In recent years, however, these diffusionist theories have drawn considerable criticism. Indeed, scholars such as Renfrew and Cherry have questioned whether all important cultural changes are to be associated with population movements or the influence of 'higher' cultures (Renfrew, 172 : 58). While acknowledging the far-reaching impact of Minoan influence in the development of a distinctive LH culture on the mainland, this view would not concede to Evans' view that the more advanced Minoan civilization was the motive-force in the emergence of the Mycenaean civilization. Rather, the prevailing view today regards the Mycenaeans as resulting from an assimilation of the MBA 'Helladic' culture of the mainland with certain Minoan, Cycladic, and Aeginetan elements[39],

---

[38]A.J. Evans believed that the Shaft Grave culture resulted from the occupation of Mycenae by Cretan conquerors: see A.J. Evans, *The Shaft Grave and Bee-Hive Tombs of Mycenae*. 1929.

[39]See O.T.P.K. Dickinson, 1977: 53; J. Rutter, 1993: 778, 792. It is commonly accepted that Minoan influence upon the Helladic culture of the mainland was limited mainly to the artistic sphere (Dickinson, 1977: 56; Treuil, 1989: 356). For the fullest exposé of the Middle Helladic

and many of its main features as essentially the product of local developments. Archaeologists today are thus less concerned with seeking external influences to explain changes in the Aegean BA than with elucidating local processes[40].

---

culture of Greece yet published, see O. Dickinson, *The Origins of Mycenaean Civilization.* Göteborg, 1977: Chs. 1-2.

[40]J.F. Cherry has expressed his scepticism towards explanations of culture change in terms of either extreme endogenous or exogenous causation (1984: 21). Most studies of the rise of the Aegean palatial systems today take into consideration both external influences and local developments.

3.1 Physical setting

The Argolid, the easternmost of the four peninsular prongs of the Peloponnese (Akte), is located in the northeast part of the Peloponnese and comprises a large fertile alluvial plain, the plain of Argos, surrounded by limestone mountains which virtually cut it off from other areas of the Peloponnese, thus forming a distinct geographical and political entity in antiquity. The Akte peninsula ends at the Dhidhima and Adheres ranges in the southern Argolid, and is rimmed by a number of small coastal plains (Ermioni, Troizen, Kranidhi). Overland access to neighbouring areas is afforded by a few narrow passes which transect the upland ranges to the east, west, and north. A narrow valley (high plateau) joins the Argive plain in the west with the east coast of the Argolid in the vicinity of Palaia Epidhavros on the Saronic Gulf. The importance of this natural causeway to the east is, as we shall see, well attested in prehistoric times by the existence of a Mycenaean road between Tiryns and the east coast (Balcer, 1974: 148-9). Access to the Corinthia in the north is provided by two river valleys, the Nemea and Kleonai valleys. Comparatively easy access to Kleonai and Nemea, and ultimately to the Corinthia further north, is afforded by the narrow Dhervenaki pass. A few harbours on the Akte (Koiladha, Porto Kheli, Ermioni) provide safe landfalls.

The Argive plain is a zone of subsidence in recent geological history (Kraft, 1977: 941; Zangger, 1994: 193-94). Like the other major plains of Greece (*e.g.* Messenia, Evrotas), the plain consists of a downfaulted basin (graben) surrounded by upthrown blocks of older rock (horsts) trending generally from northwest to southeast[41]. The plain itself is a flat, roughly triangular-shaped

[41]These features follow the general NW-SE trend of the Pindus range and ultimately that of the Dinaric mountain system of the Balkans.

expanse of black alluvial soil[42] which has been washed down from the surrounding hillsides and mountains. It comprises two major alluvial formations (Lehmann, 1937: 25): (1) an older alluvial deposit makes up the northern and central zone of the plain, while (2) a younger deposit[43] makes up the lower plain (south of Argos) at the head of the Argos Gulf. East of the plain Mt Arachnaion rises to nearly 1219 m, partially separating it from the eastern coast of the Argolid. On the western side of the plain, separating it from Arkadia, is Mt Artemision (1798 m), to the south of which rises Mt Parnon (1981 m), blocking easy access to Laconia. The Argive plain as a whole covers about 200 km^2 and is smaller than the plain of Messenia and that of the Evrotas Valley but was always capable of supporting a relatively large population. The hillsides bordering the central plain (piedmont) consists of erosional sediments (flysch and neogen), and during the BA sites clustered on or near such deep autochthonous soils[44]. Upland valleys situated on the edge of the Argive plain—such as the Berbati Valley[45]—supported local populations in Mycenaean times and supplemented the agricultural yield of the central plain.

Three rivers run through the plain, two of which, the Inakhos and the Kharadros, are torrential. Only the Erasinos, a short river which arises at the springs of Kephalari on the western edge of the plain, is perennial (Lehmann, 1937: 50-5). Although there are numerous springs in the area, the plain as a whole is dry[46] and receives little rainfall—less than 20 inches annually (*ibid.* : 41).

---

[42]As is the case elsewhere on the peninsula of Greece, this sedimentary infill was deposited during the Holocene epoch (last 10,000 years) and earlier ages of the Quaternary (Kraft, 1977: 941).

[43]The Younger fill is of recent date, and has been attributed to a period between Late Roman and early modern times; the Old fill is attributed to the last glacial (Würm) period.

[44]These soils are rich in calcium giving them a good nutrient (Nitrogen) and water retaining capacity (Nordquist, 1987: 18).

[45]See Wells, Runnels & Zangger, 1990: 227.

[46]Homer refers to 'thirsty Argos' (*Iliad* 4.171).

Sediment infilling during the last 10,000 years caused by erosion (colluvial or man made) and alluviation have had drastic effects on the coastline of the plain of Argolis by enlarging the coastal (deltaic) zone (Kraft, 1977: 941; Dietz, 1991: 281), although this has been somewhat offset by eustatic sea-level rise and local vertical tectonic movements. It has been estimated that the LBA coastline used to be some 500 m further inland from the present shore (Fig. 7) and thus the citadel Tiryns in LH times was located about 1 km from the former coastline of the Gulf of Argos (Kraft, 1977: 945; Zangger 1994: 194-96). Sites such as Magoula and Lerna on the western shore of the Gulf were established directly on the sea. A freshwater lagoon lay by Magoula during the BA, which existed into the 19th century (Lake Lerna). It is also important to note that, as we shall see, the Late Helladic peoples appear to have had some effect in altering the nature of the lower plain of the Argolid by installing an artificial river diversion[47].

It has recently been shown that the Argolid experienced a major phase of landscape instability during the EH II period (*ca.* 2500 B.C.) which resulted in the deposition of several meters of alluvium in the coastal plain (Zangger, 1994: 194, 203). The Southern Argolid Exploration Project[48] has shown the existence in the EBA of a major sedimentation phase—the so-called Pikrodafni soil—in the southeast Argolid (Akte) belonging to an erosional 'event' which had a devastating effect on the landscape and a significant impact on the patterns of human settlement (van Andel, Runnels & Pope, 1986: 113). As in the Argive plain, the greatest expansion of EBA settlement in the southern Argolid occurred towards the end of EH II. At this time a major sedimentation phase resulted from extensive land clearance and an expansion into the

---

[47]See pp. 75-78.

[48]The Argolid Exploration Project consists of an intensive survey of the southern Argolid, conducted between 1979 and 1983 and directed by M.H. Jameson and Tj. Van Andel (Stanford University). This interdisciplinary project was aimed at elucidating the paleo-ecological and paleo-geographic history of the southern Argolid, and its relation to the history of human settlement in the area. Approximately 319 new sites were found, and a geological sequence of late Quaternary (Pleistocene-Holocene) deposits was established.

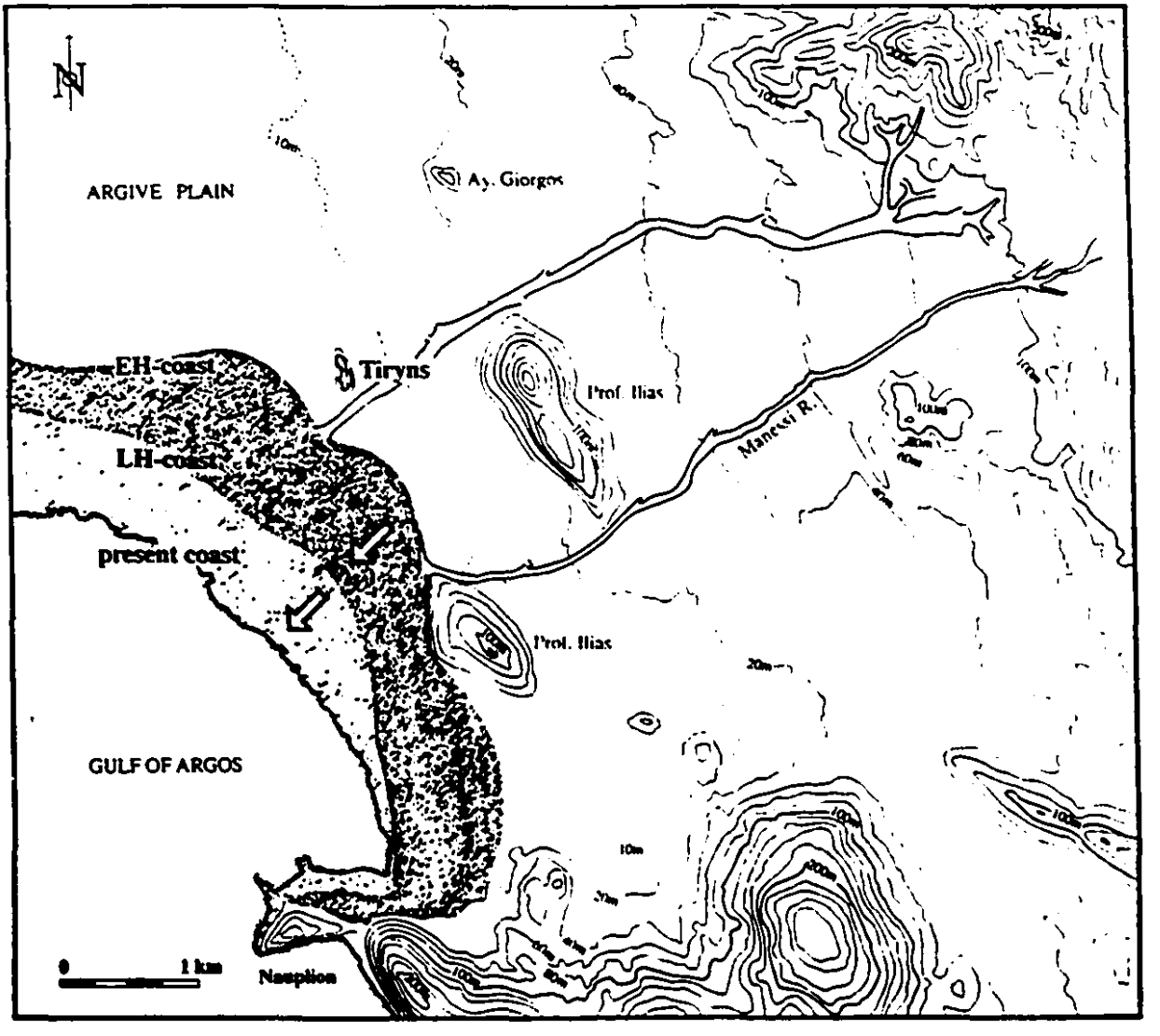


Fig. 7: Coastline changes in the eastern part of the Argive plain.

hilly interior associated with the large increase in sites engaged in cereal cultivation during the EH I-II periods (Pope & van Andel, 1984: 310). Thus, scholars have invoked environmental factors, notably a major alluvial event during the EBA, as one of the causes of the EH III/MH decline in the Argolid[49], and ultimately as providing the economic base upon which the expansion of sites in the LBA was founded[50].

[49]It has recently been shown that late in EH II, 2.4 m of alluvium were deposited in the immediate area of the lower town at Tiryns (Zangger, 1994: 203).

[50]See B. Wells, C. Runnels & E. Zangger, In the shadow of Mycenae, *Archaeology* 46, 1993: 54-63.

3.2 Settlement History

Settlement in the Argive plain was already dense in the EBA (total of 37 EH sites, up from 14 N) and achieved a high degree of prosperity in the EH II period. It is at this time that it reached its greatest density of settlement: 30 sites[51]. Settlements in the N period were often located on the coast, or in or near a cave (*e.g.* Frankthi), and during the EBA in the Argolid coastal sites were also favoured, as the example of Lerna shows. The most important EH II settlements were Lerna, Tiryns, and Zygouries[52].

At the end of the EH II period a major reduction took place in the number of occupied sites: from 30 EH II to only 14 (18?) known EH III sites. This reduction was accompanied by radical changes in artefact and building types, as well as violent destructions at several Argive sites, including Asine, Zygouries, Tiryns, and Lerna[53], some of which show reoccupation (*e.g.* Lerna IV), but on a reduced scale, while other sites appear to have been altogether abandoned (*e.g.* Kazarma, Ligourio, Epidhavros, etc.).

The disturbances at the end of EH II in the Argolid were part of a widespread phenomenon marking the EH II-III transition (*ca.* 2300 B.C.) and can be seen at many other mainland sites (*e.g.* Ayios Kosmas, Orchomenos, Malthi, Zygouries). Generally, settlements occupied in EH III are smaller and impoverished, implying a drop in the level of civilization.

By the end of the MH period almost all of the old EH sites had been reoccupied and several new ones had been founded: this period witnessed a rise from 14 (18?) EH III to 30 (33?) MH

---

[51]See Graph 1 in appendix 1.

[52]For Tiryns, see J. Jantzen (ed.) *Führer durch Tiryns.* Athens, 1975: 83.

[53]At Lerna III, the destruction of the 'House of Tiles' marks the end of EH II (Caskey, 1960: 293). The existence of a new ceramic style (Minyan) and house type (apse) at Lerna IV may imply new occupants.

sites[54]. At this time, a higher level of prosperity had returned to the Argive plain, reflected in the richer grave contents (*e.g.* Asine). During the MH period, habitation was clearly concentrated on the plain and often near the coast (Dietz, 1991: 293).

The main MH sites in the Argolid—Argos, Lerna, Tiryns, Midea, and Asine—must have had a considerable population[55]. Clearly one of the most important economic centers of the MH Argolid was Lerna V (Nordquist, 1987: 62, 66; Dietz, 1991: 297). Lerna appears to have been a major trading center for imports, with large quantities of Minoan, Aeginetan, and Cycladic pottery. By the end of the MH period an increasing population is well-attested at Argos and perhaps at Asine, while Lerna became less inhabited and Tiryns probably decreased in importance (Dietz, 1991: 293). Increasing population density is indicated by the presence of substantial extramural cemeteries at this time at Mycenae and at the Argive Heraion (Prosymna)[56].

The Argive plain achieved its highest level of prosperity and settlement density in the LH period. This was the peak of BA culture in the Argolid (total of 63 occupied sites). Beginning towards the end of the MH period there is a gradual and continuous expansion of settlement which culminated in LH III A-B: a rise from 30 MH/LH I sites to 37 (38?) LH II sites to 56 (57?) LH III sites, or an increase of *ca.* 89%[57]. By the beginning of the Mycenaean period, Mycenae had evidently surpassed all its potential rivals (*e.g.* Tiryns, Argos, Lerna, and Asine) and had become the single most important settlement in the plain. Indeed,

---

[54]See Graph 1 in appendix 1.

[55]For Tiryns, see P. Gercke & G. Hiesel, Grabungen in der Unterstadt von Tiryns von 1889 bis 1929, *Tiryns* V. Mainz, 1971; for Asine, see Nordquist, 1987; for Midea, see P. Aström, K. Demakopoulou & G. Walberg, Excavations in Midea 1989-1990, *OpAth* 19, 1992: 11-22, esp. 15-22; G. Walberg, Excavations on the Lower Terraces at Midea, *OpAth* 19, 1992: 23-39, esp. 25.

[56]A chamber cemetery was established at Prosymna at this time. The earliest tombs (Nos. 25, 26, and 52) are certainly of LH I date (Blegen, 1937: 86-98).

[57]See Graph 1 in appendices. In the southern Argolid alone, there is an increase from an estimated 5 MH to 22-37 LH sites: see Rutter, 1993: 748.

the frequency and richness of offerings in the Shaft Graves can not be matched at any other site in the Argolid (Dickinson, 1977: 88; Dietz, 1991: 261). It is believed that areas such as the Limnes uplands and the southern Argolid (Akte) came under Mycenae's control at this time and supplemented Mycenae's agricultural resources (Wells, Runnels & Zangger, 1990: 228, 237). Sites at this time are located as a rule on the hill zone around the edge of the Argive plain, indicating the importance of agriculture for the Mycenaeans. A few sites were located near the coast and in upland valleys.

The Lerna shaft graves[58] and the tumulus cemetery at Argos, which contained some richly furnished graves[59], suggest that these may have been important 'secondary' centers in LH I. The two shaft graves at Lerna, of LH I B date, were large and stone walled and cut into the northern walls of the House of the Tiles. Emptied of their original contents, they may have contained burials of important persons, but there are no signs that Lerna was of any importance in later Mycenaean times.

As of LH II A, the distribution of early Mycenaean tholoi suggests that a hierarchy of settlements emerged in the Argive plain (Dickinson, 1977: 63; Mee & Cavanagh, 1984)[60]. In all probability, the four satellites (Phykhtia, Ayios Yeoryios, Monasteraki, Vreserka) in the immediate vicinity of Mycenae were under her control. Six tholos tombs were in use in LH II A at Mycenae (Dickinson, 1977: 63). The discovery of early Mycenaean (LH II A) tholoi elsewhere in the Argolid, at Berbati, Prosymna, Kazarma, and Kokla, suggests that some sites retained a measure

---

[58]For or the two Lerna shaft graves, see J.L. Caskey, Excavations at Lerna: 1954, *Hesperia* 24, 1955: 32-34; *idem.*, Excavations at Lerna: 1955, *Hesperia* 25, 1956: 155-57; see also Dietz, 1990: 285-86.

[59]At Argos, in the cemetery east of the Aspis, Tumulus E contained a richly furnished cist grave (No. 5) of MH III-LH I date: see Dietz, 1990: 139.

[60]See Sect. 3.5, p. 70.

of autonomy in the early Mycenaean period[61]. The Prosymna tholos is relatively large (diameter 9.5 m), its contents were rich, and its construction was better than that of the other tombs. The tholos tomb at Kokla was furnished with a rich array of valuable grave goods[62].

In addition, extensive chamber tombs cemeteries at Argos (Deiras), Prosymna, Asine, Dendra, and Nauplion contained some rich LH II burials (Dickinson, 1977: 88)[63]. The astonishing series of graves at Dendra begins towards the end of LH II A. The richest tombs contained burials that might fairly be termed 'royal'[64]. It has been suggested that by the end of LH II A Dendra/Midea may have superceded one or more of the earlier sites (*i.e.* Prosymna, Berbati) as a center of power and may have controlled the eastern sector of the plain (*ibid.* : 88).

In later Mycenaean times Argos, Tiryns, and the acropolis of Midea appear to have grown in importance[65]. In LH III A palaces were built at Tiryns and Mycenae. Indeed, in LH III the rulers of Mycenae and Tiryns experienced the peak of their political and presumably economic power. Scholars have long speculated about the reasons for two major administrative centers, at Tiryns and at Mycenae, within approximately 4 km of each other, existing at the same time. In fact Tiryns was only second to Mycenae in size, and

---

[61]For the tholos at Berbati, see G. Säflund, *Excavations at Berbati 1936-7.* Stockholm, 1965; for Prosymna, see C. Blegen, *Prosymna. The Helladic settlement preceding the Argive Heraeum.* Cambridge, 1937.

[62]For the tholos at Kokla, see K. Demakopoulou, The Burial Ritual in the Tholos Tomb at Kokla, Argolis, in R. Hägg & N. Marinatos (eds.), *Celebrations of Death and Divinity in the Bronze Age Argolid.* Stockholm, 1990: 113-23.

[63]For the cemetery at Argos, see J. Deshayes, *Argos, Les Fouilles de la Deiras.* Paris, 1966; for Dendra, see P. Aström, *The Cuirass tomb and other finds at Dendra,* I: *The chamber tombs,* Göteborg, 1977; for Nauplion, see E. Deilaki, Chronique des Fouilles, *BCH* 1980: 603; *idem., Archaeological Reports* 26, 1980: 30; for Prosymna, see C. Blegen, *idem.* footnote No. 21. For example, a richly furnished cist grave of LH II B date was found at Argos: see D. Kaza-Papageorgiou, An Early Mycenaean Cist Grave from Argos, *AM* 100, 1985: 1-21.

[64]See P. Aström, *idem.* footnote No. 23.

[65]Remains of MH and LH I-III B date were found in the acropolis and lower town of Midea. The impressive circuit wall was built in LH III B (Aström, 1983: 56; 1990: 20).

is the only other LH center in the plain to have had a palace and to have produced its own Linear B tablets. Presumably, there was a close interrelationship between the two palace centers and their rulers. Mycenae may have been the key to the main overland pass to the Gulf of Corinth to the north, while the role of Tiryns may have been to protect and control the coastal plain and commerce in the area and the flanking upland agriculture between Tiryns and Mycenae. Midea and Argos probably dominated the east and west sides of the plain respectively (Dickinson, 1977: 89).

In the LH III A 2 and III B periods there was evidently a large population in the Argolid, attesting an unprecedented prosperity in the plain. Population was especially dense in the neighbourhood of Mycenae, but sites such as Tiryns, Argos, Asine, and Dendra had substantial 'lower towns'. In LH III A 2 the chamber tomb necropolis at Mycenae-Kalkani included 49 burials, a rise from 12 in preceding phase (LH III A 1), while that at Prosymna included 200, up from 40 (Alden, 1981: 332; Mee & Cavanagh, 1984: 55-56). As a whole, the LH III B period in the Argolid witnessed a reduction in the number of chamber tomb burials (Mee-Cavanagh, 1984: 57)[66]. This appears to contradict the density of occupied sites, which rises during this period, from 50 LH III A sites to 53 LH III B sites, or a 10.42% increase, suggesting the difficulty of inferring population density from such figures[67].

