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The Greek Neolithic: A New Review

Jean-Paul Demoule¹ and Catherine Perlès^{2,3}

The Greek Neolithic, here divided into five phases, is the oldest in Europe. Geographically, it is the closest to the Near East and has thus long been seen as an impoverished derivative of the latter. However, recent research has tended to emphasize the autochthonous nature of Neolithic development in Europe, including Greece. The Greek Neolithic economy, which was based almost entirely on domesticates, and its densely packed, long-lived villages strongly recall the Near East, as do also the early emphasis on fine, decorated, nonculinary pottery and the wealth of figurines. On the other hand, the evolution of stylistic patterns is specifically Greek, although generally related to trends in the Balkans. Originality in the development of the Greek Neolithic is also seen in its latest phase, with apparent decreases, rather than increases, in site density, social differentiation, and, to some extent, long-distance trade. At the same time, however, the dichotomy became much sharper between the rich agricultural plains of northern Greece and the more pastoral(?) regions of the Peloponnese and Cycladic Islands; this presages similar contrasts during the Bronze Age.

KEY WORDS: Neolithic; Greece; farming; trade; settlement patterns; metallurgy; social differentiation.

INTRODUCTION

Early in the century, the pioneering work of G. Tsountas at Sesklo and Dimini (1908), followed by the masterly syntheses of Wace and Thompson on Thessaly (1912) and Heurtley on Macedonia (1932), revealed a spectacular Neolithic, rich in architectural remains, decorated wares, plastic figurines, orna-

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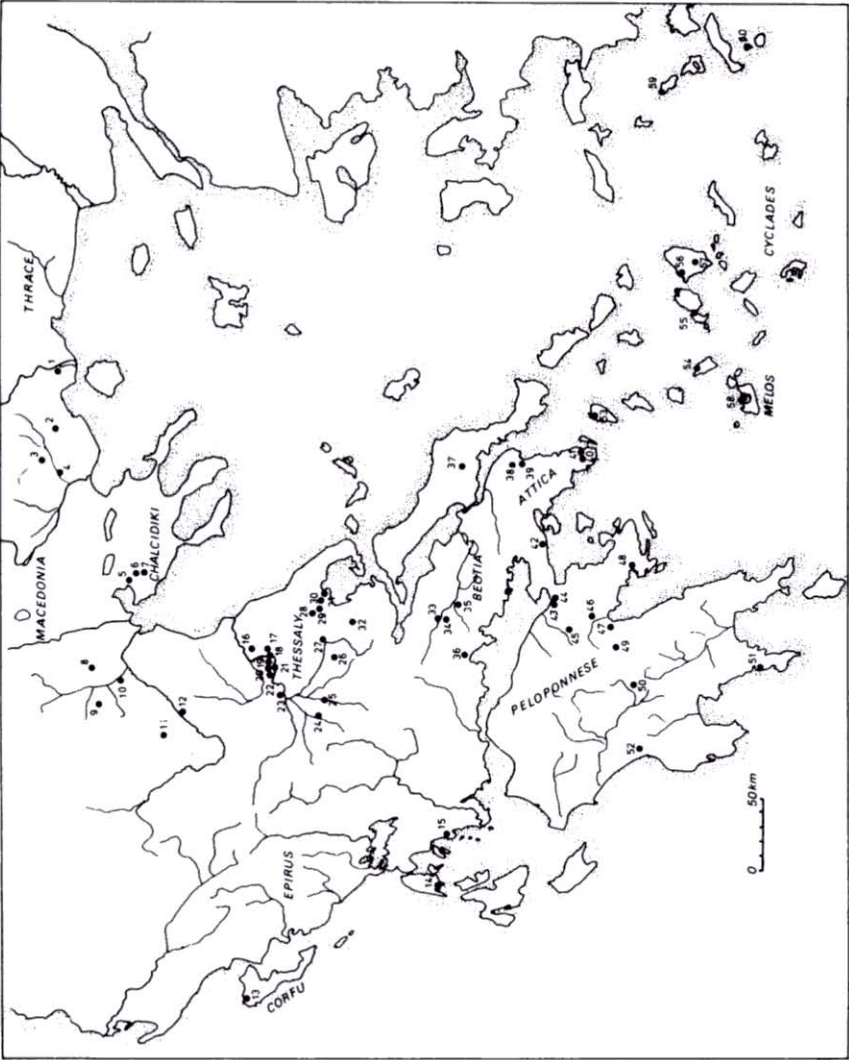
ments, and exotic stone tools. Nevertheless, the organization of archaeological research in Greece (geared toward the exploration of the prestigious Classical past), combined with a tendency to consider the Greek Neolithic as an offshoot of the Near Eastern or Balkanic Neolithic, meant that this was followed by a long period of inactivity.

Active research started again in the 1960s under two distinct influences: in the north, the Germanic "historicocultural" tradition focused exclusively on chronological frameworks and "cultures," with very little anthropological perspective. In the south, the Anglo-Saxon tradition emphasized economic and environmental reconstructions, focusing on individual sites or discrete "styles" and neglecting supraregional frameworks. In all cases, modern excavations were (and are) limited to small parts of sites; only Sesklo and Dimini, where excavations were resumed in the 1970s by D. Theocharis and G. Hourmouziadis, respectively, provide large-scale information on the settlements themselves.

Nonetheless, the Greek Neolithic has again become an active and pioneering field of research. Its strength and interest lie not in the number or scale of the excavations proper but, rather, in the number and variety of innovative methodological studies. Most aspects of archaeological research have been revitalized: systematic field surveys, site definition, regional analysis, faunal analysis, ceramic technology, use of ethnoarchaeology, etc. Thus, although several regional studies remain unpublished (Cullen, 1985a; Diamant, 1974; French, 1972; Halstead, 1984; Phelps, 1975; Vitelli, 1974; Zachos, 1987), as do final reports for several important sites, a new picture of the Greek Neolithic is emerging. New interpretations, which are also relevant for other regions of the Mediterranean, can be offered within a revised chronocultural framework. Even if many points remain obscure, a preliminary synthesis is now needed.

Within the scope of this paper, a complete synthesis, giving due reference to all the recently published work, is clearly impossible. Rather, we have tried to discuss the present state of research in those domains which seem to us the most promising or innovative. Supplementary references can be found in the works by Davis (1992), Halstead (1984), Theocharis (1973), Treuil (1983), and Treuil *et al.* (1989). For the same reasons, the chronostratigraphical discussion is greatly limited; detailed presentation of the problems and arguments must await further publication. In accordance with the practice of the *Journal of World Prehistory*, dates are given B.P. uncalibrated instead of bc as is more usual in Greek prehistory. All dates should be seen only as approximations of the true ages.

Greece is here considered within its present political frontiers, which (Fig. 1), for the most part, correspond to natural boundaries. Crete and the Dodecanese are alluded to only occasionally, since their cultural manifestations and phasing differ from those of the rest of Greece. Also, the present authors have no first-hand knowledge of the material from these two areas.



LAND AND RESOURCES

The Land

Natural factors had important effects on Neolithic economy and settlement patterns, and paramount among these is topography (Bintliff, 1977). Both mainland and island Greece are largely mountainous: more than two-thirds of the country is above 300 m asl, with broken relief and many obstacles to communication.

The combination of Mediterranean climate and steep slopes led to significant erosion. Sediments washed down by violent seasonal rains accumulated in the deep depressions of tectonic and karstic origin, which are typical of the Greek countryside. Although the lowlands represent no more than 10% of Greece, they comprise most of the country's agricultural lands. However, many of the depressions and inner basins, with poor drainage and little or no outlet to the sea, were still occupied by lakes and swamps during the Neolithic; in fact, many have only recently been drained.

The mountains, steep slopes, and expanses of water created a very compartmentalized landscape, with agricultural land concentrated in restricted and isolated areas. The same is true of most of the islands: navigation to and from these islands is rendered difficult by the winds, with an unpredictable winter regime and the constant northerly Etesian winds in summer. On the other hand, coastal navigation was probably an important means of communication, given the inland topography and absence of navigable rivers.

Recent tectonic activity has created volcanoes, of which two, on the islands of Giali and, above all, Melos, provided most of the obsidian used in the Neolithic. Tectonic activity still continues, making it difficult to reconstruct Neolithic shorelines. The relative importance of eustasy and local tectonics is debatable, but there is definite evidence for the submergence of Neolithic coastal sites (Gifford, 1990).

The topography and soils of Greece thus led to dense, but isolated, clusters

Fig. 1. Map of Greece with location of sites quoted in text (Crete excepted). (1) Paradeisos; (2) Dikili Tash; (3) Sitagroi; (4) Dimitra; (5) Thermi; (6) Vassilika; (7) Arethoussa; (8) Mandalo; (9) Nea Nicomedia; (10) Rodochori Cave; (11) Megali Toumba; (12) Servia; (13) Sidari; (14) Choirospilia; (15) Hagios Nikolaos; (16) Rakhmani; (17) Gediki; (18) Soufli Magoula; (19) Arapi; (20) Otzaki; (21) Argissa; (22) Agia Sofia; (23) Plateia Magoula Zarkou; (24) Prodomos; (25) Tsani; (26) Achilleion; (27) Tsangli; (28) Visviki; (29) Sesklo; (30) Dimini; (31) Pevkakia; (32) Zerelia; (33) Elateia; (34) Ayia Marina; (35) Chaeroneia; (36) Corycian Cave; (37) Tharounia; (38) Marathon; (39) Nea Makri; (40) Kitsos; (41) Thorikos; (42) Zaimis; (43) Corinth; (44) Gonia; (45) Nemea; (46) Prosymna; (47) Lerna; (48) Franchthi; (49) Ayioriyitika; (50) Asea; (51) Alepotrypa; (52) Ayios Dimitrios; (53) Kephala; (54) Agios Sostis; (55) Saliagos; (56) Grotta; (57) Zas Cave; (58) Melos; (59) Partheni; (60) Giali.

of settlements. Site distribution also appears to have been influenced by climate, although in a seemingly paradoxical way.