The transition from LH III B to LH III C in the Argive plain, around 1200 B.C., witnessed a dramatic reduction in the number of sites, implying a major depopulation in the region as a whole: from 53 (54?) LH III B to 17 (20?) LH III C sites, or *ca.* 51% reduction[68]. Both Mycenae and Tiryns were destroyed, and many

---

[66]For example, the LH III B period at Asine is marked by the almost complete absence of material in the chamber tombs (Dietz, 1982: 102). That LH III B habitation is well documented in the Barbouna Area and in the plain east of the Acropolis contrasts with the picture given by the tombs (Frizell, 1986: 84).

[67]C. Mee and W. Cavanagh have suggested that such discrepancies may be due to the fact that LH III B tombs, being less easily datable, are under-represented (Mee & Cavanagh, 1984: 57).

[68]See Graph 1 in appendix 1.

contemporary settlements in the vicinity were abandoned, such as the Argive Heraion, Midea, Berbati, and Kastringi[69]. Although there is evidence for widespread impoverishment and major depopulation in the Argive plain a whole (*i.e.* LH III B 2 destruction of the Lower Town at Mycenae and the palace at Tiryns), a number of settlements experienced a phase of recovery and rebuilding in LH III C (*e.g.* Argos, Tiryns, Nauplion)[70].

Continuity into the LH III C in the Argolid is especially notable at the site of Asine. The Mycenaean chamber tomb cemetery excavated on the Barbouna Hill remained in use in the LH III C period[71] (Frödin-Persson, 1938: 298-311, 356 ff.). The tombs are mostly large and rich, suggesting that some of the LH III 'secondary' centers may have survived as important settlements following the collapse of the palace centers. The LH III C period at Asine yielded substantial remains in the Lower Town (*i.e.* Buildings I and G)[72], and in the area east of the Kastraki (Karmaniolis sector)[73]. Finally, Mycenaean civilization collapsed at the end of LH III C, and sites in the Argolid such as Tiryns and Mycenae were abandoned.

Perhaps the most interesting aspect of the LH III C settlement at Asine is the existence of deposits in the Karmaniolis area containing material from the latest Mycenaean phase—the Sub-Mycenaean, or LH III C 2 period—lying between the LH III C 1 and the

---

[69]It has been suggested that the collapse of the Mycenaean palatial system in the Argolid may have been triggered by earthquakes (Zangger, 1994: 207-11). Indeed, both Mycenae and Tiryns have yielded evidence for earthquakes at the end of LH III B: for Tiryns, see K. Kilian, Ausgrabungen in Tiryns 1981, *AA* 1983: 177; for Mycenae, see S.E. Iakovidis, *Late Helladic Citadels on Mainland Greece*. Leiden, 1983: 50.

[70]For example, during the LH III C period, the lower town of Tiryns appears to have been the site of an extensive settlement (24.5 ha): see K. Kilian, *idem.* footnote No. 69: 171.

[71]The material from the tombs is abundant and is represented by developed LH III C pottery, such as 'Close Style' and 'Octopus Style' pottery.

[72]A 'shrine' was discovered in the Lower Town in a building (House G) of LH III C date (Frödin-Persson, 1938: 74-76).

[73]It is probable that a large LH III C settlement existed in the Karmaniolis area at Asine. Building 70 Q-T was built in this period (Dietz, 1982: 60-62).

beginning of the PG period (Dietz, 1982: 102; Frizell, 1986: 85)[74]. Indeed, Sub-Mycenaean sherds are plentiful in the area to the east indicating that occupation at Asine continued uninterrupted into the Protogeometric period.

[74]Elsewhere in the Argolid, sub-Mycenaean (LH III C 2) material has been found in the chamber tomb cemetery on the Deiras Hill at Argos (Deshayes, 1966: 252). Sub-Myc. grave groups are also attested at Mycenae and Tiryns (Styrenius, 1967: 127).

3.3 Trade

Trade has been invoked by scholars as a triggering mechanism or prime mover for the rise of social complexity and early states in places such as Mesopotamia and Cyprus (Harding, 1984: 280). Several of the areas where early civilizations arose are lacking in essential raw materials such as stone, wood, or metals. Such resource scarcity is believed to have stimulated trade, which in turn contributed to the formation of the state. To what extent may trade be invoked as a prime mover for the rise of social complexity in the Argive plain during the LBA?

Greece is not generally well provided with mineral resources. Especially with regard to copper and tin her import needs were presumably considerable (Dickinson, 1977: 36; Harding, 1984: 44). Sources of copper on the Greek mainland are few and small[75], and sources of tin are unknown (Fig. 8; Harding, 1984: 46). It is surmised that small local deposits of minerals like copper were rapidly worked out, and there is little evidence that these sources were exploited during the BA (Nordquist, 1987: 65). In addition to these sources, scholars have pointed to the existence of numerous deposits of copper elsewhere in the Aegean—on Crete and the Cycladic islands (Stos-Gale & Macdonald, 1991: 254-55)—but most of these were too small to satisfy local demand, and they provide little evidence of BA exploitation[76].

Several old lead, iron, and copper slag heaps have been found throughout Greece, in Chalkidiki, Thasos, Othrys, Seriphos, and Karistos on Euboea, but very few have been dated in a reliable way (*ibid.* : 255). Although they attest the smelting of copper ores to

---

[75]There are a number of reported copper sources in southern Thessaly (Othrys range) and in northern Greece—in Macedonia, on Thasos, and in Greek Thrace (Harding, 1984: 46). There is also evidence of deposits of copper, lead, silver, and gold in Laconia: see Z. Stos-Gale & N. Gale, *The Minoan thalassocracy and the Aegean metal trade*, in *Minoan Thalassocracy: Myth and Reality. Proceedings of the third international symposium at the Swedish Institute in Athens, 1982*. Stockholm, 1984: 59-64.

[76]For example, not all copper deposits were accessible with BA technology (Harding, 1984: 44).

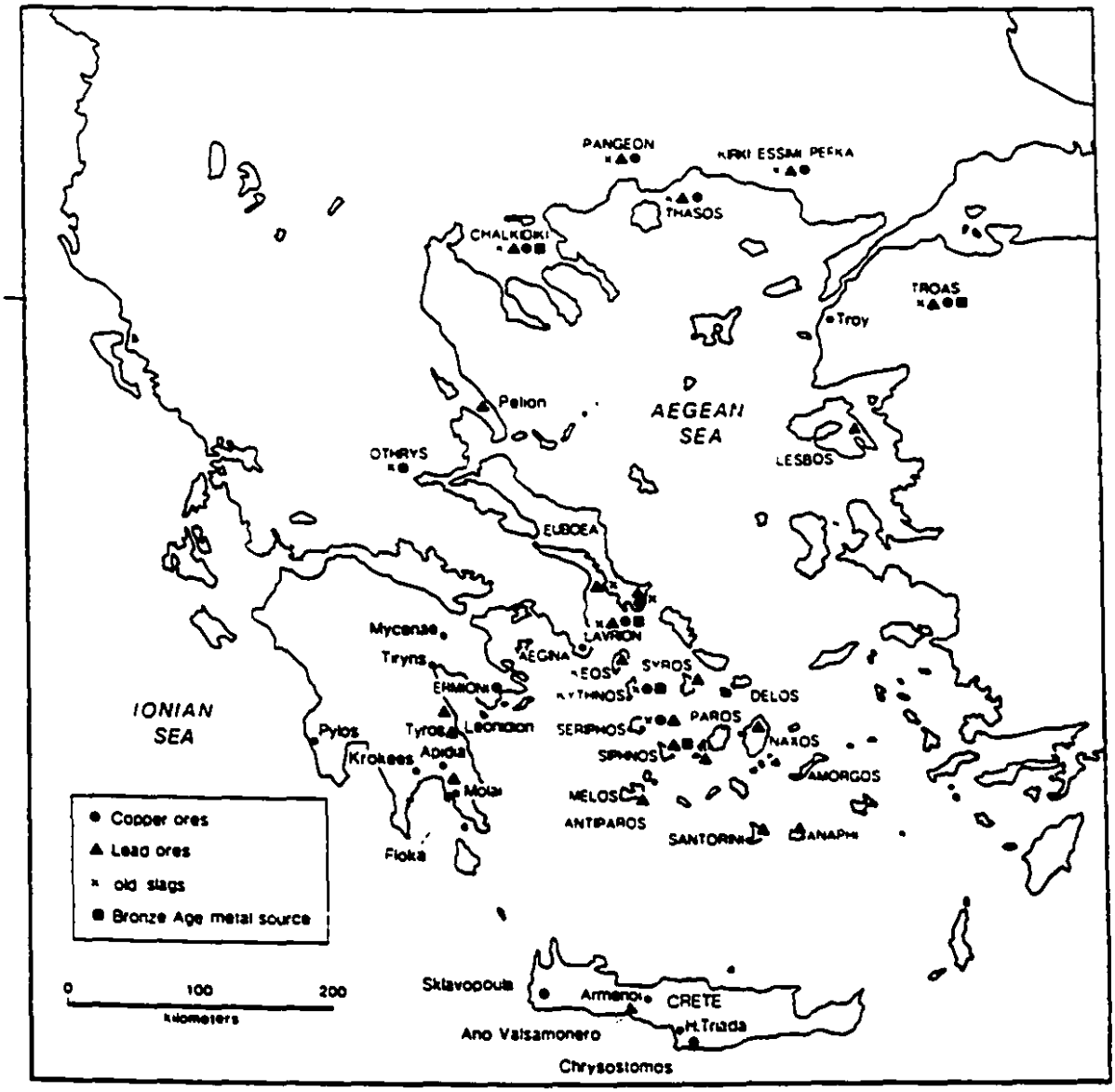


Fig. 8: Aegean ore deposits.

produce enriched slag and metallic copper—an activity almost certainly carried out in close proximity to the ore sources themselves[77]—thus documenting the exploitation of local sources of mineral ores. there is as yet no evidence that the slag heaps were the product of BA metallurgical activity; as such, the existence of slag heaps in Greece can not be taken as evidence for the BA exploitation of local sources. Indeed, it is worth noting that—unlike the situation in Cyprus—there is little direct evidence for BA metal working and copper production (*i.e.* workshops, smelting furnaces) on the mainland (Muhly, 1991: 186)[78]. Thus, the apparent lack of evidence for mining and metal working in Greece has led to the assumption that the Mycenaeans engaged in external trade to procure copper.

It is worth noting that during the LH period, bronze metallurgy developed on an unprecedented scale on the Greek mainland (Treuil, 1989: 355). Indeed, relatively little metal is found in MH graves (Nordquist, 1987: 66), and the large quantities of metal objects (vessels, tools, and weapons) found in LH graves from the beginning of the period[79] have led scholars to believe that large quantities of copper were imported into Greece during the LBA (Dickinson, 1977: 101-102; Harding, 1984: 48; Treuil, 1989: 359). By the palatial period the Linear B archives indicate that a considerable amount of copper (or bronze) at Pylos was being distributed to smiths[80]. Indeed, the Pylos tablets indicate that enough metal was reaching Pylos—and presumably the other

---

[77]See J.D. Muhly, The organization of the copper industry in Late Bronze Age Cyprus, in E. Peltenburg (ed.), *Early Society in Cyprus* : 298-214. Edinburgh, 1989; T. Stech, Copper and Society in Late Bronze Age Cyprus, in A.B. Knapp & T. Stech (eds.), *Prehistoric Production and Exchange: The Aegean and East Mediterranean* : 100-105. Los Angeles, 1985.

[78]For an exposé on the limited evidence for BA metalworking on the mainland, see Nordquist, 1987: 44.

[79]The surviving bronzes and other metal objects from the Mycenae Shaft Graves, and the Vapheio, Routsi, and Dendra tholoi bear witness to the development of metallurgy at this time on an unprecedented scale: see H. Matthäus, *Die Bronzegefässe der kretisch-mykenischen Kultur.* Prähistorische Bronzefunde, Abt. II, 1. Munich, 1980.

[80]The JN series of tablets from Pylos records allocations of copper/bronze to particular smiths. One tablet records a total of about 1046 Kg: see M. Ventris & J. Chadwick, *Documents in Mycenaean Greek* , 2nd ed. Cambridge, 1973: 352, 506.

mainland centers as well—for a sizeable smithing population to be kept at work (Harding, 198[illegible] 47-48). Thus, both the documentary and the archaeological evidence bear witness to Greece's metal needs during the LBA.

In light of recent metallurgical studies, the Laurion region in Attica—which is known to have been extensively exploited for its silver and lead ores in antiquity and during the BA[81]—is believed to have been an important BA source of copper (Gale & Stos-Gale, 1982; Knapp, 1990: 112; Gale, 1991: 231)[82]. Indeed, the application of Lead Isotope Analysis to Late Minoan copper-alloy artifacts from Crete has shown that the Laurion was an important source of copper for Crete during the Neopalatial period (Gale & Stos-Gale, 1982: 13-15; Stos-Gale, 1988: 275)[83]. Similarly, lead isotope analyses of Late Helladic copper-alloy artifacts from the Poros Wall Hoard at Mycenae[84] have shown that the majority of these derive their copper from the Laurion ore deposits (Gale, 1991: 231; Stos-Gale & Macdonald, 1991: 267). It must be noted, however, that there is as yet no direct archaeological evidence for the BA mining of copper in the Laurion.

Thus, the Laurion in Attica appears to have been an important source of copper during the LBA, and some scholars have suggested that the deposits at the Laurion were big enough to have supplied most of the needs of the BA Aegean (Gale, 1991: 231-32). In light of recent metallurgical studies and the archaeological evidence,

---

[81]The Laurion appears to have been exploited locally for its silver-lead ores beginning in the EBA, on the basis of the evidence from Thorikos: N. Gale, Thorikos, Perati and Bronze Age silver production in the Laurion, Attica, in *Studies in South Attica 1* (Miscellanea Graeca 5): 97-103. On the excavation of an EH mine at Thorikos, see P. Spitaels, The Early Helladic period in mine No.3, *Thorikos VIII* : 151-74.

[82]The ore deposit in the Laurion is a polymetallic (lead, zinc, iron) deposit, containing rich oxidized copper ores such as malachite and azurite (Gale, 1982: 14).

[83]The Cretan objects analysed include 22 Middle and Late Minoan (1800 to 1360 B.C.) copper alloy artefacts (Gale & Stos-Gale, 1982: 13, 16).

[84]The Mycenae Poros Wall Hoard is of LH III B date (about 1340 to 1200 B.C.) and contained artefacts such as a double axe, a cauldron handle, several large chisels, a hammer, part of a knife, and several ingot fragments: see A.J.B Wace, Mycenae, 1939-1952, *Annual of the British School at Athens* 48: 1-93.

however, we shall see that in LH III A-B times the mainland appears to have turned to new sources of copper, suggesting perhaps that local sources could no longer satisfy Greece's metal needs.

Let us now turn to our attention to the Argive plain. During the Middle Helladic period (*ca.* 2050/2000-1680 B.C.), the Argolid seems to have been in contact with the Cyclades, Crete, and Aegina. Minoan and Cycladic pottery occurs from MM IA/MH I at a number of Argive sites, such as Argos, Mycenae, Lerna, and Asine[85]. Two groups of ceramic wares were imported in large quantities to the Argolid throughout the MH and into the early Mycenaean period. The first of these is gold mica ware, which has been identified as Aeginetan[86] (Nordquist, 1984: 49; Dietz, 1991: 32-33; Rutter, 1993: 775). It is found in large quantities in the Argolid at sites such as Lerna, Asine, Tiryns, Kandia, and Argos (Nordquist, 1987: 49, 63). Other products imported from Aegina included andesite millstones[87]. Another group of wares imported from outside the Argolid in large quantities is the Minoanizing Lustrous Decorated, believed to have been produced in the southern Peloponnese, possibly by Minoan immigrants residing on Kythera (Nordquist, 1987: 49; Dietz, 1991: 35; Rutter, 1993: 775-76).

It is reasonable to suggest that the Laurion was the main source of copper and lead/silver for the Argolid during the MH period (Nordquist, 1987: 66; Treuil, 1989: 283). Scholars have postulated the existence in MH times of a major trading system which passed through Aegina and was directed to the coastal sites

---

[85]For Asine, see Nordquist, 1987: 50, figs. 30-31; for Lerna, see C.W. Zerner, Middle Helladic and Late Helladic I pottery from Lerna, *Hydra. Working papers in Middle Bronze Age studies* 2, 1986: 69. See also J.N. Rutter & C. Zerner, Early Hellado-Minoan contacts, in *Minoan Thalassocracy: Myth and Reality. Proceedings of the third international symposium at the Swedish Institute in Athens, 1982*, R. Hägg & N. Marinatos (eds.), Stockholm, 1984:.175-83.

[86]See footnote No. 85: C. Zerner, 1986: 58-74.

[87]C. Runnels, Trade and the demand for millstones in Southern Greece in the Neolithic and the Early Bronze Age, in A.B. Knapp & T. Stech, 1985: 30-43.

of the Argolid[88], and it is this trade route which presumably carried the Laurion metals from eastern Attica to the Argolid (Nordquist, 1987: 67). Indeed, the abundance of Aeginetan gold mica in the Argolid[89] supports the view that copper was transshiped through sites such as Kolonna on Aegina, where the existence of a developed metal industry is attested at this time[90].

Thus, we may envisage that Aeginetan products such as pottery, millstones, and metal from the Laurion area arrived on trading vessels at coastal sites in the Argolid. While trade between the Argolid and Aegina may have been direct, trade with Crete during the MH period does not appear to have been directional, but rather indirect through intermediaries such as Aegina and Kythera which have yielded large quantities of MM I-MM II pottery and other artifacts (Treuil, 1989: 283).

1. The central Mediterranean.

The Late Helladic period on the mainland witnessed the establishment of overseas contacts with the eastern and central Mediterranean. It has commonly been assumed that the central Mediterranean was a source of metals for the Aegean, and that the prime motive for Mycenaean activity in the west was the search for metals, especially copper (Harding, 1984: 49; Smith, 1987: 32, 164; Dickinson, 1977: 55). Indeed, there are substantial copper ore deposits in Sardinia and central Italy (Gale, 1988: 352; Smith, 1987: 34). Moreover, Sardinia is known to have been a major producer of copper during the LBA, in the Nuragic period (Smith,

---

[88]C.W. Zerner, *The beginning of the Middle Helladic period at Lerna*, (Ph.D. diss.), University of Cincinnati, 1978.

[89]For example, gold mica fabrics make up as much as *ca.* 23% of the total sherds from the Barbouna area at MH Asine (Nordquist, 1984: 49, Table 5.3). During the MH III period, Aeginetan gold mica makes up about 16% of the total number of sherds at Asine (Dietz, 1991: 70, 251, fig. 18).

[90]A complex smelting furnace was discovered in a MBA context (level IV) at the acropolis of Kolonna on Aegina: see H. Walter & Fl. Felten, *Alt-Ägina*, III, 1. *Die vorgeschichtliche Stadt. Befastigungen, Häuser, Funde.* Mainz, 1981: 23-28.

1988: 35; Knapp, 1990: 113). The existence of the great metal industries of Nuragic Sardinia is attested by the discovery of bronze hoards such as the Santa Marina in Paulis Hoard, dated to the 12th-11th centuries B.C. (Gale & Stos-Gale, 1988: 353; Smith, 1988:)[91].

The abundance of Mycenaean pottery in the central Mediterranean bears witness to the extent of Mycenaean activity in the west (Fig. 9). Early Mycenaean contacts with the central Mediterranean are attested by the discovery of LH I-II pottery in the region of the Tyrrhenian Sea, on Lipari and Vivara (Harding, 1984: 250-51; Smith, 1987: 113-15). The greatest expansion of Mycenaean activity in the central Mediterranean, however, occurred in the LH III A-B period, when the distribution of Mycenaean pottery was at its most dense. Indeed, the number of central Mediterranean sites with Aegean pottery has grown steadily as a result of new discoveries in recent years (Knapp, 1990: 111). At present some 50 Italian sites have yielded Mycenaean imports. At this time Mycenaean pottery is found in stratified contexts at sites in Peninsular Italy (in Apulia, Basilicata, and Calabria), on Sicily—where it is found mostly in cemeteries of the MBA (Thapsos period), and on Sardinia. Concentrations of Mycneaean sherds occur at sites such as Scoglio del Tonno (Taranto), Thapsos in southeastern Sicily, and at Antigori on Sardinia, all of which are coastal sites (Harding, 1984: 244-47; Smith, 1987: 116-123). In Sardinia, by far the most impressive evidence comes from the Nuraghe Antigori (Sarroch), where hundreds of Mycenaean sherds and imported pithoi have been found, many in stratified contexts[92].

A considerable number of copper oxhide ingots has been found in the central Mediterranean, mostly in Sardinia, but some

---

[91]It is noteworthy that the lead isotope analyses of these bronzes have shown that the copper used to make them derived from a Sardinian source (Gale & Stos-Gale, 1988: 363; Gale, 1991: 217).

[92]See M.L. Ferrarese Ceruti, Il complesso nuragico di Antigori, Sarroch, in L. Vagnetti (ed.) *Magna Grecia e mondo Miceneo: nuovi documenti*, Taranto, 1982: 167-76.