Climate

Data on the Holocene climate come primarily from palynological sequences from northern Greece. They and the macrofloral remains suggest a Mediterranean climate, with winter rains and dry hot summers, broadly similar to that of today. There are also large regional differences, especially in rainfall and, to a lesser extent, in temperature, which have important consequences for natural vegetation, agricultural potential, and risk of crop failure.

Broadly, the climate varies along three gradients: west-east and north-south gradients of decreasing rainfall and an altitudinal gradient of increasing rainfall and decreasing temperatures. In the wetter areas of the north and the west, annual rainfall can reach 1500 mm, with cold and rainy winters. Ioannina (at 470 m asl) has a mean of 27 days of frost annually. Slightly farther south, in Thessaly, frost occurs but less frequently; the mean annual temperature is 11°C, with sharp contrasts between cool, rainy winters and very hot, dry summers. Mean annual rainfall varies regionally from 500 to 1000 mm (Sivignon, 1975).

Farther south, in Boeotia and the Argolid, frost is rare and the mean annual rainfall can drop below 400 mm (Greig and Turner, 1974; Forbes, 1989; Hansen, 1991), which is close to the minimum requirement for cereals. The mean annual temperature reaches 18.5°C and the driest parts of Greece may be classified as semiarid. Periodic droughts must have been a problem: as shown by Ricklefs (quoted by Forbes, 1989), interannual rainfall variability is all the more important when the annual mean is low. Nonetheless, it is in the eastern and drier part of Greece that the densest settlement is found (cf. Fig. 2 and maps of Theocharis, 1973). We suggest that a factor in this apparent paradox may be the type of vegetation to be cleared for cultivation.

Vegetation

Following Anastassiades (1949), several zones can be distinguished, of which only the Lowlands (<700 m asl) are relevant here. They can be divided into the Lowlands Northern belt (moist and cool), the Lowlands Ionian belt (moist and warm: 800–1500 mm of rain), and the Lowlands Aegean belt (dry and warm: 300–800 mm of rain). The last is the densest area of Neolithic settlement: Thessaly, central Greece, the northern and eastern Peloponnese, and the Aegean Islands.

Today most of the Lowlands is either cultivated or barren, but forest was supposedly the climax vegetation during the Neolithic (Bottema, 1974, 1979;

Greig and Turner, 1974; Halstead, 1989b). Cores from Epirus and Macedonia indicate progressive reforestation after the Pleistocene and a climax woodland of deciduous oak, elm, ash, lime, and hazel, with pine on the slopes. Early farmers would thus have faced a densely forested landscape, a claim which has important implications for economic reconstructions (Halstead, 1989b).

Unfortunately, the pollen data refer to the Northern belt (Macedonia) or the Northern Ionian belt (Epirus), which have substantially higher rainfall than most of Greece (Bintliff, 1977), while the densest Neolithic settlement was in the much drier Aegean belt (Hansen, 1991, Fig. 9). In central Thessaly, forests, once cleared, would not have regenerated easily, and from Boeotia southward, Neolithic populations may have encountered a rather open landscape. Hansen (1991) suggests that low shrubs and small trees such as juniper and terebinth, which tend to be underrepresented in the pollen record, would have been the dominant vegetation. Indeed, the pollen diagram for Lake Copaïs indicates thin oak woodland with many shrubs for the earliest Neolithic (Greig and Turner, 1974), while later samples from Kitsos in Attica show an open environment with almost no trees and a massive predominance of Cichoraceae (Renault-Miskowski, 1981). A pollen core from Koiladha Bay, in front of Franchthi Cave, confirms an open vegetation during the Late Neolithic, with low arboreal pollen dominated by *Quercus cerris* type (Bottema, 1990).

It is true that, by the Late Neolithic, anthropogenic factors could have contributed to degradation of the vegetation, as suggested by Renault-Miskowski (1989), van Andel *et al.* (1990), Wells *et al.* (1990), and Zangger (1991). However, Bottema (1990) sees this as unlikely, and for Rackham (1982), steppes, garrigue, and maquis can also be climax vegetations, depending on soil and rainfall. In southern Greece, the dry climate of the Neolithic may have been a more important factor in their development than was farming or herding. The increase in arboreal pollen in the Koiladha core during the third millennium B.P., when human occupation was much denser than in the Neolithic, supports the hypothesis of a natural origin for the open landscape (although others would prefer to see this as a consequence of LBA conservation techniques; Runnels, *in litt.*). This is a critical debate: the natural vegetation determines the effort required for land clearance, the rate of forest regeneration, and the permanence of the fields. According to our hypothesis, early Neolithic groups would have favored regions where clearance was easier and where there was little continuous regrowth of the natural vegetation.

Natural Resources: Plants and Animals

Open woodland and garrigue offer more varied food resources than do forests, but the most striking feature about Neolithic use of wild plants and animals is how little of it there was.

In the Mesolithic of Franchthi, carbonized seeds represent a wide variety of plants typical of the garrigue, including fruit, Leguminosae and wild cereals (Hansen, 1991). Acorns, vines, wild olives, bulbs, roots, and leafy plants, which were eaten until recently, were also available. Yet carpological studies show that those resources were not used by Neolithic farmers, or only minimally (Halstead, 1984; Halstead and Jones, 1980; Hansen, 1988, 1991; Kroll, 1991; Renfrew, 1966; van Zeist and Bottema, 1971). In addition, fruit were preferred to the higher-calorie Leguminosae and wild cereals.

A similar situation obtains for animals. The data from Mesolithic Franchthi (Payne, 1975) and the rare hunted animals in Neolithic sites indicate which species were present, but not their distribution or abundance. Of the varied Mesolithic fauna at Franchthi, only red deer, birds, and small fish still occur (in small quantities) in the Neolithic. In Thessaly and Macedonia, deer, boar, aurochs, fox, hare, beaver, birds, and fish occur in Late Neolithic sites but are always rare (Boessneck, 1955; Bökönyi, 1986; Grammenos, 1991; Halstead, 1984; Hinz, 1979; Jordan, 1975; Larje, 1987). They must have been taken primarily for fur, feathers, or antlers, rather than as a dietary staple or even as a complementary meat resource. Clearly, the domestic crops and animals were usually productive enough to make the collection of wild substitutes unnecessary or too costly. Domestic species also permitted the exploitation of small islands, where natural resources may have been very scarce. The need for introduced domesticates may explain why such islands were settled late.

Mineral Resources

Greece is rich in minerals, but their distribution is uneven. In general, there are three types of distribution: (a) ubiquitous, such as clay, which allowed significant local manufacture of pottery (cherts, radiolarites, jaspers, and quartz are also common, but their mediocre quality limited their use by Neolithic groups); (b) regionally restricted (including high-quality flints in western Greece, high-quality jaspers in the Pindus, steatite, and marble, which was used occasionally for figurines, pendants, and stone vases); and (c) unique or very localized (including obsidian on Melos and Giali, andesite in the Saronic Gulf, and emery on Naxos). These contrasting distributions of key mineral resources led to specialized production and interregional trade; in fact, the most localized sources were also among the most intensively exploited during the Neolithic (Perlès, 1992).

Copper is found in many parts of Greece (McGeehan-Liritzis, 1983; Stos-Gale and Macdonald, 1991), but it is not certain that the copper objects in Neolithic sites were made from local ores. Similarly, the provenience of the rare gold and silver objects remains unknown, although some of the gold and

silver ores may already have been exploited by the end of the Neolithic (Gropengiesser, 1986).

SUBSISTENCE ECONOMY

As noted above, exploitation of wild resources played an unusually limited role in the Greek Neolithic: its economy was therefore truly agropastoral. Most, if not all, the domesticated species, especially the cereals, were introduced from the Near East (Hansen, 1991). However, they were well adapted to the environment of Greece, and the avoidance of wetter regions during the earlier phases of the Neolithic might also reflect the less successful adaptation of the cereals and legumes to higher levels of winter rainfall. [Compare, for instance, the problems faced by Hillman and Davies (1990, pp. 184–185) when they cultivated Near Eastern einkorn in Wales.]

During the earlier phases of the Neolithic, settlements were concentrated on the most fertile alluvial and colluvial soils, which retained water and were light enough for human tillage. There is no evidence of draft animals or large-scale irrigation, which is, in any case, not compatible with the unpredictable regime of the rivers.