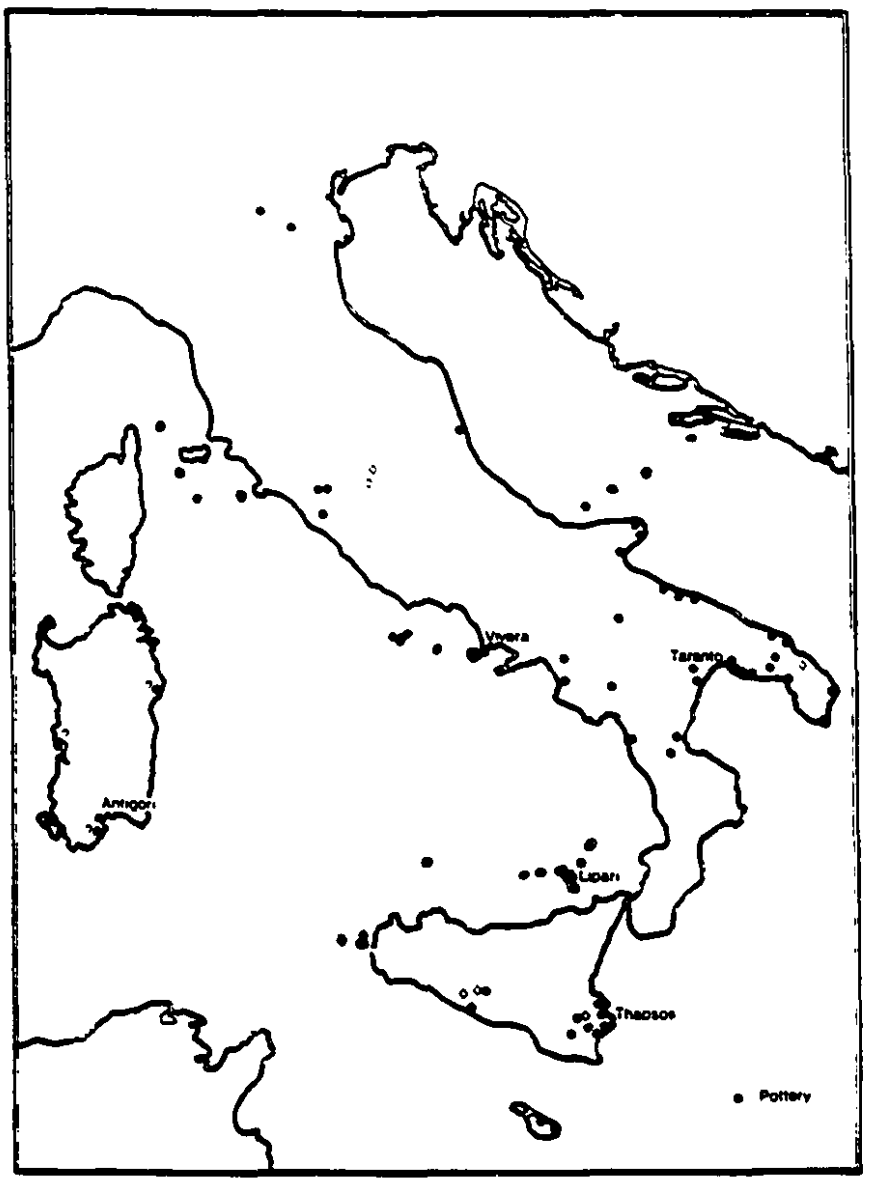


Fig. 9: Distribution of Mycenaean pottery in the central Mediterranean.

fragments are also known in Sicily and Lipari (Smith, 1988: 40; Knapp, 1990: 111). In Sardinia, such ingots have been found at Serra Ilixi and one example is known from Sant' Antioco di Bisarcio, to which a series of further findspots of ingot fragments has recently been added (Gale & Stos-Gale, 1988: 372; Gale, 1991: 213). It has commonly been assumed that these ingots were produced locally from Sardinian copper ores and were destined for the Aegean market (Harding, 1984: 49; Smith, 1987: 44). Recent lead isotope analyses of 22 oxhide ingots from 14 Sardinian loci, however, have yielded an isotopic composition consistent with their copper having derived from a Cypriot source (Gale & Stos-Gale, 1988: 375; Knapp, 1990: 112; Gale, 1991: 218). Moreover, several of the Sardinian ingots bear incised or impressed Cypro-Minoan signs, further suggesting an eastern Mediterranean provenance. Thus, it now seems that during the 13th and 12th centuries B.C. Cypriot copper travelled as far west as Sicily, Lipari, and Sardinia, and that the orbit of the eastern Mediterranean trade network at the end of the LBA extended as far west as Sardinia, a view which is reinforced by the discovery of Late Cypriot sherds, including Base Ring II and White Shaved types, at Thapsos on Sicily and Antigori on Sardinia (Gale & Stos-Gale, 1988: 349-50; Knapp, 1990: 111).

Thus, the view that the Sardinian oxhide ingots were produced locally from Sardinian ores and that they were being transported to Greece is no longer tenable. It is also significant that the analyses of LBA Minoan and Mycenaean copper ingots and artefacts have as yet provided no evidence that Crete or mainland Greece obtained copper from the central Mediterranean in the LBA (Gale & Stos-Gale, 1988: 382). In the absence of direct metallurgical evidence that the central Mediterranean was an important source of copper for the BA Aegean, the view that copper was the prime motive for Mycenaean activity in the west seems implausible. Indeed, the Laurion seems to be a much more plausible source.

How then may we explain the Mycenaean interest in the central Mediterranean? It has been suggested that Sardinia may have been a source of tin for the BA Aegean (Gale & Stos-Gale, 1988: 382), which as we have seen has no tin deposits of its own. Indeed, tin deposits do occur in the central Mediterranean, in Sardinia and in central Italy (Tuscany)[93]. It must be noted that evidence for trade with the central Mediterranean is attested for certain other commodities, notably amber and faience (Harding, 1984: 68, 87).

The dramatic rise in material wealth towards the end of the MH period reflected in the Shaft Graves of Mycenae (about 1750/1720 to 1600 B.C.) has been linked to that site's privileged involvement in trading activities by Dickinson[94]. Dickinson has suggested that some kind of 'special relationship' existed between Mycenae and Crete, whereby Mycenae satisfied the Cretan demand for metals, especially copper and tin, by channeling the supply of metals from sources further north and west. It is suggested that the Mycenaeans 'plugged in' to the central and east European exchange network to satisfy the Aegean need for metals. Thus, Mycenae would have controlled the copper trade between sources in central Europe and the southern Aegean, which was one way by which the Shaft Grave elites acquired their wealth.

Dickinson has also suggested that in the Neopalatial period (17th and 16th centuries B.C.), Crete's traditional supply of metals from the Near East was cut off as a result of the general climate of war that existed in the eastern Mediterranean and the consequent disruption of the eastern Mediterranean trade system[95]. It is surmised that at this time Mycenae may have seized the opportunity and exploited the Cretan demand for metals by intensifying exchanges with central and southern Europe. Mycenae

---

[93]See J.D. Muhly, Sources of tin and the beginnings of bronze metallurgy, *AJA* 89, 1985: 285.
[94]See O. T. P. K. Dickinson, 1977: 54-55; *idem*. 1986: 274.
[95]Dickinson mentions the expansion of the Hittite Old kingdom, the rise of the Hurrians and Kassites, and the Hyksos wars in Egypt (1977: 55).

would thus have risen to power and prosperity by channeling trade from further north or west, originating in the metalliferous regions of the Carpathians, the Alps, or Etruria.

In view of recent metallurgical studies, however, Dickinson's view is no longer tenable. Firstly, as we have seen, the lead isotope analyses of Late Minoan copper-alloy artefacts indicate that during the Neopalatial period, Crete does not appear to have obtained much copper from eastern Mediterranean sources such as Cyprus (Gale & Stos-Gale, 1982: 18); indeed, it now appears that Cypriot copper was not traded west to the Aegean before the 13th century B.C. (Knapp, 1990: 112). Moreover, as Harding has aptly pointed out, Dickinson's theory of Mycenaean exploitation of the Aegean demand for metals and control of metal routes from the Carpathians, Etruria, and central Europe "has everything to commend it except archaeological evidence" (1984: 280). The relatively small quantity of early Mycenaean pottery in the central Mediterranean and its virtual absence in central Europe make this view implausible[96].

As we have seen, in light of recent analyses of Late Minoan artefacts it seems that the Laurion region in Attica was an important source of copper for Crete in LM I times. It seems reasonable to suggest that Laurion metals were transshiped to Crete through sites such as Ayia Irini on Keos, which lies just off the coast of the Laurion region, and Kolonna on Aegina (Gale & Stos-Gale, 1982: 18). Indeed, this view is supported by the discovery of MM I A to LM IB pottery at Ayia Irini, and of large amounts of BA lead and litharge together with crucibles used for casting copper, a number of copper ingots[97], and many bronze

---

[96]For Dickinson's critique of his own theory, see O. Dickinson, Early Mycenaean Greece and the Mediterranean, in *Traffici micenei nel Mediterraneo: Problemi storici e documentazione archeologica*, M. Marazzi, S. Tusa & L. Vagnetti (eds.), Taranto, 1986: 274.

[97]It must be noted that the ingot fragments from Ayia Irini are of LM IB date—as the Ayia Triada, Zakros, and Gournia ingots found on Crete—and have been shown analytically to be of Cypriot composition (Gale, 1991: 227). Copper-alloy artefacts of MC III-LC II and LC III date from Ayia

artifacts which attest the existence of a developed metal industry on Keos at this time[98].

We have postulated that during the early Mycenaean period—as in the MH period—the Laurion was the main source of copper for the mainland, and that such copper was presumably transshipped through sites such as Kolonna on Aegina; this view is supported by the abundance of Aeginetan wares in the early Mycenaean Argolid[99]. It is here suggested that—if we accept that the Argolid imported copper from the Laurion area, and in view of the evidence suggesting that the Laurion copper ores were exploited by the Minoans in the Neopalatial period—mainland centers such as Mycenae may have been involved in the transshipment of Laurion copper, in ingot form, to Crete during the early Mycenaean period[100]. This view is reinforced by the appearance of Minoan pottery in LH IA contexts at a number of Argive sites (Dietz, 1991: 257, 300), and by the abundance of Minoan or Minoanizing artefacts in the Mycenae Shaft Graves (Dickinson, 1977: 52-53). Such a trade network may at least in part account for the prosperity and process of social evolution witnessed in the Argive plain during the early Mycenaean period.

Irini, however, have been shown to be made of Laurion copper (Stos-Gale & Macdonald, 1991: 266-67).

[98]Crucibles and copper ingots were found in the rooms of House A: see W.W. Cummer & E. Schofield, Keos III: *Ayia Irini: House A*. Mainz, 1984: 39, 140; Muhly, 1991: 185. For the early LBA fortified town at Ayia Irini (period V), see J.L. Davis, *Keos* V: *Ayia Irini: Period V*. Mainz, 1986; for Kolonna (phase X), see H. Walter & Fl. Felten, *Alt-Ägina*, III, 1: *Die vorgeschichtliche Stadt. Befestigungen, Häuser, Funde*. Mainz, 1981.

[99]Gold mica wares have been found in early LBA contexts in the Argolid at sites such as Lerna and Mycenae (Dietz, 1991: 224-27). At Asine during LH IA, Aegina imports make up about 16% of the total number of sherds (Dietz, 1991: 92-93).

[100]The absence to date of any oxhide ingots from an early Mycenaean context in the Argolid is not necessarily inconsistent with this view. It is known that during the BA metallic copper was also traded in the form finished or half-finished products, and even as scrap metal.

2. The eastern Mediterranean.

Cyprus is commonly assumed to have been a major source of copper fro the BA Aegean. This assumption is largely based on the equation of Cyprus with Alashiya, whose principal export, according to Hittite, Ugaritic, and Egyptian texts, was copper[101]. Old Babylonian texts refer to copper from Alashiya being sent to Mari and Babylon[102]. The Amarna Letters indicate that in the mid-14th century B.C. considerable amounts of copper were being sent to Egypt by the king of Alashiya[103]. Thus, if we accept the equation of Cyprus with Alashiya, the numerous textual references to copper from Alalshiya throughout the second millenium B.C. indicate that Cyprus was a major source of copper for the eastern Mediterranean during the BA. It must be noted, however, that these documents make no reference to copper having been sent to the west from Alashiya.

There is abundant evidence for BA copper production in Cyprus. Indeed, the 13th century B.C. in Cyprus (LC II period) was a time of great urban expansion which witnessed the appearance of many new urban centers, such as Kition and Hala Sultan Tekke, all of which were associated with extensive metal working and copper production[104]. It has recently been suggested that the expansion of the Cypriot copper industry in the LBA may have been a response to a growing demand for Cypriot copper in the 13th and 12th centuries B.C. in Aegean markets (Knapp, 1990: 110-12). Thus, the

---

[101]Although the identification of Alashiya is still a matter of dispute (see most recently R.S. Merrillees, *Alashiya Revisited.* Cahiers de la Revue Biblique 22. Paris, 1987), the equation of Alashiya with Cyprus is currently generally accepted by scholars.

[102]A Babylonian text, dated *ca.* 1745 B.C., refers to 12 minas (*ca.* 5,8 kg) of copper from Alashiya to Tilmum; see A.R. Millard, Cypriot copper in Babylonia, c. 1745 B.C., *Journal of Cuneiform Studies* 25: 211-14.

[103]These clay tablets were diplomatic dispatches of Asiatic vassals to Egypt during the reign of Amenhotep IV, in the 18th Dynasty; see J.D. Muhly, The Land of Alashiya: References to Alashiya in the texts of the second millenium B.C. and the history of Cyprus in the Late Bronze Age, in *Proceedings of the First International Congress of Cypriot Studies, Vol. I.* Nicosia, 1972.

[104]See O. Negbi, The climax of urban development in Bronze Age Cyprus, *Report of the Department of Antiquities, Cyprus* : 97-121.

fact that Cyprus is known to have been a major producer and exporter of copper in the eastern Mediterranean during the LBA, and the abundance of Mycenaean pottery found on Cyprus in the 14th and 13th centuries B.C. have led scholars to the conclusion that Cyprus was a major source of copper for the Mycenaeans (Gale & Stos-Gale, 1986: 82-83).

By far the greatest amount of Mycenaean pottery in the eastern Mediterranean occurs in Cyprus. Mycenaean pottery appears in Cyprus, though in small amounts, from LH II A (Dickinson, 1977: 103). The LH III A-B period, however, witnessed the maximum dispersal of Mycenaean pottery on the island, large quantities of which have been found in LC II cemeteries. Concentrations of Mycenaean imports at this time occur at Enkomi, Kition, Hala Sultan Tekke, and Maroni-*Vournes* [105].

The relatively small quantity of early Mycenaean pottery found on Cyrpus, as well as the absence of any direct metallurgical evidence that copper was being imported to Greece from Cyprus, suggests that the Laurion remained the principal source of early Mycenaean copper[106]. This picture, however, changes in the 14th and 13th centuries B.C. (LH III A-B) when the pottery record and the metallurgical evidence indicate that the Mycenaeans engaged in long-distance trade on an unprecedented scale with Cyprus.

Oxhide ingots are widely distributed in the eastern Mediterranean and the Aegean, with concentrations on Cyprus, Crete, and in two spectacular BA shipwrecks off the southern Turkish coast, at Ulu Burun and Gelidonya (Gale, 1991: 200-201)[107]. Ingots of oxhide shape were the standard form in which

---

[105]See P. Aström, The Late Cypriot Bronze Age: relative and absolute chronology, foreign relations and historical conclusions, *Swedish Cyprus Expedition* IV. Lund, 1972.

[106]As we have seen, the Laurion is now known to have become a much used source of copper by the beginning of the Late Bronze Age (Stos-Gale & Macdonald, 1991: 280).

[107]A few examples also occur in Syria-Palestine, and in the Black Sea off the coast of Bulgaria, and they are depicted in New Kingdom tomb paintings in Egypt (Stos-Gale & Macdonald, 1991: 199-200).

raw copper was exported and shipped in the LBA, and the principal way in which copper reached Mycenaean Greece and Minoan Crete; as such, they constitute an important source of evidence for copper trade in this area. The frequent occurrence of oxhide ingots weighing 30 kg in both central and eastern Mediterranean contexts suggests a common unit of exchange and an accepted standard of weight in the LBA Mediterranean (Knapp, 1990: 113).

Some 23 oxhide ingots have been found on the Greek mainland, at Mycenae, Tiryns, and Kyme in Euboea[108]. In the Argolid, a complete example—excavated by Tsountas and dating to about 1400 B.C.[109]—as well as some fragments from the Porors Wall Hoard, of probable LH III B date (about 1340 to 1200 B.C.) have been found at Mycenae (Gale, 1991: 226). More recently, an ingot fragment was discovered at Tiryns in a LH III B2 context[110].

The application of Lead Isotope Analysis in recent years to the Mycenae ingots has produced startling results; these analyses have yielded an isotopic composition consistent with their copper having derived from a Cypriot source (Gale, 1991: 227). It is also of special interest that some of the Poros Wall Hoard artefacts have similarly shown a Cypriot composition (Stos-Gale & Macdonald, 1991: 267). Thus, in light of recent metallurgical studies, it is reasonable to suggest that after 1300 B.C., during the LH III B period—the peak of the Mycenaean palatial civilization—there occurred a shift to an external source of copper; clearly the Mycenaeans were engaging in long-distance trade with Cyprus to obtain metals such as copper[111]. Archaeological evidence for this

---

[108]Significantly, the only findspots of copper oxhide ingots in southern Greece to date occur in the Argive plain; see G.F. Bass, Cape Gelidonya: a Bronze Age shipwreck, *Transactions of the American Philosophical Society* 57, part 8. Philadelphia, 1967: 61.

[109]S.E. Iakovides, The centuries of Achaean Sovereignty, in *Prehistory and Protohistory (History of the Hellenic World)*, G.A. Christopoulos (ed.), Athens, 1974: 297.

[110]See G. Touchais, Chronique des fouilles, *BCH* 108, 1984: 758, fig. 38.

[111]It is most significant that a similar shift can be observed in Minoan Crete. During the Neopalatial period, the Laurion is known to have been an important source of copper for Crete; at this time, Cyprus appears to have played only a very limited as a source of Minoan copper. The analysis of ingot fragments found at Kommos in Crete has shown that they were of Cypriot

change includes not only the abundant appearance of Mycenaean imports on Cyprus, but also the discovery of Cypriot pottery—including White Slip bowls and other types—at Argive sites such as Tiryns[112].

The view that the Argolid turned to new sources of copper during the palatial period (LH III), and notably to Cyprus, is consistent with the fact that Cyprus appears to have been a major supplier of copper in the eastern Mediterranean in the 15th to the 13th centuries B.C., the presence of Cypriot pottery on the mainland, and—most conclusively—the discovery of copper oxhide ingots of Cypriot composition at Mycenae and Tiryns.

Scholars such as Gale have suggested that the Laurion continued to to be the principal source of Mycenaean and Minoan copper in the LH III B/LM III B period (Gale, 1991: 231), and as we have seen, that the Laurion continued to be exploited at this time is well documented (Stos-Gale & Macdonald, 1991: 267). Whether the bulk of mainland copper was obtained from local sources or from Cyprus, the fact that the Mycenaeans during the LH III A-B period were involved in long-distance trade with Cyprus to obtain copper is unambiguous. And similarly, however the profusion of copper oxhide ingots in Sardinia is to be interpreted, the abundant presence of Mycenaean pottery in the central Mediterranean in LH III A-B times bears witness to the long-distance trade connections between the two areas. Clearly then, the palatial period in the Argive plain witnessed the expansion of Mycenaean overseas contacts with the central and eastern Mediterranean on an unprecedented scale.

---

composition, suggesting that Crete began to import Cypriot copper in LM III B, after 1300 B.C.; see J. Muhly, R. Maddin & T. Stech, Cyprus, Crete, and Sardinia: copper ox-hide ingots and the Bronze Age metals trade, *RDAC* 1988: 281-98.

[112]See K. Kilian, Ausgrabungen in Tiryns 1978-1979. Bericht zu den Grabungen, *AA* 1982: 149-94, esp. 170, 184, fig. 40.5.

3. Trade as a prime mover.

During the Shaft Grave period, the Argolid demonstrably drew on distant sources of both raw materials (*e.g.* amber, copper) and manufactured goods, suggesting that external trade must have played an important role in early Mycenaean times. As, we have seen, the Argolid during the palatial period (LH III A-B) clearly engaged in long-distance specific directional trade with Cyprus to obtain copper. This view is reinforced by the appearance of Cypriot pottery at a few Argive sites (*e.g.* Tiryns), and of copper oxhide ingots of Cypriot composition at Mycenae and Tiryns, suggesting that the movement of metals to the BA Aegean from other areas was highly directional and destined for individual centers.

Renfrew has cited several aspects of trade during the palatial period as exemplifying what he calls 'directional commercial trade', where the quantities of a given trade commodity fall off steeply from the source but are present in large quantities at a relatively distant point or points (Renfrew, 1972: 472-73). Indeed, the use of distribution patterns of artefacts and regression analysis to identify different modes of exchange by the shapes of 'fall-off' curves has met with much popularity (Knapp, 1985: 2-3). In recent years, however, it has been shown that a variety of exchange systems can produce similar fall-off curves, thus casting doubt on the usefulness of this method[113].

Although copper and tin were prime needs of the Mycenaean world, other commodities were also imported and were reaching the Aegean during the LBA, such as ivory and lapis lazuli (Harding, 1984: 57). Presumably, the immediate source of these commodities was the coastal cities of Syria-Palestine and Egypt. Indeed, Mycenaean LH III A-B sherds have been found in Egypt and the

---

[113]See I. Hodder & C. Orton, *Spatial Analysis in Archaeology*. New Studies in Archaeology 1, Cambridge, 1976: 138.

Levant, with concentrations at Tel el Amarna and Ras Shamra-Ugarit (Fig. 10)[114]. Tin is believed to have been traded from farther east, probably originating in Afghanistan, and shipped through Levantine ports such as Ugarit[115].

Significantly, the composition analysis by emission spectrography of imported stirrup-jars from the Ialysos cemetery on Rhodes revealed that during the LH III A-B period, the large majority of the vessels were imported from the Argolid[116]. Similarly, sampled sherds from places farther east—such as Tel Abu Hawam and Tel el Amarna[117]—have also yielded a characteristic east Peloponnesian type. Clearly, then, sites such as Ialysos on Rhodes and Enkomi on Cyprus acted as intermediaries in the flow of commodities such as metals between mainland centers of Mycenaean civilization such as the Argolid and the eastern Mediterranean[118]. Indeed, the strategic location of Cyprus and its central position between the Aegean and the eastern Mediterranean gave Cyprus an advantageous market potential far beyond that of a mere source of copper (Knapp, 1985: 67). Similarly, sites in the central Mediterranean such as Taranto in southern Italy and Antigori on Sardinia acted as intermediaries, or trading nodes, between existing western trading networks and the BA Aegean (Harding, 1984: 258; Knapp, 1990: 113).

---

[114]For Amarna, Akhenaten's capital in the mid-14th century B.C. (Dyn. XVIII), see V. Hankey, The Aegean interest in El Amarna, *Journal of Mediterranean Anthropology and Archaeology* 1/1, 1981: 38-49; for Ugarit, see C.F.A. Schaeffer, *Acts of the International Archaeological Symposium, the Mycenaeans in the Eastern Mediterranean.* Nicosia, 1973: 363-64.

[115]See J.D. Muhly, Sources of tin and the beginnings of Bronze Metallurgy, *AJA* 89, 1985: 281-82.

[116]See R.E. Jones & C. Mee, Spectrographic analysis of Mycenaean pottery from Ialysos on Rhodes: results and implications, *JFA* 5, 1978: 461-70.

[117]For Tel Abu Hawam, see F. Asaro & I. Perlman, *Acts of the International Archaeological Symposium, the Mycenaeans in the Eastern Mediterranean.* Nicosia, 1973: 213-224; for Tel el Amarna, see H.W. Catling, E.E. Richards & A.E. Blin-Stoyle, *BSA* 58, 1963: 94-115.

[118]The fact that Cypriot pottery frequently accompanies the Mycenaean pottery found in the Levant supports this view (Harding, 1984: 230).

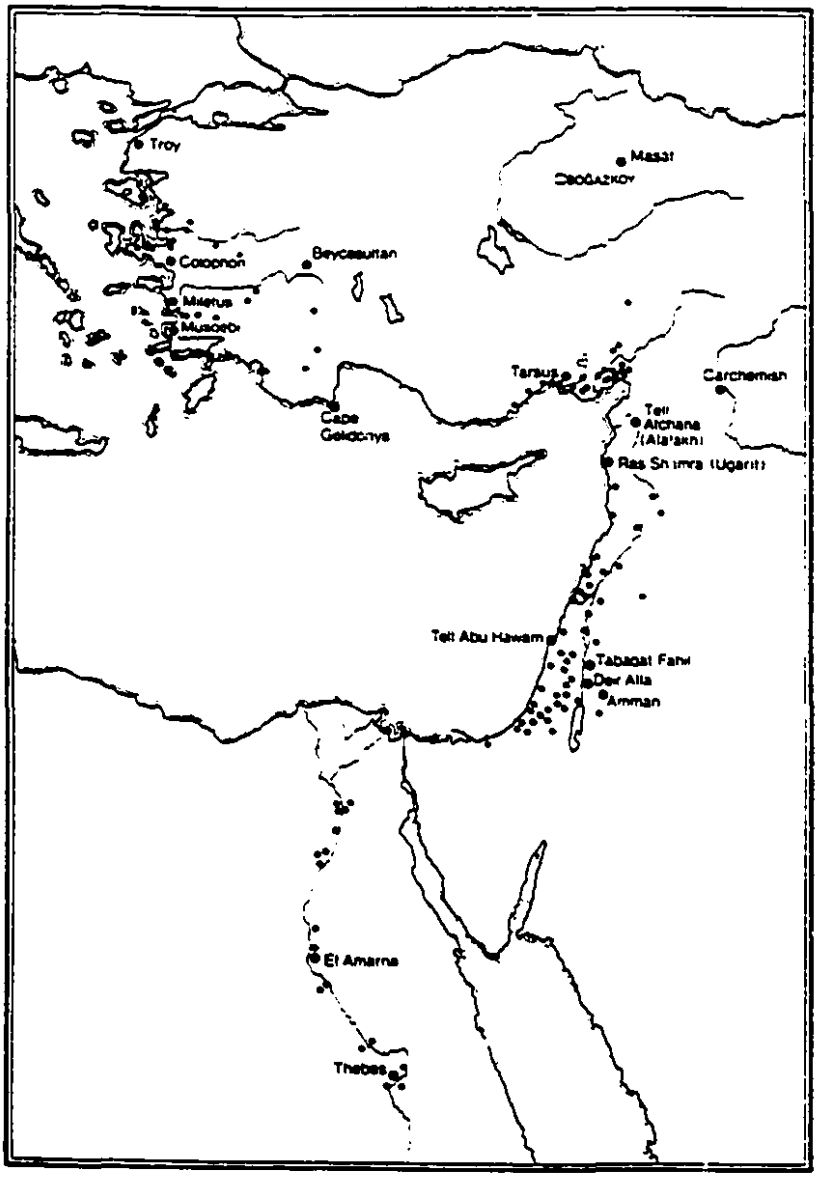


Fig. 10: Distribution of Mycenaean pottery in the eastern Mediterranean.

As we have seen, the extensive trade networks of the Mycenaeans with areas in the eastern and central Mediterranean had
their beginnings in the formative early Mycenaean period (MH III-LH II A); indeed, Mycenaean trading activity in these areas appears to have preceded the appearance of Mycenaean palatial civilization, and as such may plausibly be invoked as a prime mover in a causative sense.

What impact may the appearance of long-distance exchange have had upon the development of social complexity in LBA Argolis? External trade has been invoked by many archaeologists as a triggering mechanism in the rise of complex society and state formation (Knapp, 1985: 66)[119]. The increased demand for raw materials, especially metals such as copper and tin, within the Argive plain during the LH III period, and the related needs to create and maintain long-distance exchange networks, are here regarded as key factors in the rise of social complexity and palatial society in the Argive plain.

Presumably the maintenance of long-distance overseas exchange systems required the managerial role of elites, to organize, regulate, and provide the financial basis for such activities. Indeed, as has been pointed out by Gilman (1981: 2), direct involvement in the organization of trade seems to have been one of the chief functions fulfilled by the palaces of Minoan-Mycenaean civilization. The Mycenaean palace's central role in overseas commodity procurement is indicated by the concentration of exotic raw materials and manufactured high status objets at Mycenaean palatial centers such as Mycenae.

---

[119]Indeed, the development of complex, urban-based society in Cyprus during the LC I-II period (about 1700-1400 B.C.) has been attributed to Cypriot participation in extensive trade relations in response to growing demand for Cypriot copper in Aegean and east Mediterranean markets: see A.B. Knapp, Copper production and eastern Mediterranean trade: the rise of complex society on Cyprus, in: J. Gledhill, B. Bender & M.T. Larsen (eds.), *State and Society. The emergence and development of social hierarchy and political centralization.* London, 1988: 149-69, esp. 153.

It is reasonable to suggest that the control of mechanisms designed to improve access to supplies of particular commodities was an important means by which some individuals could acquire personal wealth, thus giving rise to social stratification and stimulating social complexity (Gilman, 1981: 4). As we shall see, however, the basic ability to procure and exchange prestigious exotic goods and raw materials is a necessary but insufficient condition to initiate processes leading to social complexity. Any explanation of the rise of palatial society in the Argive plain must also take other factors into consideration, as well as the interrelationships between them.

3.4 Redistribution

1. Renfrew's subsistence-redistribution model.

Renfrew has suggested that the palaces emerged, in Crete as in mainland Greece, primarily in their role as redistributive centers (1972: 480-82). This view forms the basis of the subsistence-redistribution model for the rise of Minoan-Mycenaean civilization in the BA Aegean. This explanatory model for the origins of Minoan-Mycenaean civilization is based chiefly on economic and environmental factors, and eschews traditional diffusionist concepts in favour of autonomous processes of social evolution (Cherry, 1984: 21). It proposes a causal link between redistribution and the development of social hierarchy. Indeed, according to Renfrew, "the growth of the palaces has to be seen in the first instance as the development of redistributive centres for subsistence commodities, controlled by a well-defined social hierarchy. The emergence of Aegean civilisation can be comprehended only if this central point is kept in view" (Renfrew, 1972: 297).

Farming changes in the later Neolithic and EBA represent the point of departure of Renfrew's argument. Renfrew has emphasized the importance of Mediterranean polyculture in generating the agricultural surplus necessary for the support of BA Aegean civilization (1972: 480-97). The introduction of the vine and the olive in conjunction with the established Neolithic complex of domesticates (emer and einkorn wheat, sheep, goats, cattle, pigs) led to an overall increase in productivity. The seasonal labour-schedule of these tree crops does not conflict with that of cereals, and they can survive in marginal locations not suited to cereal and pulse cultivation. Indeed, polyculture is a spatially extensive form of agriculture, which represents a broader use of the landscape and as such made possible the cultivation of poorer soils and otherwise unproductive land on the valley edges (Cherry, 1984: 24). As Renfrew (1972: 480-85) and Cherry (1984: 24) have pointed out,

the importance of BA Mediterranean polyculture is indicated by the correlation between the distribution of Minoan-Mycenaean centers and areas of large-scale present viticulture and olive production in the southern Aegean.

More significant, however, were the organizational changes resulting from the establishment of Aegean polyculture at the end of the Neolithic, shortly after 3000 BC. Polyculture for the first time made possible the exploitation of several distinct types of microenvironment (flat arable land, hill slopes), each most suitable for the specialized production of particular crops (Renfrew, 1972: 280-88). Thus, the diversification of the subsistence base by the addition of the olive and vine to earlier cereal and pulse staples led to local specialization, because some arable land was suited to cereals and some to olives and vines (*ibid.* : 304-307). Ecological specialization in turn favoured the rise to prominence of redistributive chiefs to organise the resulting interdependence of farmers in each locality[120]. These central persons took advantage of their position and resources to finance specialist craftsmen (*e.g.* metallurgists, stone workers, seal-cutters) who produced various new prestigious items of wealth. The elite groups were also able to maintain long-distance trade to obtain needed raw materials and exotic prestige objects. In this way, specialization promoted the development of a redistributive system and of a hierarchical order and—by logical extension—contributed to the rise of Minoan-Mycenaean palatial civilization.

Gilman (1981: 5-6) and Cherry (1984: 28) suggest that the significance of the introduction of polyculture lies in the changes of property relations which it implies. Mediterranean polyculture constitutes a labour-intensive form of subsistence in which the farmer must invest a lot of labour before he receives a return. Indeed, vines and olive trees only begin to yield fruit several years

---

[120]Such a link had already been proposed in a wider context by E. R. Service, who suggested that redistribution and social hierarchy would develop as a result of economic specialisation: E. Service, *Primitive Social Organisations: an Evolutionary Perspective.* New York, 1962: 143-6.

after planting. Thus, in any form of labour-intensive productive system (*e.g.* irrigation, terracing, plow agriculture), the investment of labour bound men to the soil, and they would not lightly forego the interests brought in by their investment of preparatory work. Under such conditions Aegean farmers were less likely to abandon exploitative elites, or not to submit to obligations—such as tribute or taxes.

Renfrew was not the first author to recognize the central economic role of the Mycenaean palaces. In light of the documentary evidence of the Linear B archives, Finley defined the palace as the center of a "massive redistributive operation" (1957: 135), whereby specified individuals and groups received or contributed goods (land, raw materials, rations, craft goods, labour) on a basis controlled by the central administration.

Renfrew's ecological account of palatial origins and the development of social stratification in the BA Aegean essentially fits within a broader functionalist framework, whereby the Minoan-Mycenaean palaces are viewed as an adaptation to particular constraints imposed by the Mediterranean environment. The functionalist account of the rise of complex, hierarchical societies is that elites obtain their position because they confer an adaptive benefit upon the population as a whole by providing essential services (Gilman, 1981: 2); these include organizing redistribution, long-distance trade, and public works, military organization, and religious functions. Generally, the palaces would have been the focal points of activities contributing to the general welfare: their elites encouraged trade, crafts were improved, leading to new metal tools increasing agricultural efficiency, and foodstuffs were more effectively made available to primary producers, who were stimulated to increase the input by the wish to receive redistributed goods.

2. Critique of the subsistence-redistribution model.

Lately, Renfrew's subsistence-redistribution model for the rise of the Aegean palatial systems has come under some criticism (Cherry 1983: 27-28; Halstead, 1988: 521-22). Firstly, Renfrew may have exaggerated the extent of subsistence diversification in the southern Aegean during the EBA (Halstead, 1986: 521). Indeed, current research stresses the scarce nature of the evidence for the EBA cultivation of the olive and vine in Greece, and has cast doubt on Renfrew's insistence on its importance in EH times. Paleobotanical finds from mainland BA sites such as Lerna[121] and Tiryns[122] indicate that the full inception of Mediterranean polyculture (olives-cereal-vine) in the Argolid may not have occurred until the LBA[123] (Nordquist, 1987: 33, 35). Grape pips (*vitis vinifera*) appear for the first time in Lerna IV (EH III), but the vine almost disappears from Lerna V (Hopf, 1962: 16). Olive pips are conspicuously absent from the material from Lerna V (MH), though there are some samples of olive and vine wood. A wide range of artifactual evidence corroborates this view[124].

Thus, Renfrew's view that the development of redistributive centers resulted from local economic specialization seems doubtful. Indeed, it seems that little, if any, arable land in Greece is suited exclusively to olives or vines or cereals' (Cherry, 1984: 28; Halstead, 1988: 522). In fact the Linear B tablets themselves point away from local specialization as the basis of the Aegean redistributive system. As a rule, the Pylos tablets record levies on

---

[121]See M. Hopf, Nutzplanzen vom Lernäischen Golf, *Jahrbuch des Römisch-Germanischen Zentralmuseums* 9. Mainz, 1962: 1-19.

[122]See H. Kroll, Kulturpflanzen von Tiryns, *AA* 1982: 467-85.

[123] Grape pips and olive stones have been found in LBA contexts at Mycenae and Tiryns (Renfrew, 1973: 127, 132).

[124]The frequency of drinking vessels and oil presses, as well as the storage facilities of the Mycenaean palaces, clearly indicate the intensive exploitation of the olive/vine during the LBA. Moreover, wine appears as a ration in the Linear B tablets, as well as oil and olives, for all of which there are ideograms (Ventris-Chadwick, 1956).

each community of the same commodities which may vary locally in size, but not in kind[125].

Gilman has expounded a critique of the functionalist account of social stratification based on the redistributive model (1981: 3). He and other scholars (Cherry, 1984: 27-28) question the wholly altruistic role attributed to the palaces by the functionalist paradigm. According to the non-functionalist approach, the palaces were not wholly beneficial and adaptive. While scholars such as Gilman would acknowledge that there may have been incidental benefits to the mass of the population, they criticize Renfrew's insistence on the palace's adaptive role. The palace elite's monopoly over production and distribution was aimed primarily at supporting and augmenting its own status and power (Cherry, 1984: 28). Presumably, the ruling elite contributed to the general welfare, but to what extent was the elite's managerial involvement in redistribution adaptive? Indeed, the transactions documented by the Linear B tablets suggest that the 'mobilization' form of redistribution prevailed in the Minoan-Mykenaian palace economies (Cherry, 1984: 29; Halstead, 1988: 523), whereby disbursements of goods from the palaces appear to have been principally to palace officials and slaves, or to craft specialists working for the palaces[126]. Presumably, the levied goods were not all redistributed, since the palace had to export a surplus in return for the raw materials and finished products it imported[127].

Current dissatisfaction with Renfrew's theory has led to a reappraisal of the palace's redistributive role, as well as increasing awareness of the diversity of its forms (Cherry, 1984: 27-28; Halstead, 1988: 523-25). Recent scholarship favours explanations in terms of a famine relief role of the Aegean palaces,

---

[125]J.T. Killen, The Linear B tablets and the Mycenaean economy, in A. Mopurgo-Davies & Y. Duhoux (eds.), *Linear B: a 1984 survey*. Louvain-la-Neuve, 1985: 270-72.

[126]See J.T. Killen, *idem.* footnote No. 125: 253-54.

[127]Indeed, the Linear B tablets inform us that textiles and oils were manufactured specifically for export; see *idem.* footnote No. 125: 262-64.

whereby agricultural surpluses were amassed in the palace repositories and used to provide relief in the event of food shortages (Halstead, 1988: 524). Variability of seasonal rainfall in southern Greece and the consequent unreliability of crop yields posed a constant threat of famine. Attempts by Aegean farmers to stabilize the subsistence base led to the development of the palaces as a mechanism to cope with localized shortfalls in production (Cherry, 1984: 24). Indeed, the risk of famine could be reduced by storing a surplus.

3. Redistribution as a prime mover.

What impact may the appearance of redistributive centers during the palatial period have had upon the development of social complexity in the Argolid? Clearly, the palatial period in the Argolid witnessed the appearance of redistributive centers with storage facilities. Indeed, the storage of food surpluses and the redistribution of goods seems to have been one of the chief functions fulfilled by the Mycenaean palaces (Gilman, 1981: 2). The archaeological record and the documentary evidence both bear witness to the redistributive role of the palaces. Numerous Linear B tablets dealing with olive oil have been recovered from Mycenae and Pylos[128]. Indeed, the transactions recorded in the Linear B archives are almost exclusively redistributive. Each commodity is listed separately, and none is given or received in return for another[129].

The evidence for the storage of oil and wine in the mainland palace centers such as Mycenae in the Argolid is abundant[130].

---

[128] Tablets dealing with olive oil have been found at Pylos (pithos magazine, Rooms 23 and 24) and in the 'House of the Oil Merchant' at Mykenai (Ventris-Chadwick, 1956: 217).

[129] See J.T. Killen, The Linear B tablets and the Mycenaean economy, in A. Mopurgo-Davies & Y. Duhoux (eds.), *Linear B: a 1984 survey*. Louvain-la-Neuve, 1985: 251-52.

[130] It is worth noting that the 'Rundbau' at Tiryns—of EH II date—may represent an EBA antecedent for the storage-magazines of the Mycenaean palaces in the Argolid. There has been much debate as to the function of this building. Caskey calls it a 'tholos' (1960: 288), while

Indeed, the palaces set aside considerable areas for the storage of foodstuffs. Traces of oil have been found at Mycenae (Mylonas, 1967: 151). A colossal pithos and storage jars were found in the so-called 'House of the Wine Merchant' (Wace, 1953: 3, 10). The so-called 'House of the Oil Merchant' contained 11 large pithoi and 30 large stirrup-jars, the clay of many of these containing traces of oil (Fig. 11)[131]. It is surmised that this storage space was actually a palace annex, a sort of storage magazine, rather than the private residence of a member of the mercantile class at Mycenae (Palmer, 1965: 114). Grain also seems to have been stored in large clay bins at Mycenae, such as were found in the East Basement of the Granary (Wace, 1923: 48). At Tiryns, it surmised that that the series of small rooms in the southeast and southern galleries of the upper citadel may have served as granaries (Fig. 2)[132]. Evidence for storage in the palaces has been found elsewhere in southern Greece, notably at Pylos[133].

Presumably, the need to organize the distribution of supplies of particular commodities (*e.g.* raw materials, agricultural surpluses) required the managerial role of elites. It seems plausible that gaining control over production and surplus wealth was an important means by which some individuals could accumulate personal wealth and establish social status and economic advantage. Such activities would thus have led to the development of elite groups and social stratification, and in turn stimulated the development of social complexity in the Argolid. Once again, it must be noted that the development of redistributive

---

Renfrew identifies it as a 'dwelling' (1972: 110). A diferent view, first suggested by S. Marinatos (1946: 338), provides the most convincing explanation: the circular structure at Tiryns, along with its couterparts at Orkhomenos and at EM Knossos (the Hypogeum) were probably granaries: see K. Kilian, The circular building at Tiryns, in R. Hägg & D. Konsola (eds.), *Early Helladic Architecture and Urbanization*, Studies in Mediterranean Archaeology 76, Göteborg 1986: 65.

[131]See G.E. Mylonas, *Ancient Mycenae.* Princeton, 1967: 151.

[132]See K. Müller, *Tiryns* III: *Die Architektur der Burg und des Palastes.* Augsburg, 1930: 79. Indeed, it seems very unlikely that an administrative center such as Tiryns, with its own Linear B archives and palace, did not posess its own storage facilities.

[133]See C. Blegen & M. Rawson, *The Palace of Nestor at Pylos in Western Messenia*, I: *The buildings and their contents.* Princeton, 1966.

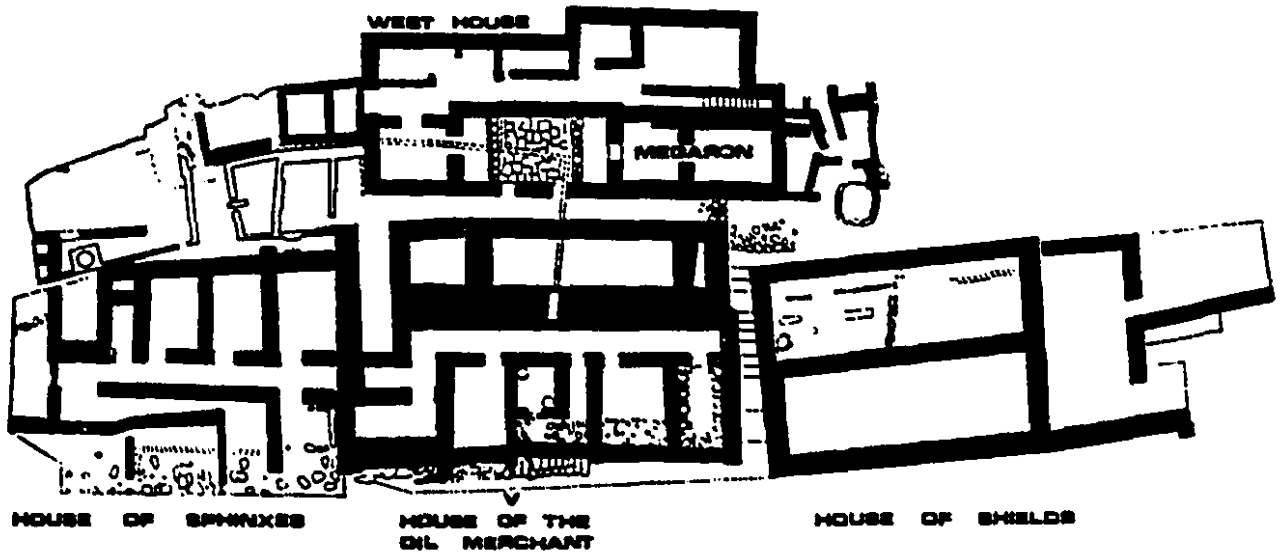


Fig. 11: House of the Oil Merchant/Sphinxes/Shields at Mycenae.

centers is a necessary, but insufficient condition to initiate processes leading to the rise of palatial society in the Argive plain.