Carbonized plant remains show that the basic cultivated crops were cereals and pulses. This combination would have been a good risk-buffering strategy, since pulses seem to withstand periodic droughts better than cereals (Forbes, 1989). The most common cereals were the glume wheats: *Triticum dicoccum* (emmer) and, less importantly, *T. monococcum* (einkorn). Bread wheat (*T. aestivum*), a free-threshing wheat, is very rare in mainland Greece although common at Knossos (Hansen, 1988; Kroll, 1991); this might reflect its greater vulnerability in storage (Halstead, 1989a) or its more demanding soil and edaphic requirements (Hansen, 1988). Six-row barley (*Hordeum vulgare*) was also widespread and seems rapidly to have replaced two-row barley (*H. distichum*). The most abundant legumes were lentils (*Lens culinaris*), peas (*Pisum sativum*), and bitter vetch (*Vicia ervilia*). Grass peas (*Lathyrus sativus*) were also common in Thessaly (Halstead and Jones, 1980; Renfrew, 1966), but chickpeas (*Cicer arietinum*) and horsebeans (*Vicia faba*) are found only in some Late Neolithic sites. Very few olive stones have been recovered and they seem to be wild (Runnels and Hansen, 1986). The same is true of the vine, which was more common but, according to Hansen (1988), too small to be a cultivar.

Methods of storage are not certain, although storage must have been important, as surplus production is a risk-minimizing device in areas where annual yields fluctuate widely (Forbes, 1989; Halstead, 1989a, 1990). This "normal surplus" also provides a means of exchange and may promote part-time craft specialization.

Sheep, goats, pigs, cattle, and dogs are present from the very beginning

of the Neolithic, sheep being predominant in the number of remains (Boessneck, 1955, 1962; Halstead and Jones, 1980; Halstead, 1987; Payne, 1985; Schwartz, 1981). Again, there is no evidence of local domestication. Since the other species are better adapted to a wooded environment, Halstead (1987) takes the predominance of sheep to indicate that animal husbandry was limited to cleared agricultural lands (Halstead, 1985, 1989b). However, we have argued that the land was more open than Halstead believes, and the sheep is indeed the animal best adapted to dry conditions (Helmer, 1992). In any case, its importance should not be overestimated, since cattle must have generally predominated in terms of meat yields.

Comparison of sheep, cattle, and pig mortality profiles with Payne's (1973) models indicates a stress on meat production: the highest mortality peak is between 6 months and 3 years, and the sex ratio shows predominant survival of adult females (Halstead, 1987; Payne, 1985). In the villages, herding was probably small scale and local, but the increase in cave sites in southern Greece during the Late and Final Neolithic suggests transhumance, although archaeozoological confirmation is still lacking. The presence of shed milk teeth shows that Franchthi was indeed used as a sheep pen (Payne, 1985).

We cannot evaluate the relative importance of animals and plants in the diet. In environments like Greece, "plant food usually provides the staple diet, with meat and milk products as an important but essentially secondary resource" (Payne, 1985, p. 234). In any case, we would emphasize that this environment, based on newly introduced species and new forms of exploitation, must be considered largely man-made, rather than natural. The success of the Greek Neolithic farmers, demonstrated by their neglect of wild resources, is all the more remarkable; it is further exemplified in their settlement patterns.

SETTLEMENT PATTERNS

Long-term, permanent villages are the most characteristic pattern of Neolithic Greece. Hundreds of closely spaced, compact villages are known from the rich basins of Thessaly and central Greece. Year-round occupation is demonstrated by the age of death of pigs (Halstead, 1984), and settlement permanence is indicated by the stratigraphies and range of dates.

Such stability, which is rare for Europe, must reflect the high productivity of the fields, probably helped by manure from the stock. Repeated rebuilding of the closely spaced houses resulted in the characteristic mounds, or *magules* (sing. *magula*). It is possible that the location of villages on good agricultural land inhibited horizontal expansion in favor of higher density and rebuilding on the same plots. This high intrasite density combined with the high density of settlements themselves created a heavily socialized environment; how conflicts were avoided in the long-term is a problem we must address.

Large "flat" villages, with widespread, separated houses and short-term occupation, as occur elsewhere in Europe, have been recognized only in Late Neolithic Macedonia (Kotsakis, 1993). They might be characteristic of more wooded environments, where rejuvenation of the forest and weeds precluded long-term use of the fields and, thus, long-term occupation of the villages.

In the hilly Peloponnese, occupation is sparser and villages more widely spread on the coastal plains and on the hillslopes. They seem to be smaller in scale, and hamlets or isolated farmsteads are also found. Caves were occupied, but we do not know whether seasonally or permanently.

These regional contrasts became progressively sharper during the Neolithic and shaped the transition to the Bronze Age, but different trajectories can be traced also from the Mesolithic to the Neolithic itself.

BACKGROUND: MESOLITHIC AND "PRECERAMIC" NEOLITHIC

The Neolithic in Greece: Indigenous or Exogenous?

Little is known of the Mesolithic substratum in Greece, dated at Franchthi from the mid-tenth to the late ninth millennium B.P. Only four sites have been published and two others have been recently discovered. (All other so-called Mesolithic sites may be discounted.) Sidari, Franchthi, Zaïmis, and Ulbrich (Perlès, 1990b, and references therein) are coastal sites in Attica or the Argolid, except for Sidari on Corfu. The scarcity of Mesolithic sites is not due to a lack of research. It is significant that there is no Mesolithic on top of the Upper Paleolithic sequences of Epirus or under the Neolithic sequences of Thessaly, and systematic surveys have been conducted in the Argolid, Boeotia, Epirus, Euboea, and Thessaly, some specifically for Mesolithic sites (Runnels, 1988). Since all excavated Mesolithic sites show a heavy reliance on mollusks, fish, and plants, Early Holocene Greece may have lacked the abundant large game that would have allowed dense human settlement (Perlès, in press). Provisional faunal data from Franchthi (Payne, 1975) show a striking decrease in large game in the Mesolithic, even for species widely hunted at the end of the Pleistocene.

The rarity of Mesolithic and frequency of Early Neolithic sites may in itself cast doubts on claims for an entirely local origin of the Neolithic (Theocharis, 1973; Dennell, 1983). In addition, the Early Neolithic shows a complete break in flaked stone (pressure-flaked blades and bladelets), celts, and grinding implements; the bone tools have no local antecedents and include Anatolian elements (the "belt hooks" from Argissa) (Perlès, 1988, 1989); similarly, the "ear-studs," "sling-bullets," and stone seals resemble Anatolian artifacts, although with some stylistic differences.

Settlement patterns are equally different in the Mesolithic and the Neolithic:

hills versus inner basins, and caves versus permanent villages. The earliest domesticated plants and animals are of Near Eastern origin, and even for the goat, barley, and lentils, no transitional forms are known which might indicate local domestication. It might be argued that a major shift in economics can transform all other aspects of a society, but the available data strongly suggest that the newly established villages were not of local origin. On Crete, where no earlier occupation is known (Broodbank and Strasser, 1991; Cherry, 1981; Cherry, 1990), the case for colonization is even stronger.

There were contacts between the Neolithic and the indigenous Mesolithic groups. At Franchthi, both traditions are represented in the lithics and fauna of the Initial Neolithic (Payne, 1975; Perlès, 1990b; Shackleton, 1988). At Sidari (Sordinas, 1969), we have observed that the lithics show continuity in techniques between the Mesolithic and the EN, while the ceramics of the earliest Neolithic level (C Base), which directly overlies the Mesolithic, are both technologically and stylistically different from those of the surrounding regions. Here, a local adoption of domesticates and pottery by Mesolithic groups with minimal external contacts seems probable.

The origins of the Neolithic groups of Thessaly cannot be traced precisely, but the clear differences from EN sites in Turkish Thrace (Özdoğan, 1989) and the absence of EN sites in Greek Thrace and Macedonia may argue in favor of an island-hopping route. Navigation had been known in Greece since the Late Pleistocene (Perlès, 1979, 1987) and is demonstrated in the EN all over the Mediterranean by the colonization of islands such as Crete, Cyprus, and Corsica (Cherry, 1981, 1990). However, the extensive alluviation may also have hidden Early Neolithic sites in northern Greece, especially if they were short-term occupations.

The Earliest Neolithic: A Preceramic Neolithic?

There are few dates for the earliest Neolithic (Phase 0) (Fig. 2), defined as those strata which underlie the first EN levels rich in ceramics. The "pre-ceramic" of Argissa has dates of 8130 B.P. \pm 100 years and 7990 B.P. \pm 95 years (UCLA-1657A and UCLA-1657D), which accords with the dates from Franchthi of 7930 B.P. \pm 100 years and 7900 B.P. \pm 90 years (P-2094 and P-1527) and a date from Level X in Knossos of 8050 B.P. \pm 180 years (BM-124). The status of this earliest phase is debated: Is it, as in Cyprus or Anatolia, a preceramic Neolithic?

The data come from a 50-m² excavation at Argissa (Milojčić *et al.*, 1962), other small soundings in Thessaly (Gediki, Soufli Magoula, Sesklo) (Theocharis, 1958), Level X of Knossos (Evans, 1964), and the Initial Neolithic of Franchthi (Perlès, 1990; Vitelli, 1993). The economy of this earliest Neolithic is clear: nearly all the domesticates known during the later Neolithic are present. Simi-

TRADITIONAL GREEK PHASING	Uncl. B.P.	Cal. B.C.	Central and southern Greece	Cyclades	Thessaly	Greek eastern Macedonia	Southern Albania	Eastern Serbia	Bulgarian Thracian	EAST-EUROPEAN CHRONOLOGY
EARLY BRONZE AGE	4 600	3 200	Early Helladic	Early Cycladic	Early Thessalian	Dik. Tech IIB Sinagroi V Dik. Tech IIIA Sinagroi IV	Maliq III	Bubanj Hum II Bubanj Hum Ib	Ezero B Karazovo VII Ezero A	MIDDLE CHALCOLITHIC OR EARLY BRONZE AGE
FINAL NEOLITHIC (Phase 5)	5 700	4 500	Aegina-Atica-Kephala	Aegina-Atica-Kephala	Rakhtmani	Kaeni ? Sinagroi IIB Sinagroi IIC	Maliq IIB Maliq IIA	Bubanj Hum Ia	Karazovo VI Kobademen	EARLY CHALCOLITHIC
LATE NEOLITHIC (Phase 4)	6 000	4 800	Genia, Corycian Cave	Basis of Zas Cave and Grotto, Salangos	Classical Dimini Orzaki Aga Sofia	Dik. Tech IIC (Galaxos) Dik. Tech IIB Sinagroi IIIA Dik. Tech. IIA	Maliq I - Kammik	Vinca C	Karazovo V - Marica	LATE NEOLITHIC
LATE NEOLITHIC (Phase 3)	6 500	5 300	Main-painted, Kinoussa, Eleusis	Salangos	Arapi Tsangli Larissa	Paradimi III Sinagroi II Dihali Tech I Sinagroi I Paradimi I	Cabran	Vinca B Vinca A	Karazovo IV - Kalojanovec Karazovo III (Vestitinoovo)	MIDDLE NEOLITHIC
MIDDLE NEOLITHIC (Phase 2)	7 000	5 800	Chersonese, Urficina	-	Zarko Sealdio I-III	?	Vasacmi-Podgorje	Saracovo	Karazovo II	EARLY NEOLITHIC
EARLY NEOLITHIC (Phase 1)	7.700	6.500	Rainbow ware Franchthi	-	Proto-Sealdio Frith-keramukun	-	-	-	Karazovo I	-
PRECERAMIC ? (Phase 0)	8,000	6,800	Franchthi ?	-	Argissa	-	-	-	-	-

Fig. 2. Synthetic chronological table of Greece and adjacent areas.

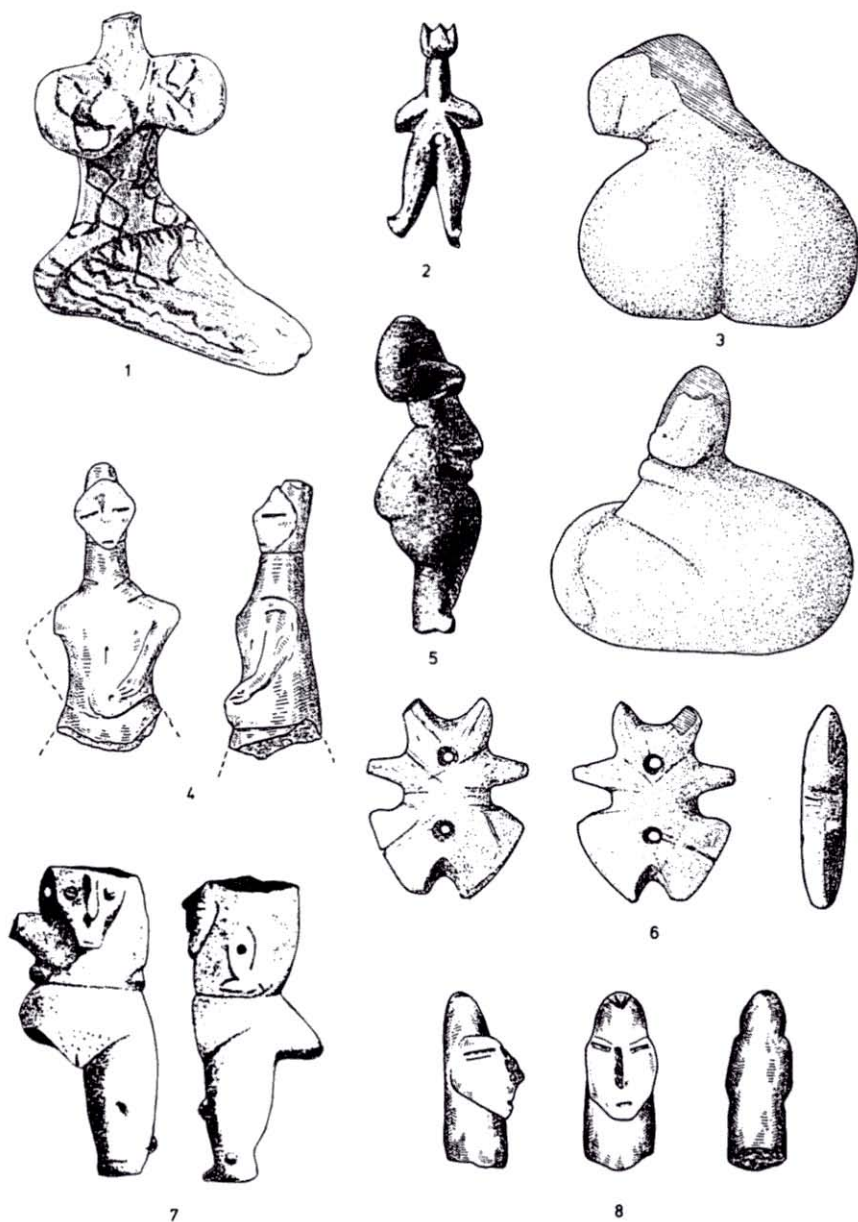


Fig. 3. Human figurines. (1) Franchthi, LN, clay (after Jacobsen, 1976); (2), (5) Sesklo (after Tsountas, 1908); (3), (6) Saliagos, LN, stone (after Evans and Renfrew, 1968); (4), (8) Achilleion, MN, clay (after Gimbutas *et al.*, 1989); (7) Tsani Magoula, MN, clay (after Wace and Thompson, 1912). Not to scale.

larly, "preceramic" assemblages are almost indistinguishable from the Early Neolithic (Phase 1): they include a rich and well-made bone industry, ground stone tools, and the characteristic pressure-flaked stone industry (Bloedow, 1991; Perlès, 1989). The earplugs, figurines, and slingshots reveal a knowledge of the firing of clay, which in itself does not preclude a prepottery Neolithic *sensu stricto*.

All these strata also contained a few, small potsherds, concentrated mostly at the top, just under the ceramic Early Neolithic, to which they are comparable. For Bloedow (1991), they indicate the introduction of an exogenous, fully ceramic Neolithic; for Theocharis (1973) they show the progressive development of a local ceramic tradition that was crude and rare at the beginning, whereas Vitelli (1993) suggests that pots may have present in the "aceramic" as rare and precious items. However, it remains possible that the sherds are actually intrusive; only new excavations can resolve this problem.

EARLY AND MIDDLE NEOLITHIC (PHASES 1 AND 2)

Most of the EN (or Phase 1) radiocarbon dates fall between 7800 and 7000 B.P. (with two dates over 8000 B.P.), while those of the MN (Phase 2) center around 7000–6500 B.P. All the data show continuous development from Phase 1 to Phase 2 and they are considered together.

Settlement Patterns

A striking element of the Early Neolithic is the sheer number of sites. Settlement patterns are best known in Thessaly, which has been intensively surveyed (French, 1972; Halstead, 1984; Gallis, 1989). In eastern Thessaly alone, nearly 120 EN sites are known, and as many for the MN (Phase 2); the mean distance between neighboring EN or MN sites is <5 km. A second striking element is settlement stability: up to 75% of the sites were occupied during both the EN and the MN.

Their topographical distribution is uneven. There was some clustering, especially in the drainages of major rivers, but early sites were not, as is commonly held, restricted to the alluvial plains. New surveys (Gallis, 1989) show that nearly half of the sites are in the Revenia hills, and some 5% are >500 m asl. They occur on different soil formations, which, in this area, seem not to have been crucial in settlement location. Water may have been more important, but the sites in the Revenia hills are problematical: Was water collected from cisterns, depressions, or even wells?

Halstead's computations of mean site sizes, based on French's data (French, 1972; Halstead, 1984, Tables 6.1 and 6.6) indicate that Neolithic sites would have generally been of a small size (<1 ha). Our own calculation, based on



Fig. 4. Pendants, ornaments, seals, ear studs, clay spoons. (1) Achilleion, MN, alabaster (after Gimbutas *et al.*, 1989); (2, 3, 8-10) Franchthi, MN, stone (after Jacobsen, 1976); (4) Saliagos, LN, green stone (after Evans and Renfrew, 1968); (5-7, 11-20) Sesklo, various periods and raw materials (after Tsountas, 1908). Not to scale.

Gallis's (1989) recent data and using only single-phase sites, suggests that this was a marked underestimate and that the surface area varied from 2 to 5.5 ha. The discrepancies between these estimates have not been explained, but in any case, the population could be up to 100–300 per village (Halstead, 1984; Jacobsen, 1981) or even more (Theocharis, 1973).

Most settlements were open. A surrounding wall is known only from the initial settlement at Nea Nicomedia, but it was quickly replaced by a deep, water-filled ditch (Rodden, 1965). Other ditches are known at Servia, Soufli, and Achilleion and may have served for drainage rather than defense (Jacobsen, 1981). A symbolic meaning is also possible, delimiting the inner village space when it was first built: the ditches date from the oldest phases of occupation and were soon filled up and built upon, so they were not vital for defense or other practical purposes. Each village comprised many closely spaced houses, but with no common walls and no bounded courtyards.