3.5 Militarism

1. The evidence

Warfare has also been suggested as a basic prime mover in the development of early states, a theory whose chief advocate, as we have seen, is R. Carneiro (1970). Perhaps the most striking aspect of the early Mycenaean period on the mainland is the dominant accent placed on war, a phenomenon by and large unprecedented in the earlier phases of the Greek BA[134]. Substantial investments of labour and capital appear now to have been made in the military sphere. Indeed, scholars such as C. Renfrew acknowledge the dramatic rise in the evidence for hostility and war on the mainland in the LH period, and the ascendancy of a warrior aristocracy at this time (Renfrew, 1972: 399).

The rise of militarism in the Argolid from the beginning of the Mycenaean period is clearly documented by the evidence of weapons, artistic representations, and by the remains of defensive fortifications. The prevalence of weapons on mainland, and of militaristic motifs in iconography—and the attendant rise in militarism they imply—may indicate one of the ways in which the powerful acquired and maintained their wealth and status. Swords, spearheads, and daggers are frequently found in the early Mycenaean tombs, for example at Dendra, Argos, and the Mycenae Shaft Graves[135]. Such objects may also have functioned as

---

[134]A notable antecedents on the mainland include the EH II fortifications at Lerna III (Caskey. 1960: 289); and the MBA fortifications at Kolonna on Aegina (Rutter, 1993: 776).

[135]See H. Matthäus, *Die Bronzegefässe der kretisch-mykenischen Kultur.* Prähistorische Bronzefunde, Abt. II, 1. Munich, 1980: 5-58. For Argos, Tumulus E, Grave 5, see Dietz, 1991: 139.

indicators of rank and status (Rutter, 1993: 790). Several early Mycenaean tombs in the Argolid are remarkable for the frequency and richness of weapons they contained, such as Graves G, D, !, L, and N of Circle-B at Mycenae, dated *c.* 1650-1550 B.C. (Dietz, 1991: 106-132). Indeed, the grave goods of Grave G are no less than spectacular, including 5 long-swords, a short sword, a spearhead, and 4 daggers[136]. Significantly, these graves were associated with a large number of expensive luxury and status objects, such as an amethyst seal, gold cups and diadems, and an electrum funeral mask. It is equally significant that there appears to have been a gradual increase in the quantity of weapons found in individual graves of Circles A and B at Mycenae, from the earliest to the latest burials, indicating a process of increasing militarism at Mycenae over the course of some 100-150 years (Kilian-Dilmeier, 1988: 161-62).

The LH period also witnessed the introduction of the light chariot, probably to transport the warrior to the scene of battle rather than for use as a genuine war-chariot[137]. By about 1400 B.C., the Mycenaean warrior wore a whole panoply of bronze armour, carried a shield, sword, spear, or javelin[138]. Large-scale defensive fortifications were erected at several Argive centers in the palatial period, at Midea, Mycenae, Tiryns, and Argos (Iakovidis, 1983). Militaristic motifs also appear in the iconography of seals, carved stelae, and decorated daggers from the beginning of the Mycenaean period in the Argolid[139].

---

[136]See Dietz, 1991: 108-112, fig. 32.

[137]See J.H. Crouwel, *Chariots and other Means of Transport in Bronze Age Greece.* Amsterdam, 1981. It is noteworthy that the Tiryns Linear B tablets deal with chariots.

[138]A complete bronze cuirass, of LH III A1 date, was found at Dendra in the Argolid; see P. Aström, The Cuirass Tomb and other Finds at Dendra, Vol 1, The Chamber Tombs. *Studies in Mediterranean Archaeology* 4. Götebory, 1977.

[139]For Mycenaean seals, see J.G. Younger, *The Iconography of Late Minoan and Mycenaean Sealstones and Finger Rings.* Bristol, 1988.

2. Militarism as a prime mover

What was the impact of the dramatic rise in militarism in the Argolid shortly after 1600 B.C., towards the end of the MBA? Certainly by the time of the Pylos tablets—in LH III B—military equipment was centrally controlled and, if the tablets are correctly interpreted, a complex hierarchy existed to conduct and control military operations[140].

The fact that that no sign of central places is evident until the LBA in the Argolid gives the overriding impression of small socio-economic units in MH times, which carries with it the implication of small-scale conflicts. In fact there are few signs of large-scale organized warfare during the MH period. The small size and scale of the widely distributed polities, the lack of fortifications, and warrior graves during the main part of the MH period in the Argolid suggests that organized conflicts were rare (Nordquist, 1984: 68).

Presumably, by the beginning of the early Mycenaean period, the emerging centers of the Argive plain established an expanding degree of socio-economic control over the smaller communities in their sphere of influence. Of special significance here is the apparent process of territorial angrandizement suggested by the distribution of the early tholoi (LH II) in the Argolid (Mee & Cavanagh, 1984). Indeed, the distribution of early tholoi in the Argive plain suggests the existence of a relatively smaller number of socio-economic units—and consequently of larger size—during the LH period (Fig. 12). It is commonly assumed that the tholoi were the preserve of an elite (*ibid.* : 50). Six tholoi were in use in LH II A at Mycenae, which surely were not the tombs of successive kings. Rather, they will have been built for the ruling elite and members of the aristocracy. Similarly, the LH II tholoi at Berbati, Dendra, Kazarma, and Kokla were presumably the graves of local

---

[140] *o-ka* Series: see J. Chadwick, *The Mycenaean World.* Cambridge, 1976: 175-78.

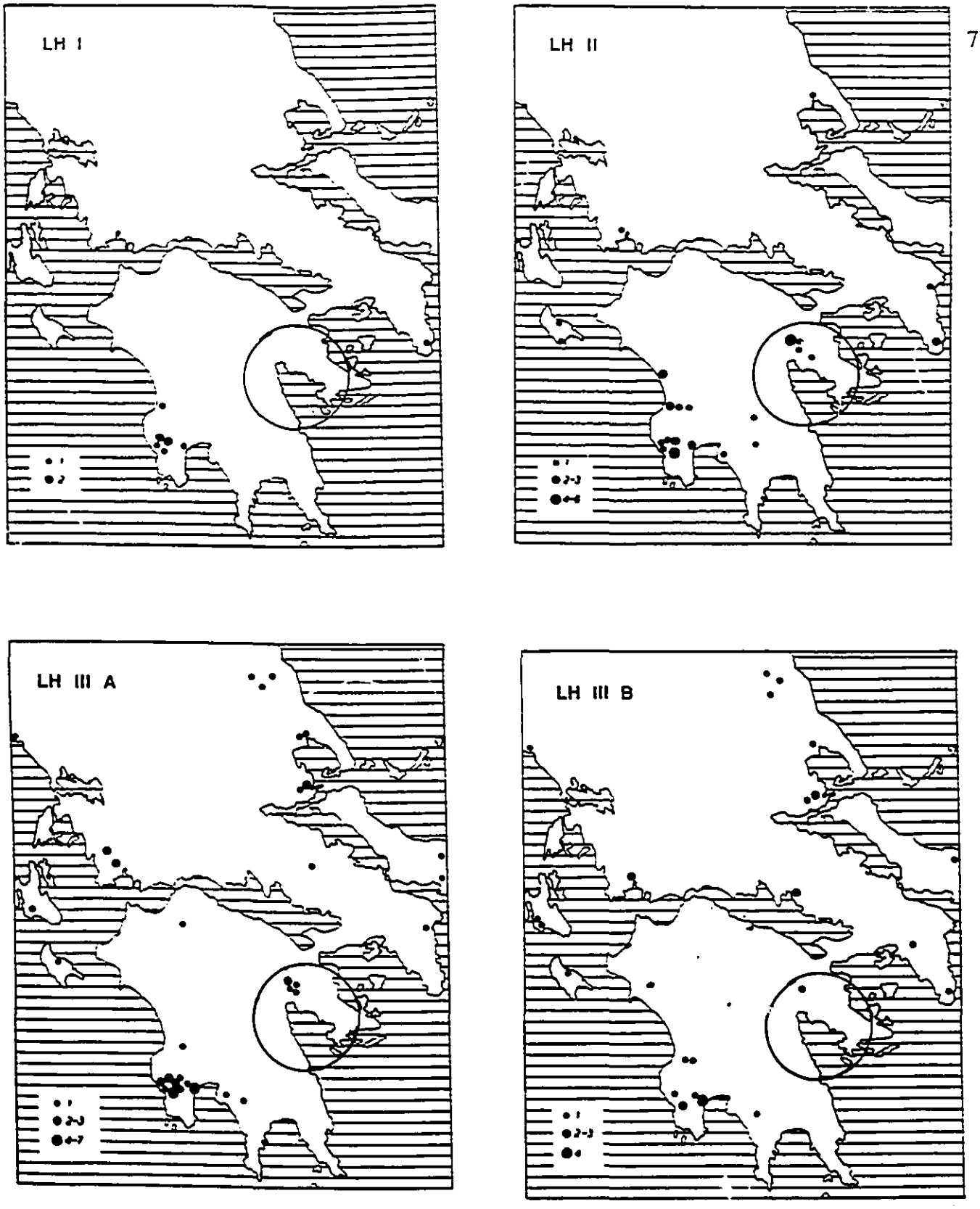


Fig. 12: Distribution of tholos tombs (Argolid encircled).

elites (Mee & Cavanagh, 1984: 51). It seems plausible that their distribution implies a process of creating larger and larger political units in the LBA, possibly by force of arms and coercion. Although the early Mycenaean polities did not reach the extent of those in existence after *c.* 1400 B.C., the aggrandizement of a local chieftain's territory at the expense of weaker neighbours must have begun long before, in the formative Shaft Grave period (MH III-LH IA). Then, in LH III B, there is a decrease in the number of tholoi in the Argolid, and a concomitant increase in their size (Fig. 12). The more restricted geographical distribution of tholoi in LH III A2/III B times might indicate the emergence of a larger socioeconomic unit or early state in the Argive plain at this time[141]. Thus, the distribution of Mycenaean tholoi is an important indicator of sociopolitical organization in the LBA Argolid. It must be noted, however, that other tomb types may also have been endowed with rich offerings and could thus equally well have been the graves of local elites[142].

It can also be argued that with the expansion of population density in the LH period, the risk of conflicts over land would have increased (Nordquist, 1984: 108). Indeed, as we have seen, the LH period in the Argolid witnessed a dramatic expansion of population[143]. It can be argued that—as postulated in Carneiro's environmental circumscription theory—such a scenario is especially likely to have occurred within a geographically circumscribed area, such as the isolated mountain and coastal valleys typical of Greece. Indeed, as we have seen, the Argive plain was essentially circumscribed on all sides by substantial mountain masses.

---

[141]Indeed, there were tholoi in use in LH III A1 at 5 known Argive sites, but in LH III A2/III B the type continues only at Mycenae (Mee & Cavanagh, 1984: 53).

[142]For example, a cist grave of LH II B date at Argos was richly furnished: see D. Kaza-Papageorgiou, An Early Mycenaean Cist Grave from Argos, *AM* 100, 1985: 1-21.

[143]For the expansion of settlement density in the Argive plain during the LBA, see section 2, Settlement History of the Argolid, p. 33.

With an increased risk of armed conflict during the LH period on the mainland, the need for protection and military organization may have stimulated the rise to dominance of a warrior aristocracy, which used weapons as an expression of their status and power (Gilman, 1981: 2). Such elite groups could offer protection (*i.e.* protection of property) in the event of conflicts (Dickinson, 1977: 56). They could also, however, use their power to establish economic advantage and social status, as well as expand their control over other key sectors of society (*e.g.* resource acquisition, production, distribution). It is significant that in the burials of Circles A and B at Mycenae, it has been shown that there is a greater concentration of wealth—in the form gold masks, diadems, and precious vessels—in those graves which contained a complete array of weapons (sword, dagger, spear), suggesting there was a correlation between status and wealth and military power (Kilian-Dilmeier, 1988: 162-63; Graziado, 1991: 419). Such a correlation gives an idea of the ways in which the Shaft Grave elites acquired their wealth and status. As such, it is reasonable to suggest that a rise in militarism in the Argolid from the beginning of the early Mycenaean period stimulated the development of social stratification and social complexity.

Thus, the formative early Mycenaean period in the Argive plain (MH III-LH IIA) witnessed a dramatic rise in militarism, which clearly appears to have preceded the appearance of the first mainland palaces, and—like trade—may as such be invoked as a prime mover in a causative sense.

Finally, it is worth mentioning that some scholars have proposed somewhat controversial pseudo-historical accounts of the dramatic rise of Mycenae's prosperity in the early Mycenaean period. Marinatos' so-called 'Egyptian Theory' suggests that mainlanders were hired to assist in the expulsion of the Hyksos usurpers from Egypt (Marinatos, 1960: 181). Pay for their services might have come in the form of luxury goods and raw materials exemplified in the Mycenae Shaft Graves. According to

Karo's 'Theory of Plunder', the sudden accession of wealth reflected in the Shaft Graves is to be explained as the result of plundering raids by mainlanders of Crete who took advantage of the devastation of the island towards the end of the Middle Minoan period (Karo, 1930: 334). Moreover, the many works of art in the Shaft Graves which display a strong Minoan influence would have been produced by Cretan craftsmen who were captured during the raids and set to work on the mainland as slaves. Scholars such as Hooker and Dickinson, however, have underscored a basic shortcoming of the 'Egyptian' and 'Plunder' theories, namely that they fail to account for the gradual rise of Minoan influence witnessed in the Shaft Grave contents, as well as for the fact that their wealth was clearly accumulated over a long period rather than on a single occasion[144].

[144]For Dickinson's critique, see O. Dickinson, 1977: 54; for Hooker's critique, see J.T. Hooker, *Mycenaean Greece*. London, 1976: 51.

3.6 Irrigation and other major public works.

1. The evidence

Wittfogel, as we have seen, has invoked irrigation as the prime mover in the rise of a 'Hydraulic State' (1972: 70). He believed that the rise of the state lay in the establishment of a body of rulers who provided the management for large-scale irrigation agriculture. What evidence, if any, for hydraulic works exists in the BA Argolid? Direct evidence for prehistoric irrigation in Europe (remains of dams and ditches) is scarce. Nonetheless, hydraulic engineering is attested on the Greek mainland during the LBA, notably in the Copaic basin in central Greece and in the Argive plain. Indeed, the potential for irrigation was especially important in the more arid sectors of Mediterranean Europe such as Greece (Gilman, 1981: 6). Of course, such hydraulic systems were small in scale in comparison to the great hydraulic installations of Mesopotamia and Egypt.

Remarkable evidence for BA hydraulic engineering has been found in the Argive plain. A LH dam had been discovered near Tiryns (Balcer, 1974; Zangger, 1994; Fig. 13). It lay 4 km northeast of the citadel of Tiryns and acted to divert a stream that emerged from a shallow valley to the north of the settlement and flowed into the vicinity of the town. Measuring some 100 m long and 10 m high, the dam consisted of an inner core (fill) of stone, earth, and rubble retained on either side by two massive walls of cyclopean masonry (Balcer, 1974: 147). This damming system also incorporated a 1.5 km canal which redirected the water partially to a deeper valley and stream bed to the southwest which flowed into the Gulf of Argos south of Tiryns (Fig. 14; Balcer, 1974: 148; Zangger, 1994: 204). Surface sherds were very rare in the area of the dam (Balcer. 1974: 147), but a LH date is commonly assumed on the basis of the structure and design of its masonry. E. Zangger has

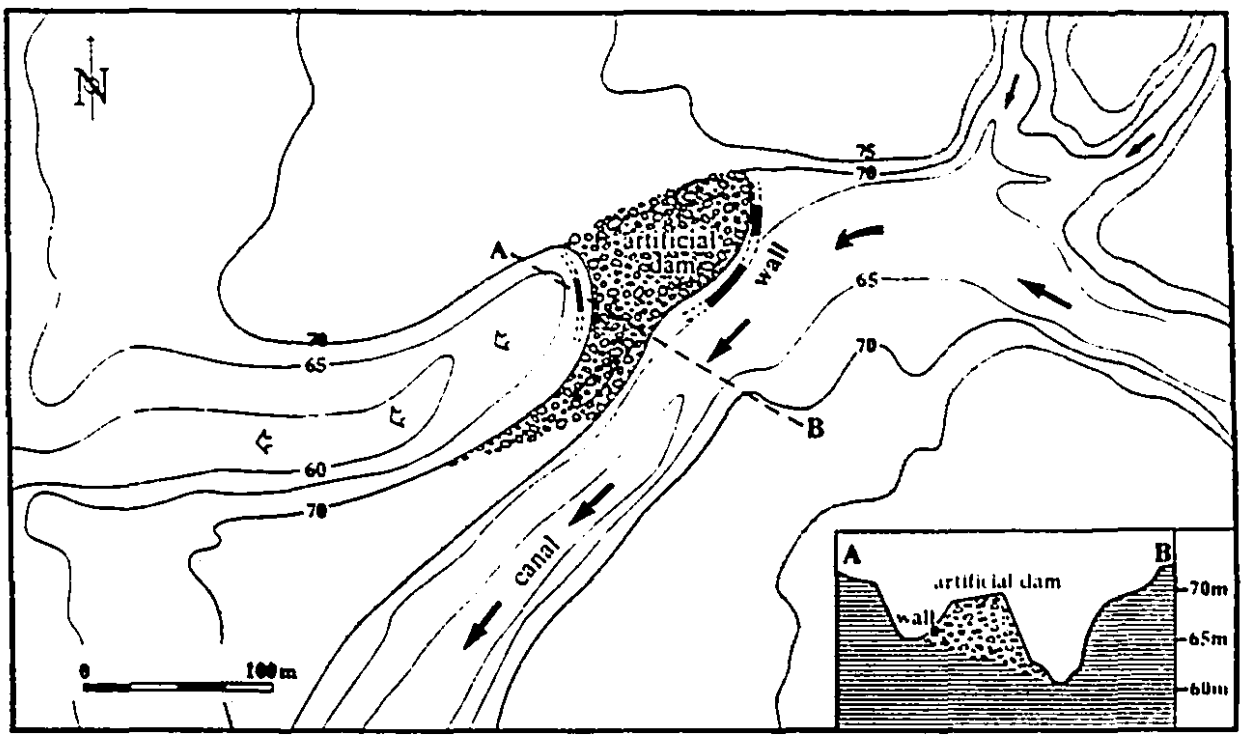


Fig. 13: Mycenaean dam at Tiryns.

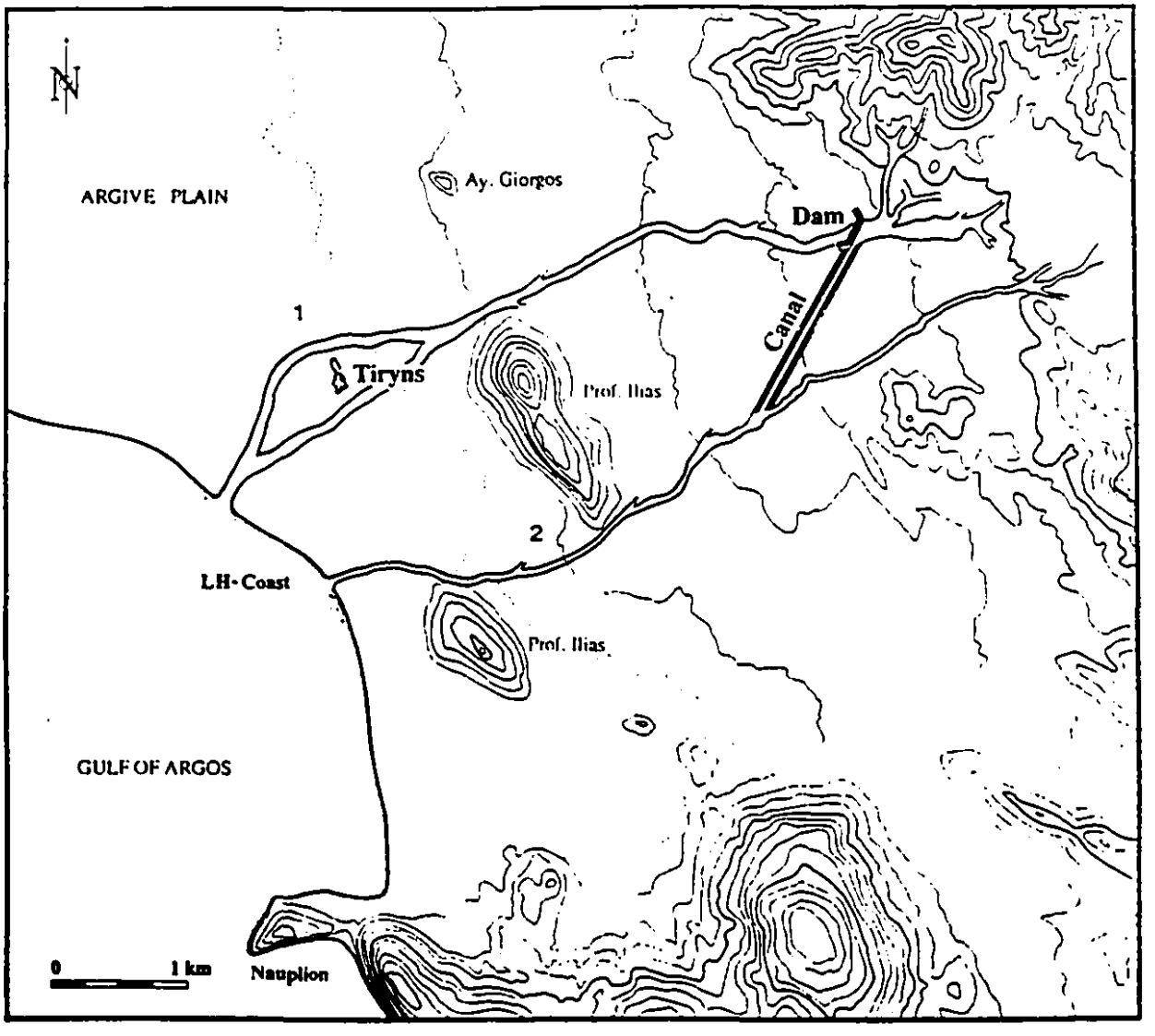


Fig. 14: Map showing course of the Manessi river in LH III B2/C (1), and after redirection (2).

most recently suggested a date in the latter half of LH III B for the construction of the dam (Zangger, 1994: 207).