Outside Thessaly, settlement density is much lower. Less permanent sites with less conspicuous features, such as were recently found during the Nemea survey (Cherry *et al.*, 1988), may partly account for this and would indicate a different pattern of territorial exploitation. According to Runnels and van Andel (1987), it is possible that sites in southern Greece would have required permanent springs. Caves were not widely used, which may indicate that full pastoralism had not yet emerged (Cauvin, 1992). However, seasonal movement of flocks away from the main settlements has been suggested for the northeastern Peloponnese, where most MN sites lie on traditional transhumance roads (Jacobsen, 1984). Farther south, in the Cyclades, no Phase 1 or 2 sites are known (Cherry, 1990; Davis, 1992), despite surveys and the demonstrated use of resources from the islands (particularly Melian obsidian).

Architecture

House plans (mainly small and rectangular) were the same throughout Greece and the Balkans, but details of construction vary even within a site (Elia, 1982). Mudbricks are typical of the Near East and, in Europe, are restricted mostly to Greece; in contrast, wattle-and-daub was rare in the Near East but is characteristic of Europe and has been seen as a local invention (Treuil, 1983). Both techniques occur in Greece, sometimes in the same site, as at Sesklo. At nearby Otzaki and Magoulitsa, mudbricks were dominant, as they also seem to be in the Peloponnese (Guest-Papamanoli, 1978). Stone foundations were used where stone was accessible (Servia, Sesklo, and Lerna). Interestingly, the lack of standardization in Neolithic construction is echoed in present-day vernacular architecture in the same regions.

The general appearance of the houses (some of which had two or three rooms, like the Middle Neolithic "megaron" at Sesklo) is known from clay

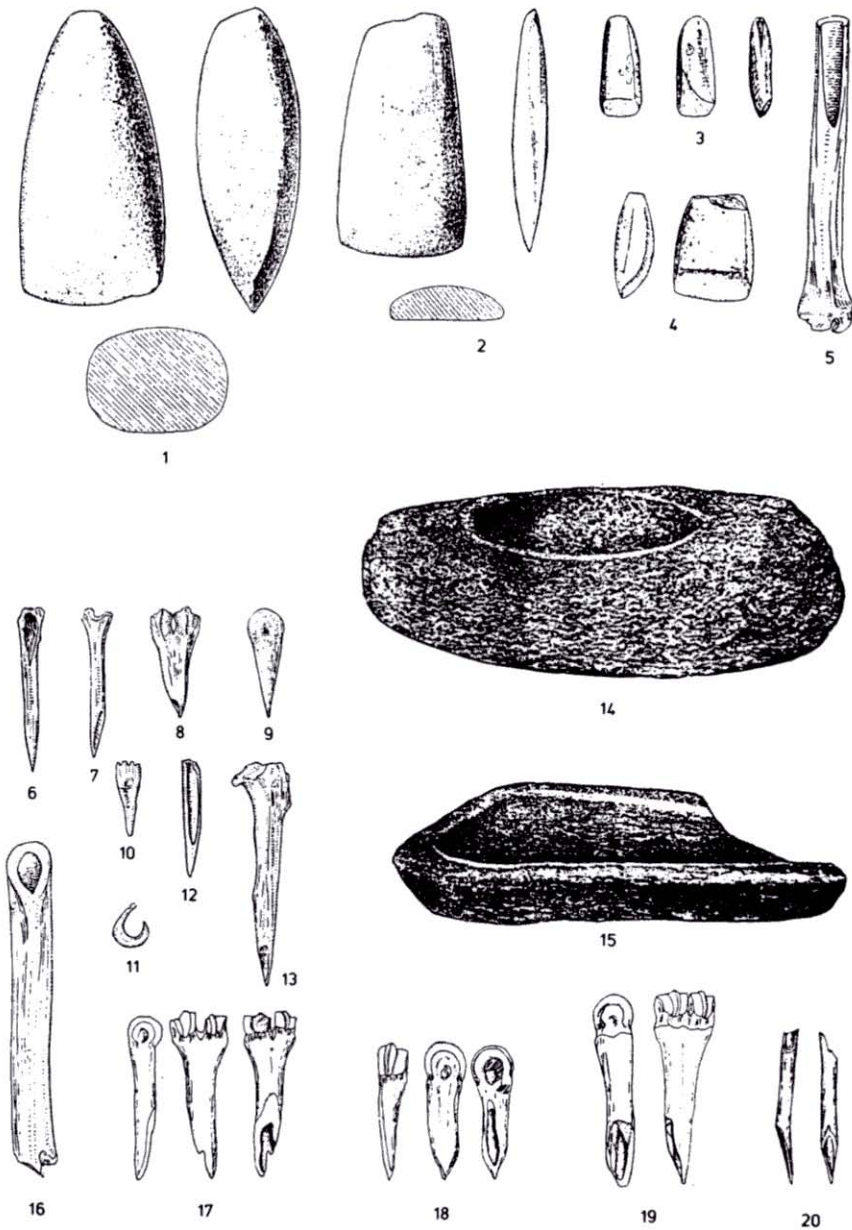


Fig. 5. Stone and bone implements. (1, 2, 14, 15) Sesklo (after Tsountas, 1908); (3, 4) Achilleion, MN (after Gimbutas *et al.*, 1989); (6-9, 11, 16) Franchthi, EN; (5, 10, 12, 13) Franchthi, MN (after Jacobsen, 1976); (17-20) Saliagos, LN (after Evans and Renfrew, 1968).

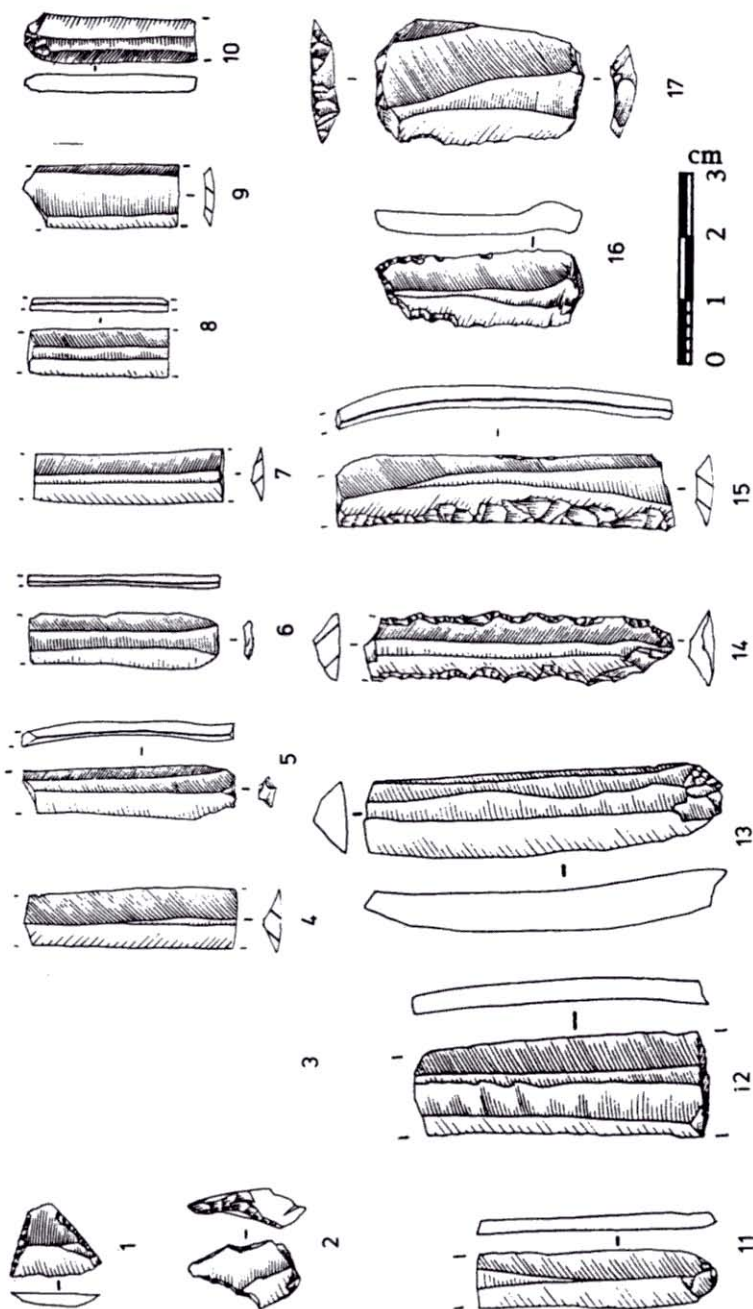


Fig. 6. Chipped stone tools. (1) Franchthi, EN, jasper; (2) Franchthi, EN, flint; (10) Franchthi, LN, obsidian; (18-20) Franchthi, EN, honey-flint; (22) Franchthi, MN, honey-flint; (23) Franchthi, LN, flint; (24) Franchthi, FN, jasper; (26) Franchthi, MN, honey-flint; (11), (13) Argissa, "preceramic Neolithic," obsidian; (12) Argissa, "preceramic Neolithic," honey-flint; (3-9) Tharounia, LN/FN, obsidian; (14), (15) Tharounia, LN/FN, obsidian; (17) Tharounia, LN/FN, jasper; (21) Tharounia, LN/FN, obsidian; (25) Tharounia, LN/FN, obsidian.