Two motives have been suggested for the construction of the Tiryns dam: (1) to prevent flooding in the Tiryns area, and (2) to prevent the silting up of the harbour area in front of Tiryns (Kraft, Aschenbrenner & Rapp, 1977: 946)[145]. It is believed that Tiryns was afflicted with problems of flooding and erosion due to the hydrologic conditions of the lower plain of the Argolid. A high water table in this part of the plain impeded rapid drainage in times of heavy rainfall[146], and the torrential character of local streams resulted in flooding and severe silt deposition[147]. Both of these factors threatened the cultivated fields around Tiryns and caused damage to the Lower Town of the citadel (Balcer, 1974: 142-43; Zangger, 1994: 203). In addition, the delta of the original stream may have contributed to the infilling of the area in front of Tiryns, thus making it less viable as a natural harbour. Clearly, then, the construction of the dam contributed to the welfare of Tiryns' inhabitants.

Equally positive evidence for BA hydraulic works in Mycenaean Greece is attested in the Copaic basin in central Greece. Lake Copais appears to have been drained by an extensive system of ancient dykes and canals constructed along the northern and southeastern edges of the lake (Knauss, 1984; 1987). These BA drainage works represent a unique and remarkable example of organization at the micro-regional level. It appears to have served two basic functions: first, to protect peripheral land from

---

145 Although no structural evidence for the existence of an LBA port has been found in the vicinity of Tiryns, it has been shown that the site was much closer to the original shoreline (Kraft, Aschenbrenner & Rapp, 1977: 945) and thus Tiryns and this area of the Argos Gulf presumably served as a natural harbour, *ie.* for beaching. It has been suggested by J. Kraft that during the LBA Tiryns was a port; see J.C. Kraft, *A Reconnaissance of the Geology of the Sandy Coastal Areas of Eastern Greece and the Peloponnese.* Newark, 1972.

146 The lowest occupation level at Tiryns is only *c.* 1.5 m above the present water table (Balcer, 1974: 142).

147 This stream has been shown to have deposited up to 4 m of alluvium in the eastern parts of the palatial lower town in LH III B/C (Zangger, 1994: 203).

seasonal flooding, and second to create new farmland by partial draining[148]. As to the date of the hydraulic works around Lake Copais, it is generally accepted that they were constructed in LH III A 2, coinciding with the fortification of the acropolis at Gla[149].

Other notable examples of large-scale Mycenaean public projects in the Argolid include (1) the LH III A-B defensive fortifications themselves, (2) the later (LH III B) vaulted tholos tombs (*i.e.* Atreus, Clytemnestra), and (3) the complex network of ancient roads discovered in the area of Mycenae (Mylonas, 1966: 86-88)[150]. This road system incorporated 4 distinct roads, as well as further architectural elements (*i.e.* culverts, bridges, and terraces of cyclopean masonry), and connected the Argive plain with the Corinthian plain to the north and with the Saronic Gulf to the east. The roads were probably built in LH III B, in the latter half of the 13th century B.C. (Mylonas, 1966: 87; Wells, Runnels & Zangger, 1990: 227). The best preserved section of the road—Road 1—linked Mycenae to its hinterland, the Berbati Valley (Wells, Runnels & Zangger, 1990: 223-25; Fig. 15). The portion of the road in the western part of the Berbati valley is preserved over a distance of 700 m or more along the southern and eastern slope of Mt Kondovouni, and incorporated retaining walls and three bridges built of rough Cyclopean blocks, culverts, and terra-cotta gutters.

It has been suggested that this road network served primarily a military function[151] (Hope-Simpson, 1981: 17), but an economic and administrative role seem equally plausible. Centered on the

---

[148]H. Kalcyk points to the existence in the eastern section of the north dyke and along the southeast dyke of smaller dams used to create farmland (polders) along the big canal (1989: 62).

[149]J. Knauss (1992: 38) has recently outlined the grounds for assuming a Mycenaean date for these hydraulic works, namely the proven existence of a nearby Mycenaean center and structural features of the dams (*i.e.* size, construction).

[150]Similar Mycenaean roads have been found in Messenia, Boeotia, and Phocis: see J. Crouwel, *Chariots and other means of transport in Bronze Age Greece.* Amsterdam, 1981: 29.

[151]It has been suggested that Mycenaean forts were located along the roads, such as the one identified by G. Mylonas in the Mavroneri pass (Mylonas, 1966: 86-87). The military role of the road would have been to facilitate the rapid deployment of mobile forces, and possibly that of chariots as well.

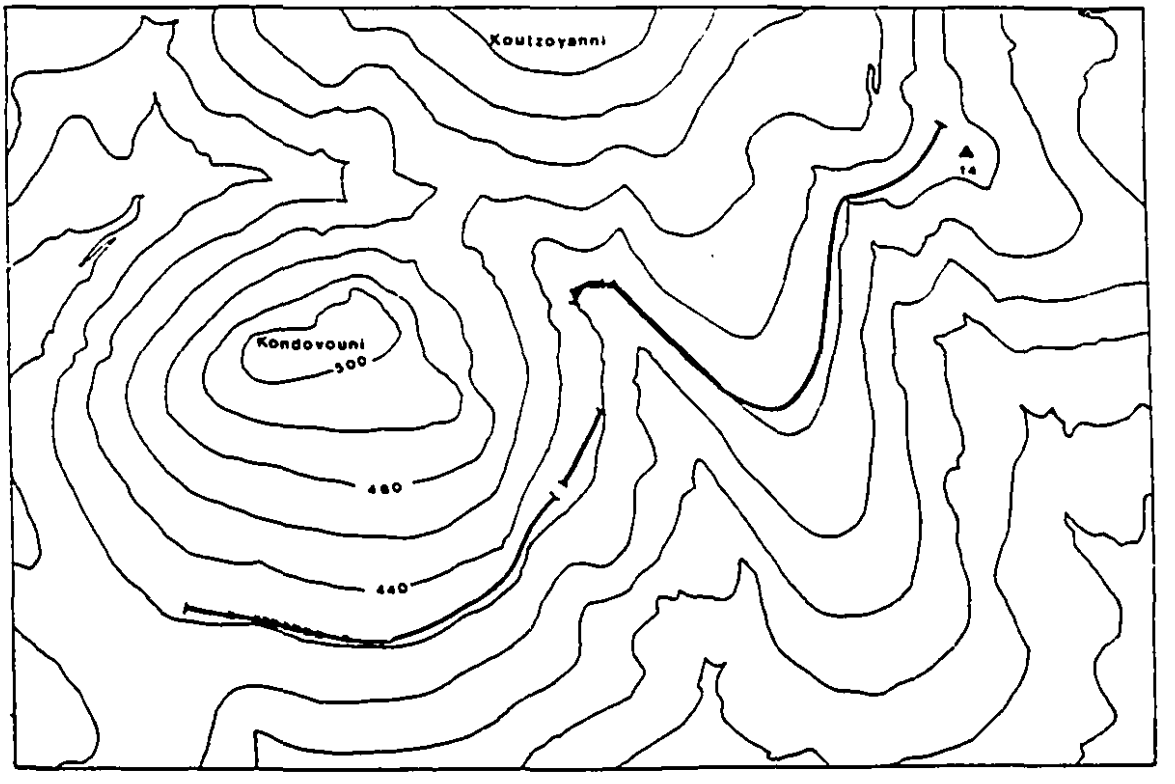


Fig. 15: Mycenaean Road 1.

palace-town of Mycenae at the head of the Argive plain, this road system would have stimulated political and economic centralization. It presumably facilitated wheeled traffic—thus stimulating the flow of trade along its course, chiefly that between the Argolid and the Corinthia to the north—as well as the collection and distribution of agricultural products which were stored in the palaces.

2. Irrigation as a prime mover

The LH III period in the Argolid thus witnessed the construction of major public works, notably a dam and canal in the vicinity of Tiryns of probable LH III B/C date, to redirect a stream and prevent damage to the Lower Town of Tiryns and the silting up of the arable land around it. The construction and maintenance of the dam and other public works in the Argive plain (*e.g.* road network) was a major enterprise, which presumably required a substantial investment of labour and capital, and involved large-scale cooperation. It is reasonable to argue that the need to organize and finance such an enterprise required the managerial role of the palace elite at Tiryns. Indeed, the ruling elite could direct the repair of hydraulic works in the event of damage due to natural causes (*i.e.* unusually severe torrential rains and flooding).

Thus, it appears that the construction of hydraulic and other large-scale public works in the LBA Argolid came late in the Mycenaean period (LH III A-B). Clearly they do not appear to have preceded the appearance of the first palaces, and as such cannot be invoked as a prime mover in a causative sense. Rather, they should be viewed as a consequence of the emergence of palatial society in the Argive plain.

It is important to note, however, that although such activities were not responsible for the ruling elite's attainment of power—and therefore can not be invoked in a causal sense—

they were a useful means by which the elite could consolidate, legitimize, and even enhance its sociopolitical status and power. In fact such activities could help perpetuate stratified society and the existing social order.

3.7 Discussion.

Having identified some of the key factors in the rise of social complexity in LBA Argolis, let us now try to synthesize some of the key interrelationships between these factors responsible for initiating a process of social evolution and the rise of palatial society in the Argive plain towards the end of the fifteenth century B.C., during the LH III A-B period.

As we have seen, adherents of the multivariant approach suggest that we ought to eschew linear causal explanations for the rise of complex society. According to this view, the processes operating during the LBA in the Argolid which resulted in the emergence of Mycenaean palatial civilization involved various interacting factors. We have postulated a relationship between trade, militarism, redistribution, population growth, and the accumulation of wealth and the development of social complexity in LH Argolis. Some of these factors—namely trade and militarism—appear to have preceded the appearance of the first mainland palaces, and as such may represent primary determining factors. Others—notably irrigation—appear to have been a consequence of the emergence of palatial society in the Argive plain. Yet to argue that a given factor was exclusively a 'cause' or an 'effect' of Mycenaean civilization is an oversimplification. Rather, we must acknowledge the complexity and multiplicity of the processes involved and ask how these various factors interacted with each other to bring about the evolution of social complexity[152].

Clearly, external trade in both raw materials and finished goods played an important role in Greece during the LH period. As we have seen, the palatial period in the Argive plain witnessed the establishment of extensive overseas contacts with the central and

---

[152]For example, while we have seen that external trade may arguably be invoked in a causative sense for the rise of elite groups in the Argolid, existing elites could further enhance their economic advantage and status by engaging in successful trading enterprises.

eastern Mediterranean, which had their beginnings in the formative early Mycenaean period (MH III-LH IIA). Presumably, the increased demand for raw materials, especially metals such as copper and tin, within the Argive plain stimulated the development of overseas networks of commodity exchange.

It has been argued that the elaboration of external exchange systems promoted the emergence of complex society and social stratification (Earle, 1985: 110-11). Indeed, the maintenance of long-distance trade networks required the managerial role of elites to organize and finance such activities. As we have seen, the involvement of the Argolid in long-distance trade during the palatial period is attested by the discovery of pottery of characteristic Argive compcsition in places such as Ialysos on Rhodes, and Tel Abu Hawam and Tel el Amarna in the east. That Mycenaean centers such as the Argolid were involved in specific directional trade with Cyprus to obtain copper in LH III times is indicated by the discovery of copper oxhide ingots of Cypriot composition at Mycenae and Tiryns, and of Cypriot sherds at Tiryns.

It is reasonable to suggest that gaining control over commodity procurement mechanisms was an important means by which some individuals could acquire personal wealth and establish social status and economic advantage. Clearly, the spectacular richness of the funeral offerings in the Mycenae Shaft Graves documents the development of social stratification at this time in the Argolid (Graziado, 1991). In fact the Shaft Grave contents document the emergence of an aristocratic warrior class at Mycenae towards by the end of the MH period. Scholars such as C.B. Mee and W.G. Cavanagh have plausibly suggested that LH I Mycenae was ruled by dynasts whose close relations and possibly even favoured retainers were buried in the Grave Circles (Mee & Cavanagh, 1984: 48). In addition, it must be noted that the rich finds in early Mycenaean tombs elsewhere in the Argolid—at Argos and Dendra, for example—bear witness to the rise of local elites.

This argument thus proposes a causal link between trade and the development of social hierarchy.

It is worth noting that the elaboration of long-distance trade connections during the LH III period had the secondary effect of transforming the local subsistence economy towards a market exchange system, where elites could instigate an increase in production to create an exportable surplus (Earle, 1985: 111). By their very nature, the palatial economies of Mycenaean Greece and Minoan Crete—with their surplus wealth in the form of agricultural surpluses or finished products—imply the emergence of a market exchange system where production has increased beyond basic subsistence needs (Cherry, 1984: 28-29).

It is reasonable to suggest that the need to procure raw materials, especially metals, stimulated Mycenaean centers such as the Argolid to increase production and create an exportable surplus. Indeed, as we have seen, the Linear B tablets indicate that certain commodities—notably textiles and oil—were manufactured specifically for export[153]. It is important to note, however, that other factors may also have stimulated the creation of a surplus in LH times, such as the desire to stabilize the subsistence base[154], the introduction of new technologies and crops (*i.e.* polyculture)[155], or the desire to alleviate population pressure in a circumscribed environment.

Presumably, the need to organize the distribution of supplies of particular commodities (*e.g.* raw materials, agricultural surpluses) required the managerial role of the palatial elites. By gaining control over production and surplus wealth, some individuals could accumulate personal wealth and establish social

---

[153]See p. 64, footnote No. 127.

[154]Variability in seasonal rainfall in southern Greece and the consequent unreliablity of crop yields posed a constant threat of food shortages (Nordquist, 1987: 18).

[155]As we have seen, it now appears that the full implementation of Mediterranean polyculture in southern Greece occured only during the LH period; see p. 63.

status. Such activities, therefore, may be invoked as having stimulated social stratification and the rise to dominance of elite groups in the Argive plain in LH times. That Mycenaean palace centers such as Mycenae and Tiryns in the Argolid came to dominate distribution and external trade is, as we have seen, well documented by the archaeological record and the documentary evidence[156].

Having established social status and economic advantage, elite members of a society arguably had to secure their wealth and maintain their status and power by sponsoring capital and labour investments in the military sphere. Indeed, scholars such as C. Renfrew have suggested that competition for the acquisition of wealth in the BA Aegean presumably led to hostility and warfare (Renfrew, 1972: 483-85). As we have seen, a dramatic rise of militarism in the LH Argolid from the beginning of the Mycenaean period is clearly documented by the evidence of weapons, artistic representations, and by the remains of fortifications[157]. A rise in militarism may also have resulted from the expansion of population density witnessed in the Argolid during the LH period, and the consequent increase in the risk of conflicts over land[158]. Indeed, the distribution of early tholoi (LH II A) in the Argolid suggests a process of territorial aggrandizement, possibly by force of arms or coercion.

Military power could enable elites to secure and expand their control over key aspects of production, distribution, overseas procurement mechanisms, as well as derive greater capital through profit, taxation or tribute, or by increasing productive output. Greater capital—in the form of food surpluses and craft goods—could in turn be invested to sponsor the construction of large-scale public or ceremonial buildings (*e.g.* palaces) and regal burials, to finance specialist craftsmen (*e.g.* metallurgists, stone-workers

---

[156]See pp. 58, 65-66.
[157]See pp. 68-69.
[158]See p. 72.

seal-cutters, etc.) to create various new prestigious items of wealth, or to sponsor overseas exchange ventures on a larger scale (Earle, 1985: 110). Social elites could also sponsor capital and labour investments in the construction of public works—such as the Tiryns dam—and thereby legitimize and enhance their sociopolitical status and power.

Thus, a 'positive feedback loop' was created, whereby increasing Argive participation in external trade during the LH period stimulated further social, economic, and political developments (Fig. 16). That such a model may plausibly account for the rise of palatial society in the Argive plain towards the end of the 15th century B.C. is consistent with the archaeological evidence. Palatial civilization thus emerged in the Argive plain during the LH III A-B period as a result of the interrelated processes of the expansion of trade, the rise of militarism, the development of social stratification, and the intensification of production.

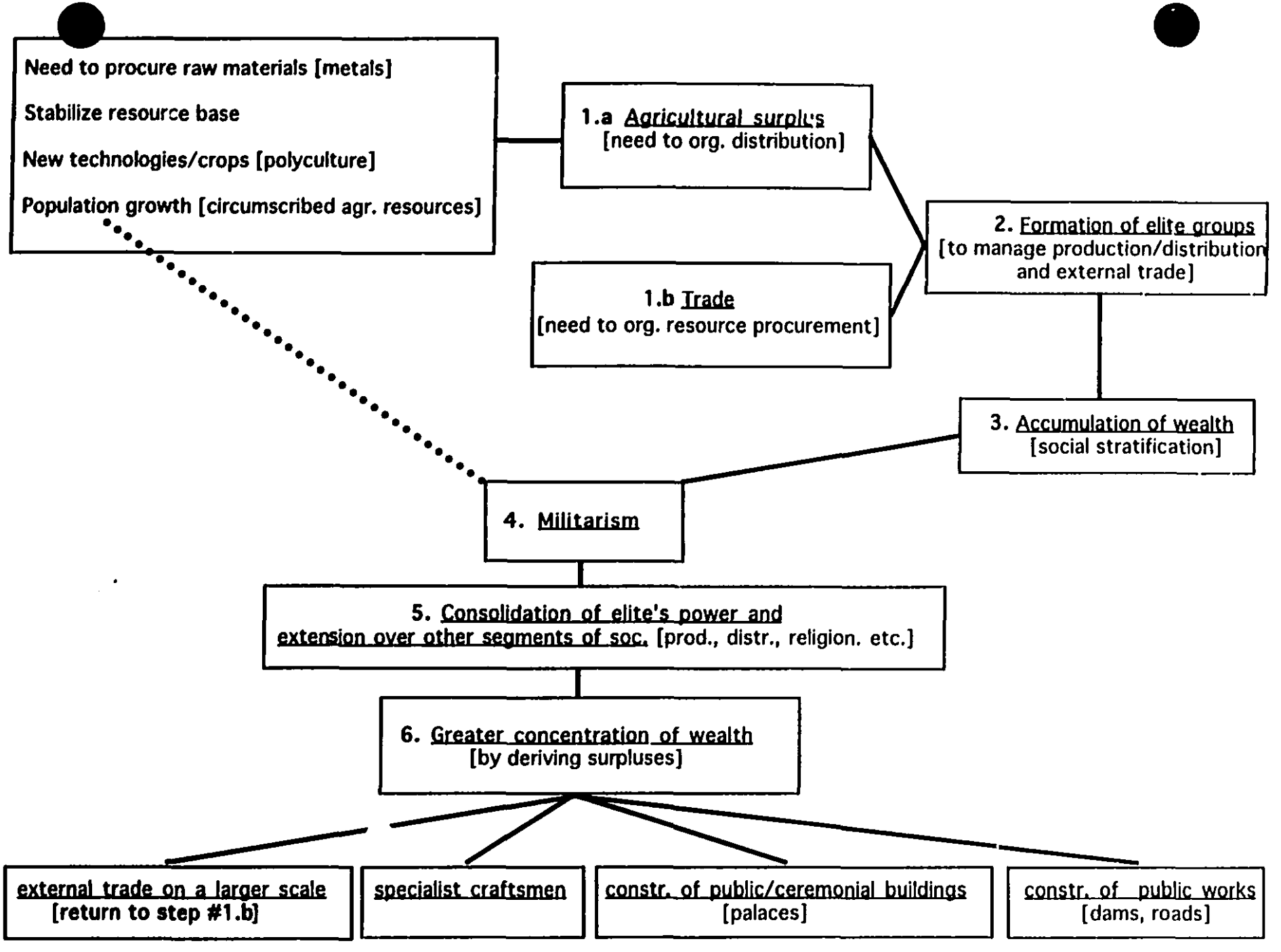


Fig. 16: Proposed multivariant model for the rise of palatial society in LBA Argolis.

Conclusion.

We have postulated a relationship between external trade, militarism, redistribution, and irrigation and the development of social complexity in the Argive plain during the LH period. Some of these factors—namely trade and militarism—appear to have preceded the appearance of the first mainland palaces, and as such can be invoked as prime movers in a causal sense. Others—notably irrigation and other major public works—clearly do not appear to have preceded the first palaces, and should be viewed as a consequence of the emergence of palatial society in the Argive plain. But to argue that a given factor was exclusively a cause or an effect of Mycenaean civilization is an oversimplification, and we must acknowledge the interrelations and processes of feedback between each of these factors. We may thus conclude that the rise of the palatial society in the Argolid can be best understood as the result of the mutual interdependence of a multiplicity of interacting variables. Indeed, the interplay of expanding trade, increasing militarism and social stratification, and intensified production was in LH Argolis—as in LC Cyprus and Palatial Crete—central to the rise of social complexity.