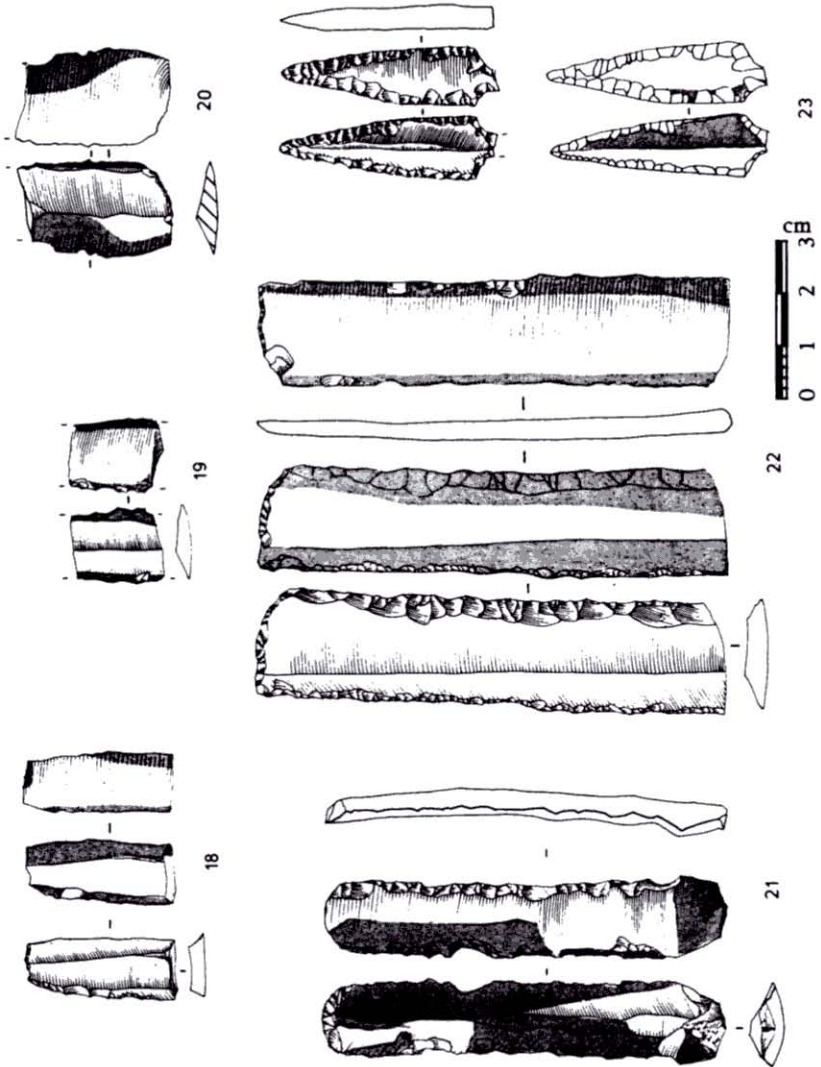


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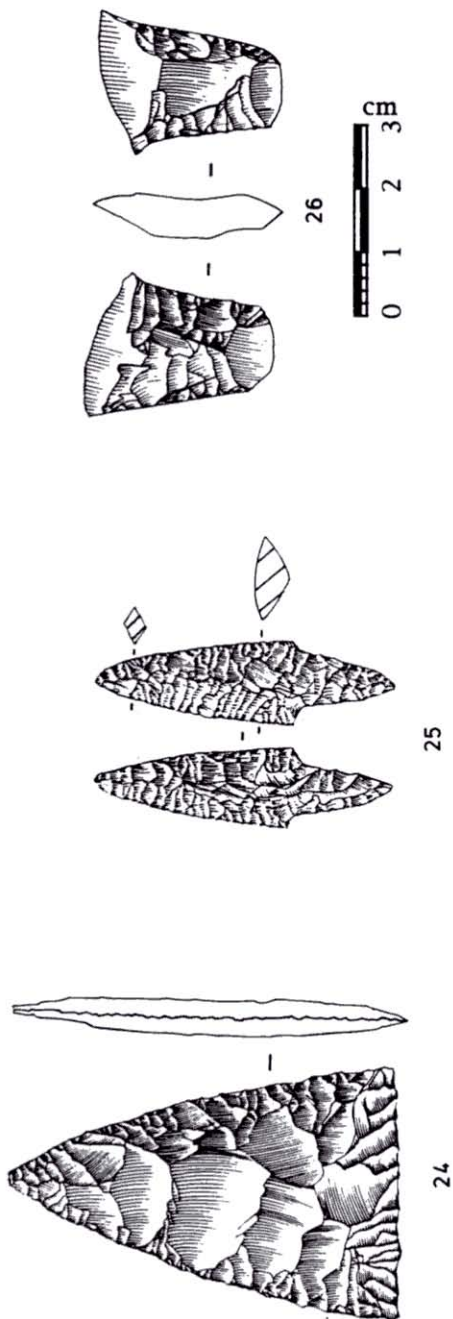


Fig. 6. Continued.

models, which show double-pitched painted roofs and several openings (doors or windows) (Theocharis, 1973, Figs. 192, 193, 255). At Prodomos, the remains of what was probably the roof of a building (Phase 1) include squared beams assembled with wooden pegs (Hourmouziadis, 1971).

At Servia, the walls of an early Phase 2 house, measuring 5.7×5.2 m, consisted of a framework of small wooden posts reinforced at intervals by large timber posts and plastered with mud. The wooden floor was still discernible and seems to have consisted of planks rather than logs (Rhomiopoulou and Ridley, 1973; Ridley and Wardle, 1979). Slightly later at the same site, there are indications of two-story houses. Two stories are also suggested by the "Tsangli-type" MN house plan, known from Tsangli, Otzaki, and Lerna, where internal buttresses may have supported an upper story (Treuil, 1983). The earthen floors were rebuilt regularly. At Elateia, a wattle-and-daub house supported by regularly spaced wooden posts had four successive floors. Two large hollow stones have been interpreted as door pivots (Weinberg, 1962), but they are located curiously near the hearth.

Internal features and cooking structures are remarkably varied [see MN Achilleion and Servia for examples: Ridley and Wardle (1979); Gimbutas *et al.* (1989)]. Patches of pebble flooring, pits of unbaked clay, pebble-lined plastered hearths, raised platform hearths, and complex, oven-like hearths occur inside the houses and in the courtyards. So-called ovens are rare. At Nea Nicomedia, they were roughly cylindrical, set in a basin and opened at the top (Rodden, 1962). They were probably used for cooking, but the oven in the "Potter's room" at Sesklo raises the possibility of ceramic kilns (Theocharis, 1973).

Domestic Equipment

The domestic equipment is typically Neolithic in its diversity and the presence of cumbersome implements. The use of mats is demonstrated by impressions on sherds from Servia (Carington Smith, 1977) and a twined-weave mat impression from Nea Nicomedia (Rodden, 1964). Weaving is suggested by rare, clay spindle whorls. Small disks shaped from sherds and sometimes pierced are more common, but their use is unknown. Also of unknown purpose are the clay or stone "sling-bullets," which are reminiscent of Near Eastern artifacts. Although their name refers to weapons, they are often unbaked and their distribution (often in clusters of up to thirty near indoor hearths) recalls that of later loom-weights. Clay spoons or ladles, stone pestles, pounders, palettes, grinders, and querns complete the domestic equipment. Bone tools are varied and numerous: they include awls, often made on the distal ends of ovicaprid metapodials, pins, spatulae, burnishers, and hooks (Moundrea-Agrafioti, 1980, 1981).

Polished stone tools (axes, celts, chisels) were made of serpentine, jadeite,



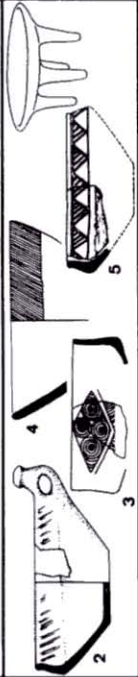

Phases	Main shapes and designs	Main techniques of ornamentation
5		<ul style="list-style-type: none"> - graphite painted ware (12) - painted black-on-red (10) - incised - rolled rim - channel decoration (11)
4		<ul style="list-style-type: none"> - graphite painted ware (8) - painted black-on-red (9) - incised (7)
3		<ul style="list-style-type: none"> - paint. brown-on-brown Akropotamos (3) - black burnished - black-topped (4) - incised (5) - channel decoration (2)
2		<ul style="list-style-type: none"> - painted white-on-red ? (Kitrini Limni, Tumba-Serrai) - painted red-on-white (1)
1	?	?

Fig. 7. Typochronology of Neolithic ceramics in Macedonia and Thrace. (1) Nea Nicomedia; (2, 5, 6) Paradimi; (3) Mitopotamos; (4, 7, 9-12) Sitagroi; (8, 9) Dikili Tach. Not to scale.

hematite, or igneous rocks but not flint. Consequently, they were not flaked before polishing, but were ground or cut to shape. Several types can be defined (Diamant, in press; Moundrea-Agrafioti, 1981; Moundrea and Gnardellis, 1991), but they seem to have little chronological significance.

Ceramic Production

Phases 1 and 2 are fascinating periods when the main aspects of ceramic technology were being explored. Although our data come from only a few sites in the Peloponnese (Vitelli, 1974, 1984a, b, 1988, 1989, 1993) and Thessaly (Gardner, 1978; Kotsakis, 1983; Wijnen, 1981), plus some archaeometric analyses (Jones, 1986; Maniatis and Tite, 1981; Maniatis and Perdikatsis, 1983; Maniatis *et al.*, 1988; Schneider *et al.*, 1991), the results are sufficiently consistent for preliminary generalizations.