It is reasonable to suggest that in the case of the Mycenaean culture of mainland Greece, trade and militarism acted as original motivating factors. It is interesting to note, for example, that militarism appears to have played a less central role in the evolution of Minoan palatial civilization[159]. A strong military component appears to have been a distinguishing aspect of the Mycenaeans. We may postulate that the need to organize and manage resource procurement and distribution—*i.e.* economic needs—were instrumental in the emergence of Mycenaean palatial centers such as Mycenae and

---

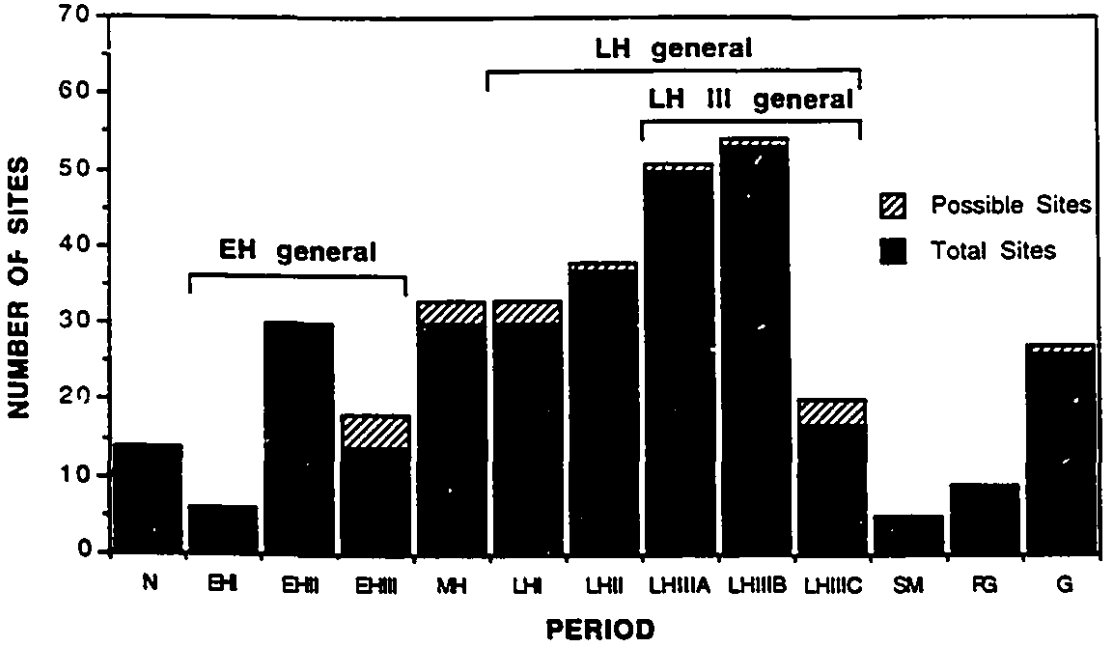
[159]See J. Cherry, 1934: 34.

Tiryns in the Argolid. It is especially poignant, then, that Plato in his theory of the development of the Greek State, points to economic needs as responsible for its origin.

> "Now let us build our imaginary state from the beginning. Apparently, it will owe its existence to our needs [...] Having all these needs, we call in one another's help to satisfy our various requirements; and when we have collected a number of helpers and associates to live together in one place, we call that settlement a state. [...] And yet, again, it will be next to impossible to plant our city in a territory where it will need no imports. So there will have to be still another set of people, to fetch what it needs from other countries [...] So, besides everything wanted for consumption at home, we must produce enough goods of the right kind for the foreigners whom we depend on to supply us."
>
> *Republic* II. 369-71.

APPENDICES

GRAPH 1 : SITE INCIDENCE OF THE ARGOLID

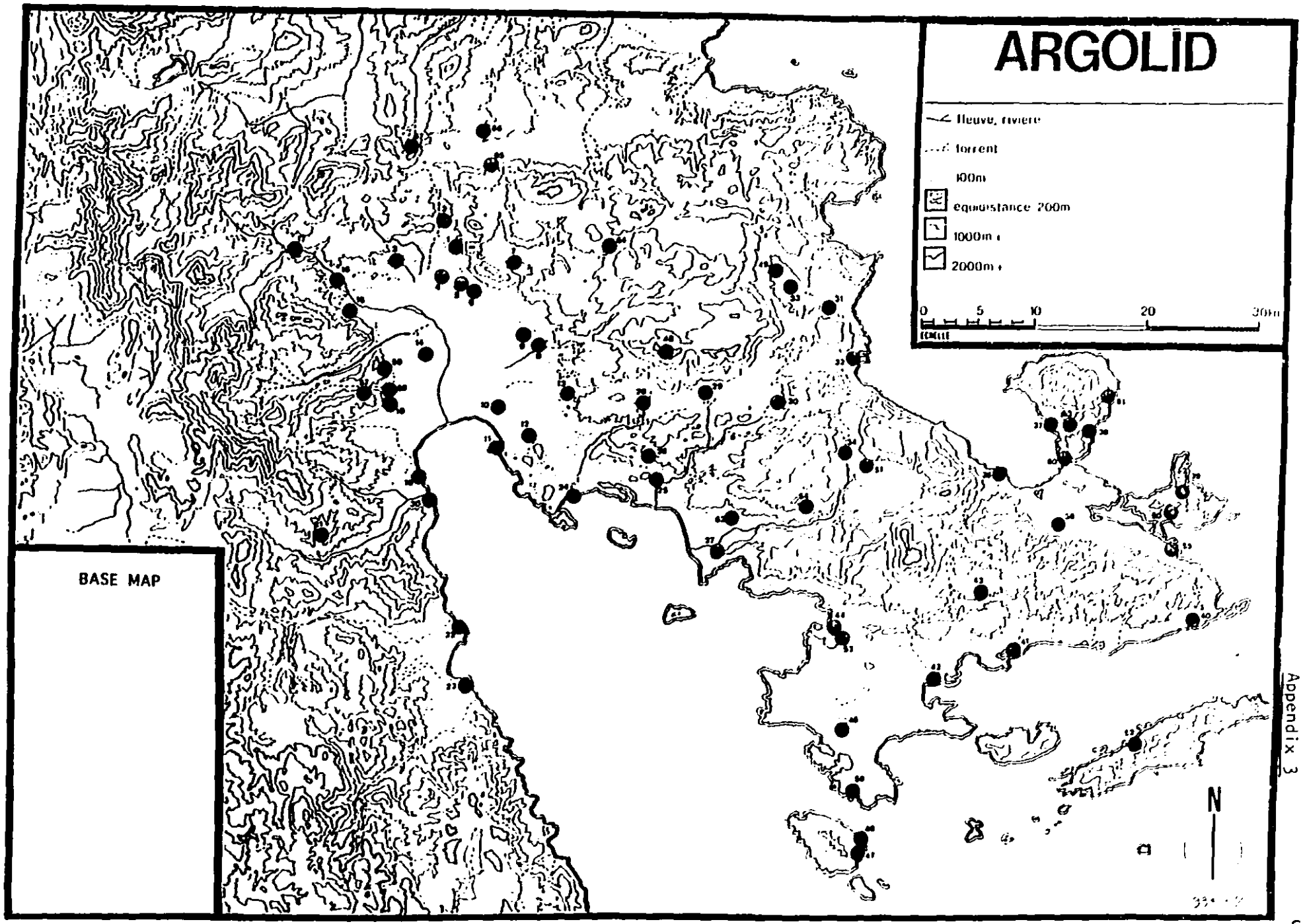


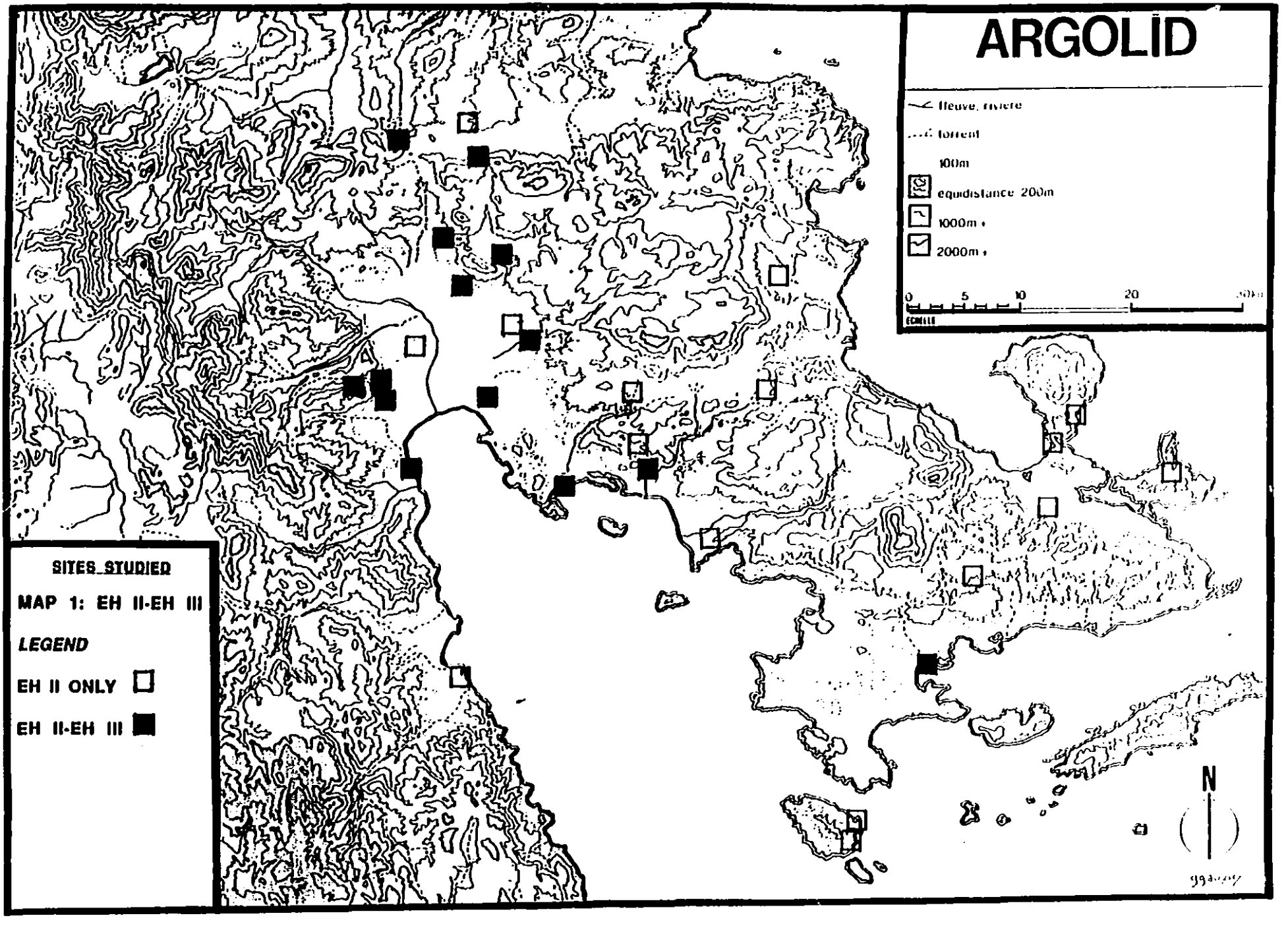
ARGOLIS : TABLE OF SITE/POTTERY INCIDENCE

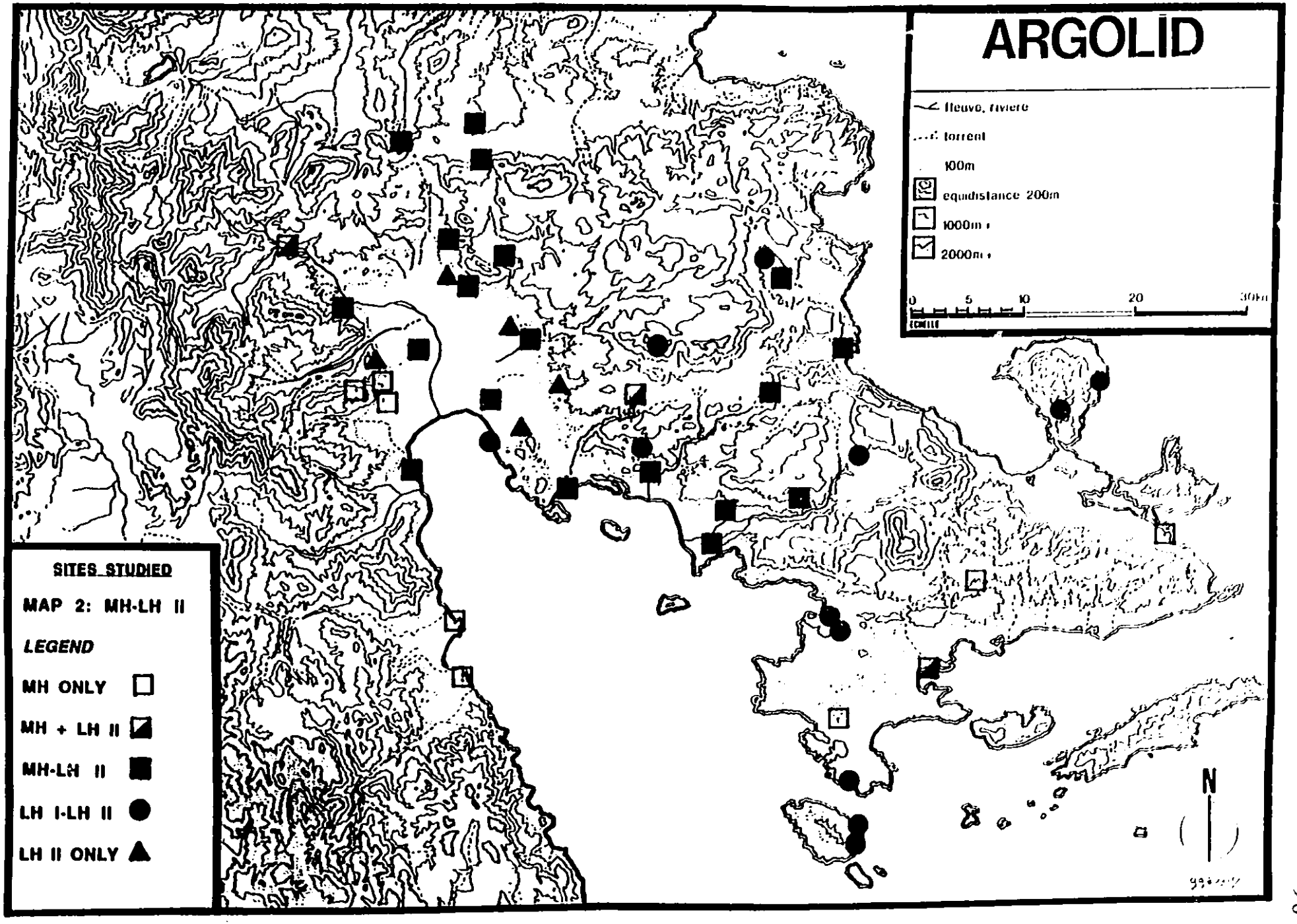
SITES	N	EH	EH I	EH II	EH III	MH	LH	LH I	LH II	LH III	IIIA	IIIB	IIIC	SM	PG	G
1.Mykenai	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2.Phykhtia (Boliari)							X			X	X	X	X			
3.Phychtia (Ay.Yeorylos)		?				?	X			X	X	X				
4.Monasteraki (Magoula)							X			X	X	X				
5.Vreserka							X	?	X	X	X	X				
6.Prosymna (Argive Heraion)	X	X		X	X	X	X	X	X	X	X	X				X
7.Berbati (Kastraki)	X	X	X	X	X	X	X	X	X	X	X	X				X
8.Dendra (Midea)		X		X	X	X	X	X	X	X	X	X				?
9.Dendra village	X	X		X	?	?	X		X	X	X	X	?			X
10.Tiryns	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11.Navplia							X	X	X	X	X	X	X	X	X	X
12.Aria							X		X	X	X					
13.Prophitis Ilias							X		X	X	X	X				
14.Argos	X	X		X	?	X	X	X	X	X	X	X	X	X	X	X
15.Skholnokhori		X				X	X	X	X	X	X					
16.Malandrini						?	X									
17.Gymno						X	X		X	X	X	X				
18.Magoula (Kephalari)	X	X		X	X	X	X			X		X				
19.Miloi (Lerna)	X	X		X	X	X	X	X	X	X	X	X			X	X
20.Kiveri							X			X	X	X				
21.Akhladokambos (Hysiai)							X			X		X				
22.Kastro (Astros)						X	X								X	X
23.Khersonisi		X		X		X	X			X	X	X				X
24.Asine		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25.Kandia		X		X	X	X	X	X	X	X	X	X	X			X
26.Synoro		X		X			X	X	X							
27.Iria	X	X		X		X	X	X	X	X	X	X	X			X
28.Kasarma		X		X		X	X		X	X	X	X			X	
29.Ligourio							X			X	X	X				
30.Epidavros (Asklepieion)		X		X		X	X	X	X	X	X	X				X
31.Palaiokhori (Nea Epidavros)							X			X		X				
32.Palaia Epidavros						X	X			X	X	X	X			X
33.Vassa		X		X		X	X	X	X	X	X	X				X
34.Trakheia							X									
35.Kalloni (Ay. Yeorylos)							X			X	X	X				

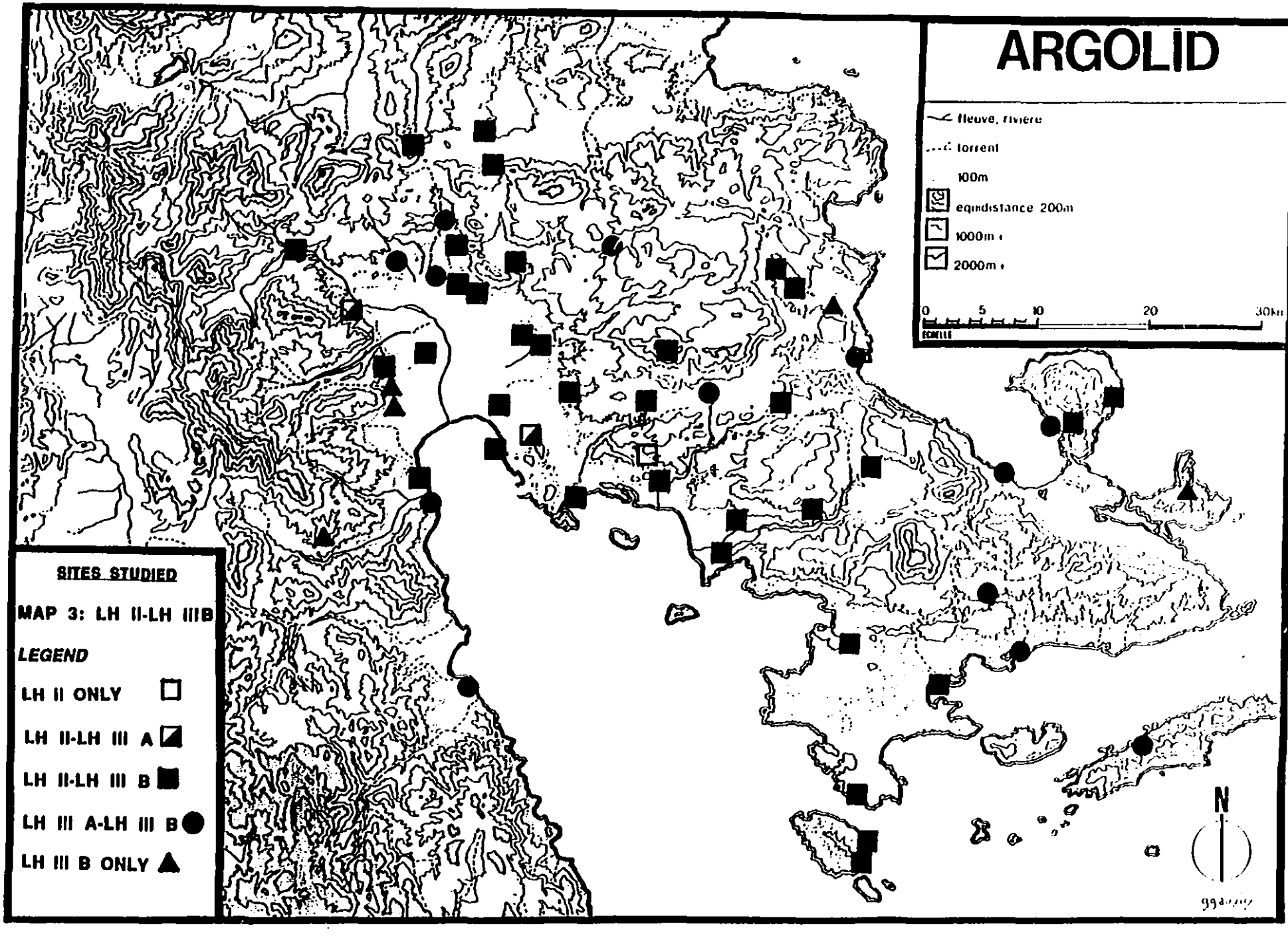
ARGOLIS : TABLE OF SITE/POTTERY INCIDENCE