During the Early Neolithic, both the shapes (mostly convex bowls with rounded bases) and the small size of the vessels were within the range of the simplest ceramic manufacture (Roux, 1990). At Franchthi and Sesklo, first the base was molded, and then walls were built with coils (Vitelli, 1984b, 1993) or slabs (Wijnen, in press). The pots were slipped, sometimes painted with iron oxide pigments, and carefully burnished (Vitelli, 1984b, 1993).

Firing was at low temperatures (<650°C) in an oxidizing atmosphere with the pots in direct contact with the fuel (Vitelli, 1991; Maniatis and Tite, 1981). In the thousands of sherds at Franchthi, Vitelli found no evidence for stacking and firing more than one pot at a time, which accords with estimates of a very low annual rate of production—of the order of 10–13 pots. Each potter thus would have made pots at long intervals and lacked regular practice, as is reflected in the frequent irregularities of the pots (Vitelli, 1989).

What was the function of these earliest pots? Nothing at Franchthi or in Thessaly indicates their use for cooking. The near-absence of truly coarse-grained fabric, the added ring bases, the lack of soot deposits, and the well-preserved burnishing gloss all show that the pots were not repeatedly placed in fires (Björk, in preparation; Vitelli, 1989, 1991). This, in turn, may explain the remarkable variety in Greek Neolithic villages of hearths, ovens, fire-pits, and other features which were probably related to the cooking of food. Storage is no better an explanation: the rarity of vessels and their small size would not allow the storage of grain for even one family over the year (Vitelli, 1989).

Phase 1 ceramics are fairly homogeneous throughout Greece (Figs. 8–10). The existence of an early, undecorated stage in Thessaly (the *Frühkeramik* of Milošević at Argissa) is still a matter of debate, but decoration does remain scarce. It consists mainly of geometric motifs painted in red or brown on a light background (proto-Sesklo ceramics). Such motifs are well-known in Thessaly (Sesklo, Prodromos, Otzaki), Boeotia (Elateia), and the south (Franchthi), which





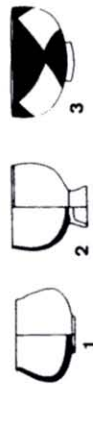
Phases	Main shapes and designs	Main techniques of ornamentation
5		<ul style="list-style-type: none"> - painted "crusted" (18, 19)
4		<ul style="list-style-type: none"> - painted white-on-red "Agia Sofia" - painted black-on-red "Otzaki" (15) - painted brown-on-cream "Dimini" (17) - incised (14)
3		<ul style="list-style-type: none"> - black burnished "Larissa" (10) - channel decoration - "matt-painted" brown-on-brown - painted black-on-red (13) - grey-on-grey (5) - polychrome
2		<ul style="list-style-type: none"> - painted red-on-white "Sesklo" (6, 7) - painted white-on-red - scraped ware (8, 9) - impressed (4) - grey-on-grey (5)
1		<ul style="list-style-type: none"> - monochrome (1, 2) - painted "proto-sesklo" (3) - impressed (4)

Fig. 8. Typochronology of the Thessalian Neolithic ceramics. (1-3, 6-8, 13, 15) Otzaki; (5) Plateia Magoula Zarkou; (10, 12) Arapi; (14) Dimini; (17) Sesklo; (18, 19) Rachmani. Not to scale.


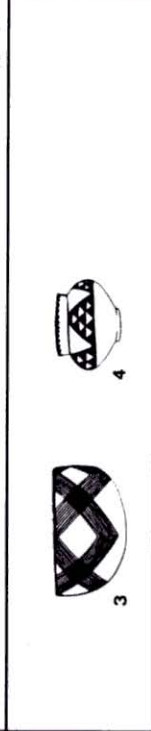
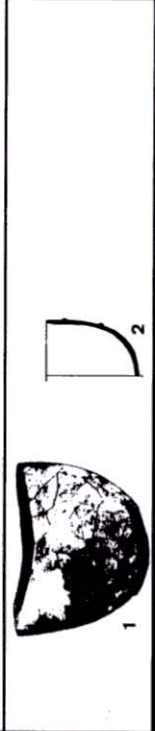
Phases	Main shapes and designs	Main techniques of ornamentation
5		<ul style="list-style-type: none"> - painted "crusted" - pattern-burnished - plastic decoration - rolled rim
4		- painted polychrome ?
3		<ul style="list-style-type: none"> - black burnished "Larissa" (5) - "matt-painted" brown-on-brown (6) - painted black-on-red (8) - polychrome (7)
2		- painted red-on-white "Cheronea" (3, 4)
1		- monochrome (1, 2)

Fig. 9. Typochronology of the Neolithic ceramics in Central Greece. (1, 3, 4) Chaeroneia; (2, 5, 8) Elateia; (6) Kitosos Cave; (7) Antre Corycien. Not to scale.






Phases	Main shapes and designs	Main techniques of ornamentation
5		<ul style="list-style-type: none"> - painted "crusted" (9) - pattern-burnished (7) - plastic decoration (10) - rolled rim (8)
4		<ul style="list-style-type: none"> - painted polychrome "Gonia" (6)
3		<ul style="list-style-type: none"> - black burnished (4) - "matt-painted" brown-on-brown (5)
2		<ul style="list-style-type: none"> - monochrome "Urfirnis" (2) - painted "Urfirnis" (3)
1		<ul style="list-style-type: none"> - monochrome (1) - "rainbow" ware

Fig. 10. Typochronology of the Neolithic ceramics in Southern Greece. (1, 2, 4, 5) Franchthi Cave; (3) Lerna; (6) Prosymna; (7-10) Agios Dimitrios. Not to scale.

suggests open networks of relations, extending all over Greece without sharp stylistic or cultural boundaries. Some impressed wares are also present in north-eastern Greece, usually in small frequencies. In contrast, impressed wares predominate in northwestern Greece, but their exact chronological position is difficult to establish.

During Phase 2, there were striking developments and innovations in the ceramics. For the first time, different fabrics were used for specific wares (Vitelli, 1989). Large vessels and vessels of very difficult shapes could now be built: sharply carinated vessels, pyriform vases, pedestalled basins, collared jars, etc. (Figs. 8–10). Firing temperatures above 800°C were consistently attained (Maniatis and Tite, 1981; Vitelli, 1991) and firing circles show that multiple pots were being fired at once (Vitelli, 1993). Varied surface treatments (painting, scraping, incisions) permitted great diversity in decoration, which was common and covered most of the vessel.

The rich and varied painted decoration also shows differentiation into several regional styles. Monochrome, patterned-painted, and patterned-burnished Urfinis wares, relying exclusively on the use of iron-oxide pigments, are characteristic of the Peloponnese (Cullen, 1985a, 1985b; Vitelli, 1974, 1993). In Thessaly, the Sesklo pottery usually has brown-red geometric patterns on a white/cream background (Kotsakis, 1983; Mottier, 1981). In Boeotia, both painted and unpainted backgrounds were used (Weinberg, 1962). In western Macedonia, Nea Nicomedia has a range of decorations involving brown-red motifs on a light slip (Washburn, 1984); this and the complexity of the patterns suggest to us that it might belong to our Phase 2 rather than to Phase 1, as early radiocarbon dates seemed to indicate.

The factors underlying such variability are complex: some relate to function, others to regional preferences, and others to the socioeconomic context of production and use. Function appears to be involved in the new dichotomy between fine wares (lightly tempered, relatively hard-fired, with well-finished surfaces) and the first coarse wares (with numerous, large nonplastics, a lower firing temperature, and more coarsely finished surfaces). Only the latter show evidence of having been used repeatedly on fires, presumably as cooking vessels (Vitelli, 1989, 1991), but curiously, they remain uncommon: 5–10% of the total.

The socioeconomic context can be seen in several respects. The very high standards achieved in ceramic production have led both Vitelli (1991) and Wijnen [(in press) for the Sesklo A1 ware] to view it as no longer simple domestic production: it required the skills and regular practice typical of a few specialized potters within the group (most probably part-time). Rather than concentrating on standard, utilitarian production, the potters seem to have aimed at high-risk vessels, probably intended for highly visible social or symbolic roles (Vitelli, 1991).

Although production was mostly local, there is some evidence for the circulation of pots. X-ray fluorescence analyses of Xesti sherds from Thessaly have shown a substantial amount of local circulation of this ware (Schneider *et al.*, 1991). Its uneven distribution in various Thessalian sequences therefore testifies to the variable degrees of interaction between communities, rather than being a simple chronological indicator.

Interaction between groups can also be addressed through stylistic analysis. In southern Greece, analysis of the patterned Urfinis suggests two main interaction networks, which did not correlate precisely with absolute distances between sites: Franchthi, Corinth, and Lerna, on the one hand; and Lerna, Asea, and Ayoriytika, on the other hand (Cullen, 1985a, b). Such networks may in part have related to alliances between nonendogamous rural communities and to the avoidance of conflict in more densely settled areas. The increasing distinctiveness of regional styles in ceramics might, therefore, be linked with their increasing role in local and regional social systems, rather than with the emergence of cultural frontiers (Perlès, 1992).