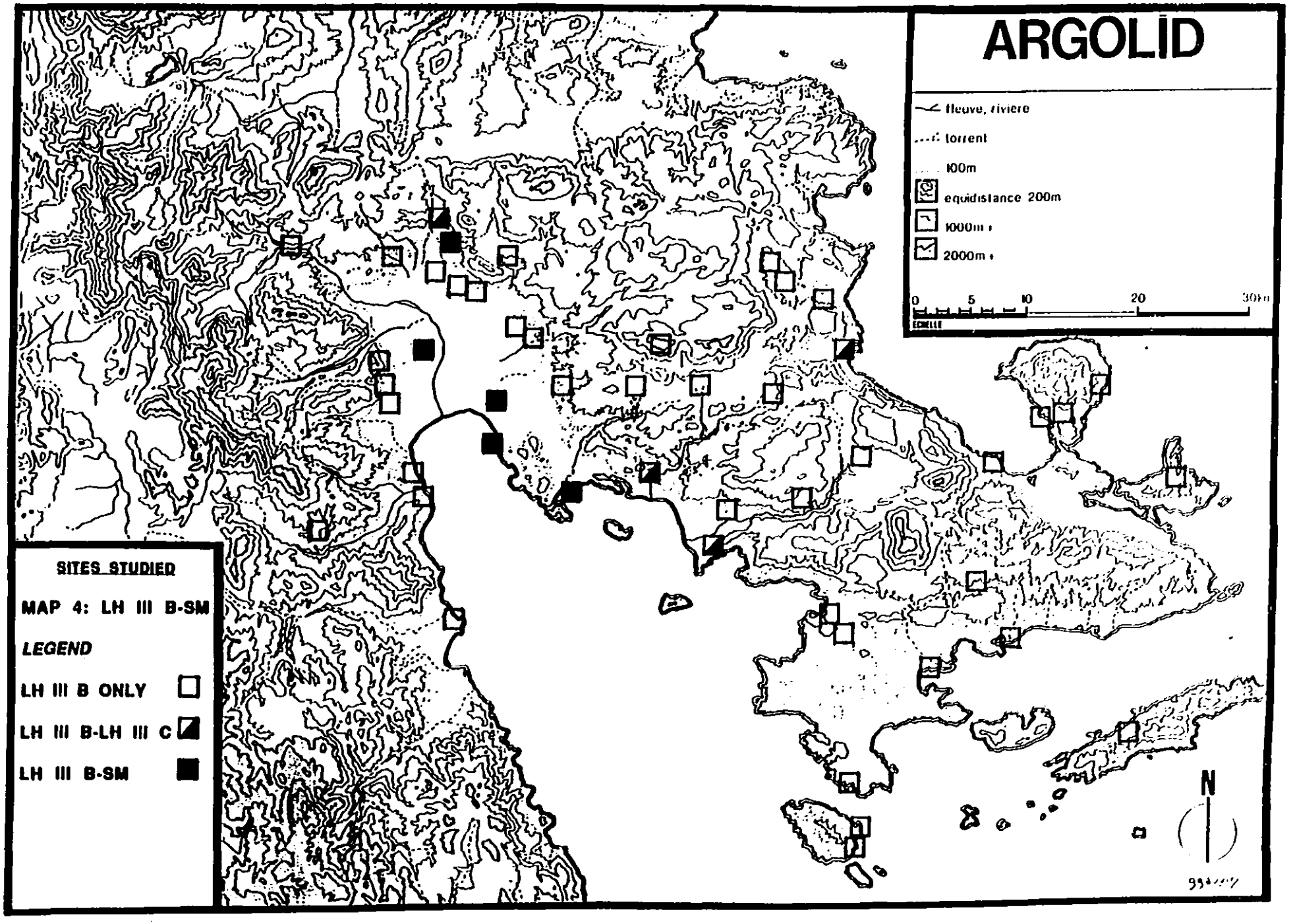
SITES	N	EH	EH I	EH II	EH III	MH	LH	LH I	LH II	LH III	IIIA	IIIB	IIIC	SM	PG	G
36.Troizen		X		X			?									X
37.Megalokhorio		X					X			X	X	X				X
38.Loutra Methana		X		X			X									
39.Poros (Temple of Poseidon)		X		X			X			X		X				X
40.Phourkaria							X									
41.Thermisi							X			X	X	X				
42.Ermioni		X		X	X	X	X		X	X	X	X				
43.Eilioi		X		X		X	X			X	X	X				
44.Koiladha							X	X	X	X	X	X				
45.Porto Kheli	X	X				X	X			X					X	X
46.Spetsai		X		X	?		X	X	X	X	X	X				
47.Ayia Marina		X		X	?		X	X	X	X	X	X				
48.Ayios Ilias		X					X	X	X	X	X	X	X			X
49.Ayios Leonidhas							X	X	X	X	X	X	X			
50.Ayios Stathis		X														
51.Bedeni Klapha							X	X	X	X	X	X	X			
52.Khoritsa							X			X	X	X				X
53.Phrankhthi	X						X	X	X	X	X	X	X			X
54.Gyphtokastro						X	X	X	X	X	X	X	X			
55.Aliki		?				X	?	?	?	?	?	?	?			
56.Kephalari	X	X		X	X	X	X			X		X				
57.Kephalari Cave	X	X		X	X	X										X
58.Kokla							X		X	X	X	X				
59.Kosta							X	X	X	X	X	X	X			
60.Methana (the Isthmus)		X		X			?	?								X
61.Oga		X					X	X	X	X	X	X	?			X
62.Pirgos		X				X	X	X	X	X	X	X	X			
63.Throni							X	X	X	X	X	X	X			
64.Pirgos							X			X	X	X				
65.Zygouries		X	X	X	X	X	X	X	X	X	X	X				
66.Ancient Kleonai		X		X		X	X	X	X	X	X	X				
67.Heraklion	X	X	X	X	X	X	X	X	X	X	X	X				
TOTAL SITES	14	37	6	30	14	30	63	30	37	56	50	53	17	5	9	26
TOTAL POSSIBLE SITES		2			4	3	3	3	1	1	1	1	3			1

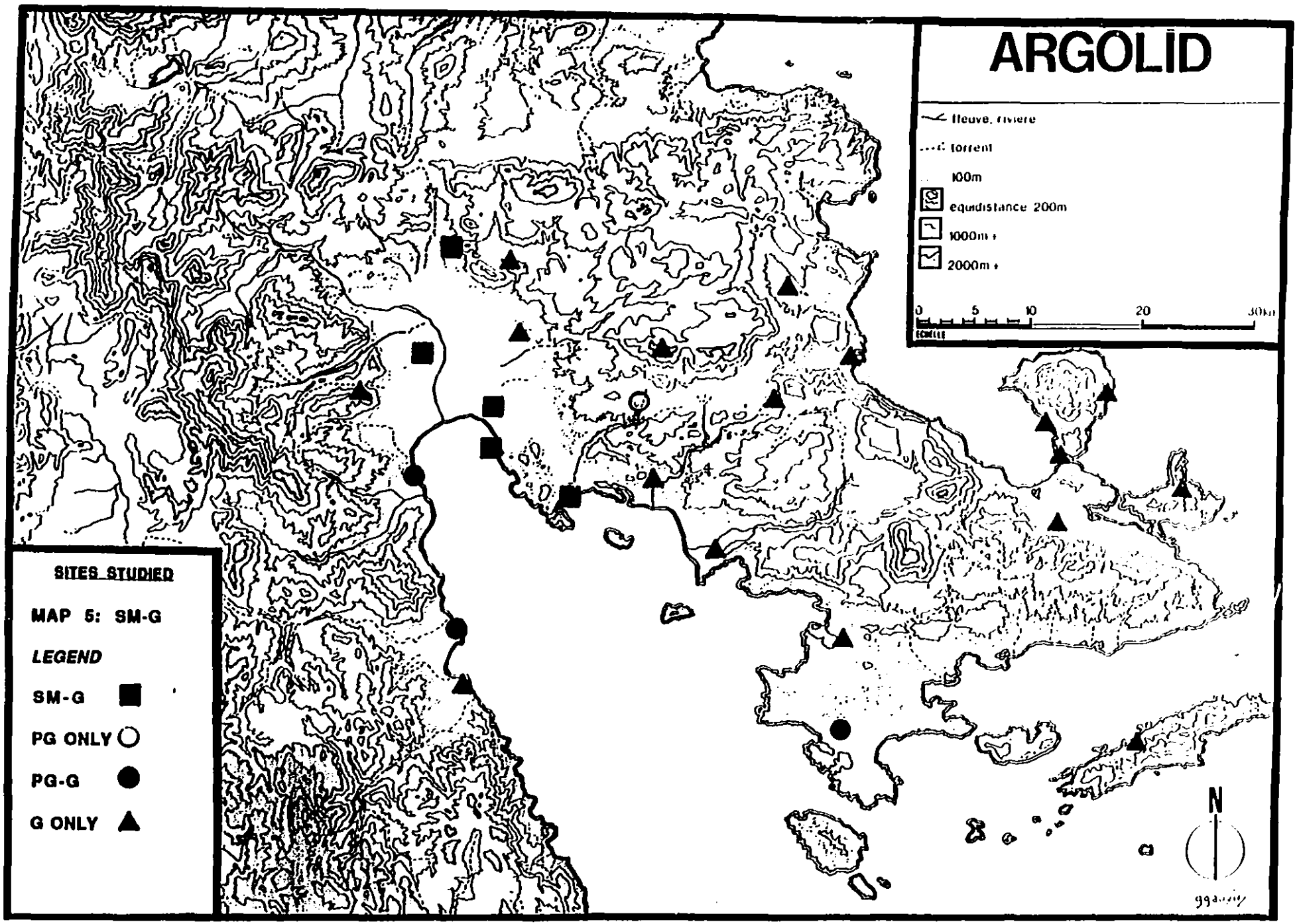

ARGOLID
fleuve, riviere
torrent
400m
equidistance 200m
1000m
2000m
0 5 10 20 30km
BASE MAP
N


ARGOLID
fleuve, rivière
torrent
100m
equidistance 200m
1000m +
2000m +
0
5
10
20
SITES STUDIED
MAP 1: EH II-EH III
LEGEND
EH II ONLY
EH II-EH III
N


ARGOLID
fleuve, rivière
torrent
100m
equidistance 200m
1000m
2000m
0 5 10 20 30km
SITES STUDIED
MAP 2: MH-LH II
LEGEND
MH ONLY
MH + LH II
MH-LH II
LH I-LH II
LH II ONLY
N


ARGOLID
fleuve, rivière
torrent
100m
equidistance 200m
1000m +
2000m +
0 5 10 20 30km
ECHELLE
SITES STUDIED
MAP 3: LH II-LH IIIB
LEGEND
LH II ONLY
LH II-LH III A
LH II-LH III B
LH III A-LH III B
LH III B ONLY
N


ARGOLID
fleuve, riviere
torrent
100m
equidistance 200m
1000m +
2000m +
0 5 10 20 30km
ECHELLE
SITES STUDIED
MAP 4: LH III B-SM
LEGEND
LH III B ONLY
LH III B-LH III C
LH III B-SM
N


ARGOLID
fleuve, riviere
torrent
100m
equidistance 200m
1000m +
2000m +
0 5 10 20 30km
ECHELLE
SITES STUDIED
MAP 5: SM-G
LEGEND
SM-G
PG ONLY
PG-G
G ONLY
N

Sources of Figures

Fig. 1: Upper citadel of Tiryns: S. Iakovidis, 1983.

Fig. 2: Citadel of Mycenae: S. Iakovidis, 1983.

Fig. 3: Menelaion, Mansion 1: W. Talylour, *The Mycenaeans* (2nd ed.). London, 1983.

Fig. 4: Pylos throne room: C. Blegen & M. Rawson, *The palace of Nestor at Pylos in Western Messenia*, I: *The buildings and their contents*. Princeton,1966.

Fig. 5: Reconstruction of the House of Idols: W. Taylour, *The Mycenaeans* (2nd ed.). London, 1983.

Fig. 6: Reconstruction of the Shrine at Tiryns: K. Kilian, Ausgrabungen in Tiryns, *AA* 1978-83.

Fig. 7: Coastline changes in the Argolid: E. Zangger, 1994.

Fig. 8: Aegean ore deposits: Z.A. Stos-Gale & C. Macdonald, 1991.

Fig. 9: Distribution of Myc. pottery in the central Mediterranean: A. Harding, 1984.

Fig. 10: Distribution of Myc. pottery in the eastern Mediterranean: A. Harding, 1984.

Fig. 11: House of the Oil Merchant at Mycenae: W. Taylour, *The Mycenaeans* (2nd ed.). London, 1983.

Fig. 12: Distribution of early tholos tombs: C. Mee & W. Cavanagh, 1984.

Fig. 13: Tiryns dam: E. Zangger, 1994.

Fig. 14: Tiryns river diversion: E. Zangger, 1994.

Fig. 15: Mycenae, Road 1: B. Wells, C. Runnels & E. Zangger, 1990.

Bibliography.

Adams, R.M. (1966) *The Evolution of Urban Society. Early Mesopotamia and prehistoric Mexico.* Chicago.

Alden, M. (1981) *Bronze Age Population Fluctuations in the Argolid from the Evidence of Mycenaean Tombs.* Göteborg.

Aström, P. (1977) *The Cuirass tomb and other finds at Dendra*, I: *The chamber tombs.* Göteborg.

----- (1983) *The Cuirass tomb and other finds at Dendra*, II: *Excavations in the cemeteries , the lower town and the citadel.* Göteborg.

Balcer, J.M. (1974) The Mycenaean Dam at Tiryns, *AJA* 78: 141-49.

Blegen, C. (1937) *Prosymna. The Helladic settlement preceding the Argive Heraeum.* Cambridge.

Carneiro, R.L. (1970) A theory of the origin of the state, *Science* 169: 733-38.

Caskey, J. (1960) The Early Helladic period in the Argolid, *Hesperia* 29: 285-303.

Cherry, J.F. (1984) The emergence of the state in the prehistoric Aegean, in *Proceedings of the Cambridge Philological Society* 210: 18-48.

Claessen, H.J.M. & Skalnik, P. (1978) *The Early State.*

Deshayes, J. (1966) *Argos, Les Fouilles de la Deiras.* Paris.

Dickinson, O.T.P.K. (1977) *The Origins of Mycenaean Civilization. Studies in Mediterranean Archaeology* 49, Göteborg.

----- (1986) Early Mycenaean Greece and the Mediterranean, in M. Marazzi, S. Tusa & L. Vagnetti (eds.) *Traffici micenei nel Mediterraneo: Problemi storici e documentazione archeologica* : 271-76. Taranto.

Dietz, S. (1982) *Asine*, II: *Results of the excavations east of the acropolis 1970-1974. Fasc. 1: General stratigraphical analysis and architectural remains.* Stockholm.

----- (1991) *The Argolid at the Transition to the Mycenaean Age. Studies in the Chronology and Cultural Development in the Shaft Grave Period.* Copenhagen.

Driessen, J. & Macdonald, C. (1984) Some military aspects of the Aegean in the late fifteenth and early fourteenth centuries B.C., *BSA* 79: 49-74.

Earle, T. (1985) Prehistoric economics and the evolution of social complexity: a commentary, in A.B. Knapp & T. Stech (eds.) *Prehistoric Production and Exchange: The Aegean and Eastern Mediterranean.* Los Angeles: 106-111.

Finley, M.I. (1957) The Mycenaean tablets and economic history, *Economic History Review* 10: 128-41.

Flannery, K.V. (1972) The cultural evolution of civilizations, *Annual Review of Ecology and Systematics* 3: 399-426.

Frizell, B. (1986) *Asine*, II: *Results of the excavations east of the acropolis 1970-1974. Fasc. 3: The Late and Final Mycenaean periods.* Stockholm.

Frödin, O. & Persson, A. (1938) *Asine, results of the Swedish excavations 1922-1930.* Stockholm.

Gale, N.H. & Stos-Gale, Z.A. (1982) Bronze Age copper sources in the Mediterranean: a new approach, *Science* 216: 11-19.

----- (1986) Oxhide copper ingots in Crete and Cyprus and the Bronze Age Metal Trade, *BSA* 81: 81-100.

----- (1988) Recent evidence for a possible Bronze Age metal trade between Sardinia and the Aegean, in E.B. French & K.A. Wardle (eds.) *Problems in Greek Prehistory* : 349-384. Bristol.

Gale, N.H. (1991) Copper oxhide ingots: their origin and their place in the Bronze Age metals trade in the Mediterranean, in N.H. Gale

(ed.) *Bronze Age Trade in the Mediterranean, Studies in Mediterranean Archaeology, Vol. XC.* : 197-239. Jonsered.

Gilman, A. (1981) The development of social stratification in Bronze Age Europe, *Current Anthropology* 22: 1-8.

Graziado, G. (1991) The process of social stratification at Mycenae in the Shaft Grave Period: a comparative examination of the evidence, *AJA* 95: 403-30.

Halstead, P. (1988) On redistribution and the origin of Minoan-Mycenaean palatial economies, in E.B. French & K.A. Wardle (eds.) *Problems in Greek Prehistory* : 519-529. Bristol.

Harding, A.F. (1984) *The Mycenaeans and Europe.* London.

Hope Simpson, R. (1981) *Mycenaean Greece.* Park Ridge.

Iakovidis, S. (1983) *Late Helladic citadels on Mainland Greece.* Leiden.

Kalcyk, H. & Heinrich B. (1989) The Munich-Kopais Project, in J.M. Fossey (ed.) *Boiotia Antiqua I: Papers on Recent Work in Boiotian Archaeology and History.* Amsterdam.

Karo, G. (1930) *Die Schachtgräber von Mykenai.* Munich.

Kilian-Dirlmeier, I. (1988) Jewellery in Mycenaean and Minoan 'warrior graves', in E.B. French & K.A. Wardle (eds.) *Problems in Greek Prehistory* : 161-171. Bristol.

Killen, J.T. (1985) The Linear B tablets and the Mycenaean economy, in A. Mopurgo-Davies & Y. Duhoux (eds.) *Linear B: a 1984 survey.* Louvain-la-Neuve: 241-305.

Knapp, A.B. (1985) Production and exchange in the Aegean and Eastern Mediterranean: an overview, in A.B. Knapp & T. Stech (eds.) *Prehistoric Production and Exchange: The Aegean and Eastern Mediterranean.* Los Angeles: 1-11.

----- (1988) Copper production and eastern Mediterranean trade: the rise of complex society in Cyprus, in *State and Society. The emergence and development of social hierarchy and political*

centralization, in J. Gledhill, B. Bender & M.T. Larsen (eds.): 149-169. London.

----- (1990) Copper production and Mediterranean trade: the view from Cyprus, *Opuscula Atheniensia* XVIII: 109-116. Stockholm.

Knauss, J. (1984) *Kopais* 1: *Die Wasserbauten der Minyer in der Kopais: die älteste Flussregulierung Europas*. Bericht Nr. 50, *Inst. f. Wasserbau der TU Munchen*. Munich.

----- (1992) Purpose and function of the ancient hydraulic structures at Thisbe, in J.M. Fossey (ed.) *Boiotia Antiqua II: Papers on Recent Work in Boiotian Archaeology and Epigraphy*. Amsterdam.

Kraft, J.C., Aschenbrenner, S.E. & Rapp, G. (1977) Paleographic reconstructions of coastal Aegean archaeological sites, *Science* 195: 941-47.

Lehmann, H. (1937) *Argolis* 1: *Landeskunde der Ebene von Argos und ihrer Randgebiete*. Athens.

Marinatos, S. (1960) *Crete and Mycenae*. Athens.

Mee, C.B. & Cavanagh, W.G. (1984) Mycenaean tombs as evidence for social and political organization, *OxJournArch* 3 (3): 45-64.

Mylonas, G. (1966) *Mycenae and the Mycenaean Age*. Princeton.

----- (1967) *Ancient Mycenae*. Princeton.

Muhly, J.D. (1991) *The development of copper metallurgy in Late Bronze Age Cyprus*, in N.H. Gale (ed.) *Bronze Age Trade in the Mediterranean, Studies in Mediterranean Archaeology, Vol. XC.*:180-96. Jonsered.

Nordquist, G.C. (1987) *A Middle Helladic Village. Asine in the Argolid*. Uppsala.

Pope, K. & van Andel, T.J. (1984) Late quaternary alluviation and soil formation in the Southern Argolid: its history, causes and archaeological implications, *Journal of Archaeological Science* 11: 281-306.

Redman, C.L. (1978) *The Rise of Civilization. From early farmers to urban society in the ancient Near East.* San Fransisco.

Renfrew, C. (1972) *The Emergence of Civilization. The Cyclades and the Aegean in the Third Millenium B.C.* London.

Renfrew, J.M. (1973) *Paleoethnobotanv.* London.

Runnels, C.N. & van Andel, T.H. (1987) The Evolution of Settlement in the Southern Argolid, Greece: An Economic Explanation, *Hesperia* 56: 303-34.

Rutter, J.B. (1993) Review of Aegean Prehistory II: The Prepalatial Bronze Age of the Southern and Central Greek Mainland, *AJA* 97: 745-97.

Säflund, G. (1965) *Excavations at Berbati 1936-7.* Stockholm.

Smith, T.R. (1987) *Mycenaean Trade and Interaction in the West Central Mediterranean 1600-1000 B.C.* Oxford.

Stos-Gale, Z.A. (1988) Lead isotope evidence for trade in copper from Cyprus during the LAte Bronze Age, in E.B. French & K.A. Wardle (eds.) *Problems in Greek Prehistory* : 265-282. Bristol.

Stos-Gale, Z.A. & Macdonald, C.F. (1991) Sources of metals and trade in the Bronze Age Aegean, in N.H. Gale (ed.) *Bronze Age Trade in the Mediterranean, Studies in Mediterranean Archaeology, Vol. XC.* : 249-88. Jonsered.

Styrenius, C.-G. (1967) *Submycenaean studies.* Lund.

Treuil, R., Darcque, Poursat, J.-C. & Touchais, G. (1989) *Les Civilizations Egéennes du Néolithique et de l'Age du Bronze.* Paris.

van Andel, T.H. & Runnels, C.N. (1987) *Beyond the Acropolis: A Rural Greek Past.* Stanford.

van Andel, T.H., Runnels, C.N. & Pope, K. (1986) Five thousand years of land use and abuse in the Southern Argolid, Greece, *Hesperia* 55: 103-28.

Ventris, M. & Chadwick, J. (1973) *Documents in Mycenaean Greek* (2nd ed.). Cambridge.

Wells, B., Runnels, C.N. & Zangger, E. (1990) The Berbati-Limnes Archaeological Survey: The 1988 Season, *Opuscula Atheniensia* 18: 207-38.

Wittfogel, K.A. (1957) *Oriental Despotism: A comparative study of total power.* New Haven.

Zangger, E. (1994) Landscape Changes around Tiryns during the Bronze Age, *AJA* 98: 189-212.