Stone Tool Production

The flaked stone tools of Phase 1 (EN) and, to some extent, of Phase 2 (MN) have often been described as simple. However, this typological simplicity rests upon complex strategies of raw material exploitation and sophisticated methods of production. From the earliest EN, different raw materials were worked by different techniques to produce specific classes of tools. In general, there was a predominant use of nonlocal raw materials, often obtained from considerable distances: obsidian from Melos, pressure-flaked into fine blades and bladelets; fine-grained cherts, in smaller quantities and worked in the same way for the same kind of products; large, regular blades of honey flints, introduced as blanks and used predominantly for plant processing; and jasper blades produced by indirect percussion, and also used on plants (Moundrea-Agrafioti, 1981, 1983; Perlès, 1990; Perlès and Vaughan, 1983). Local raw materials (lower-quality cherts and jaspers) are usually less common and the flaking-techniques much simpler: unstandardized flakes produced by direct percussion, often with a hard hammer.

The high-quality blades required little retouching. Phase 1 assemblages consist mainly of unretouched obsidian blades/bladelets, and flint and jasper blades with sickle-gloss covering lateral retouch of variable extent (Moundrea-Agrafioti, 1980, 1981; Perlès and Vaughan, 1983). Rare large trapezes on pressure-flaked blades are the only type that might be considered armatures (arrowheads). Endscrapers are rare and burins are absent. The quantity of borers, drills, and points varies greatly between sites; at Franchthi, during the second part of

Phase 1, thousands of small borers and points were manufactured on a particular local chert and are clearly related to the production of cockleshell beads.

Tool-kits from Phase 2 had more retouching (Elster, 1989; Moundrea-Agrafioti, 1981, 1992; Perlès and Vaughan, 1983). The sickle blades (sometimes also of obsidian) underwent several cycles of use and rejuvenation, sometimes ending with very extensive bilateral gloss and blunt edges. Obsidian blades also were more frequently retouched, but with a more marginal retouch. Armatures were represented by bifacial, transverse arrowheads, which, by the end of Phase 2, graded into asymmetrical points with a lateral notch.

Unlike ceramics, the lithics show no regional variability. This raises the problem of who obtained the exotic raw materials and who made the tools. Although Torrence (1986) concluded in favor of direct procurement for later periods (and a more restricted geographic area), we have argued elsewhere that direct procurement seems unlikely in the EN and MN (Perlès, 1990): the small absolute quantity of obsidian in each site is not compatible with land and sea trips of several hundreds of kilometers or with the specialized knowledge of boat construction and seafaring. It is even more unlikely if one considers that the imported blades of jasper and honey flint came from totally different sources (probably from the west or the northwest). Since there is no indication of down-the-line trade, the most plausible hypothesis is that of particular groups specializing in the acquisition of obsidian and its distribution throughout Greece as preformed or partially flaked cores (Perlès, 1990). Production must also have been technically specialized: pressure-flaking is a difficult technique, which requires a long apprenticeship and regular practice. The low overall rate of production would not have allowed each hypothetical knapper in a village to keep his hand in, yet study of thousands of blades shows a rate of error that was almost nil.

Specialized Production and Exchange

Other stone tools also indicate specialized procurement and production (that is, done only by particular groups and distributed to others). For example, millstones had to be brought into the alluvial basins. In southern Greece, the andesite of the Saronic Gulf was distributed > 100 km from the quarries, although in small quantities (Runnels, 1981, 1985). The abundant polished celts and chisels were often made of nonlocal materials, of which the origins and patterns of circulation are yet to be studied.

The EN long-distance trade in lithics contrasts with its near-absence in ceramics. Even in the MN, ceramic exchange was limited, and the well-defined stylistic interaction spheres contrast with the absence of stylistic differentiation in the flaked stone. The circulation of ornaments and of prestige items, such as stone seals or vases, is different again. Their range seems to have been as large

as those of flint and obsidian, but they circulated in much smaller quantities and are not present in every site. There are thus three different systems in the MN.

- (1) *Flaked, polished, or ground stone tools*: Utilitarian goods; no discernible voluntary stylistic imprint and one "style" throughout Greece; much material circulated over a very large area; procurement and probably production restricted to a few, part-time, specialized groups.
- (2) *Ceramics*: Not strictly or not only utilitarian; highly visible deliberate stylistic imprint and clear regional stylistic boundaries; little material circulated within a restricted range; local procurement of raw material and manufacture.
- (3) *Stone Seals and Vases, Stone and Shell Ornaments*. Symbolic or prestige items; no stylistic distinctions documented, but raw material distinctively exotic in itself; very little material circulated over very long distances.

These differences have important implications, and it is unlikely that they reflect a single exchange system, with the same mode and purpose (Perlès, 1992). The stone tools seems to reflect a socially neutral, economic exchange system, free of symbolic connotations; it was probably done by specialized groups who used their free time for the distribution of their manufactured goods. The circulation of ceramics, on the other hand, seems to relate to social alliances between closely related communities and individuals: all villages produced pottery and its circulation did not answer an immediate economic need. Finally, items such as stone and shell ornaments or vases show the typical distribution of very rare prestige items. All of this implies more complex relations between Neolithic communities than is usually supposed. However, complex is not the same as hierarchical, and data on social differentiation during Phase 2 are extremely limited. Two kinds of evidence must be considered: settlements patterns at Sesklo and funerary rituals.

Social Aspects: The Case of Sesklo

MN Sesklo is spread over and below the acropolis, with different settlement patterns in the two areas: on the acropolis, there was continuous occupation with free-standing houses, while below, areas of settlement shifted through time and houses were often contiguous (Kotsakis, in press; Theocharis, 1973). During the last subphase of the Middle Neolithic (MNIIIb), the distribution of painted pottery is markedly unequal between the two parts of the site, in terms of both quantity and quality (Kotsakis, 1981, 1983, 1986; Maniatis and Perdikatsis, 1983). To Kotsakis, this indicates controlled access to better-quality sources, special production techniques, and social differentiation between the inhabitants of the two areas (Kotsakis, 1981, in press; Maniatis *et al.*, 1988).

However, the samples are small and all the sherds from Sesklo B (the lower settlement) came from one house only.

Funerary Rituals and Ideology

The general pattern follows that of the Balkans: there are no separate cemeteries or monumental structures outside the village. Funerary rituals seem to have occurred within the context of the family and were not yet a means of integrating the whole community. Treatment of the dead in Phases 1 and 2 was very diverse, but as noted by Jacobsen and Cullen (1981), there seems generally to be no emphasis on the visibility of the dead, little indication of elaborate rituals, and no indication of social inequality.

Primary burial of the tightly flexed body in a shallow pit outside or under the house may have been the most common (Hourmouziadis, 1973). At Franchthi, most primary burials [redated in the cave to the early MN rather than to the EN by Vitelli (1993)] are of infants. With few exceptions, grave goods are limited and unremarkable (Jacobsen and Cullen, 1981). An EN or early MN infant burial was also found at Agios Petros (with a second one less securely dated) (Efstratiou, 1985). Multiple primary burials are rare and seem to involve mostly women with children [Nea Nicomedia (Rodden, 1962)] or children [Lerna (Caskey, 1957)].

The secondary burials uncovered so far are of adults. At Prodomos, there were two or three successive deposits of disarticulated bones (mainly skulls and long bones) beneath a house floor (Hourmouziadis, 1971). An isolated adult jaw was found at Agios Petros (Efstratiou, 1985). At Franchthi, what were initially considered as secondary burials grade into "bone scatters," which are just a few bones of one individual (Jacobsen and Cullen, 1981). Collins Cook and Cullen, currently working on these human bones, now wonder whether they do not simply represent disturbed primary burials. However, both secondary burials (individuals brought into the site?) and "bone scatters" (individuals taken out of the site?) are known in Greece during this period. If primary and secondary burials do indeed occur in the same site, they might not represent different traditions; rather, they may have been used for individuals of different status, such as children versus adults, as initially suggested by Jacobsen and Cullen (1981).

Cremation was also practiced. At Soufli Magoula, 11 EN cremations were found in pits, associated with small pots (Gallis, 1975, 1982). They may be compared with finds from the small cave of Prosymna, where several shallow pits contained charcoal and fragmentary burned human bones (Blegen, 1937).

In northern Greece, as in the Balkans and the Near East, figurines are very abundant during Phases 1 and 2 (Gallis and Orphanidi, 1991; Gimbutas, 1982; Hourmouziadis, 1974; Marangou, 1990). Ceramic female figurines with well-

marked sexual characteristics are the most common, some free-standing and others seated on chairs. They vary in technique and style (Gallis and Orphanidou-Georgiadou, *in press*); in some types, specific details, such as "coffee-bean" eyes, recall the Near East. More stylized (and rarer) figurines were made of marble and other hard stones. Another rare type is the pegged figurines found at Servia and Nea Nicomedia (Phelps, 1987). The domestic (but usually imprecise) context of discovery of the figurines does not help us to understand their meaning or function. The fact that legs were frequently found in isolation in Peloponnesian sites led Talalay (1987, 1993) and Phelps (1987) to suggest that they were intentionally broken off: according to Talalay, they might have been symbolic tokens of alliance between individuals or communities. However, this could be no more than a regional phenomenon: in Thessaly, where figurines are far more numerous than in the Peloponnese, they are stylistically different and the pattern of split legs is less frequent.

Similarly, nothing is known of the role of the various animal figurines [cattle, birds, dogs, etc. (Toufexis, *in press*)] or of the anthropomorphic vases (often quite striking) and other clay objects, like house models, which are often found inside houses. It can be argued in circular fashion either that the houses were in fact shrines or temples (Gimbutas, 1989) or that the figurines had no ritual connotations. All that can be said in favor of a ritual interpretation of the figurines is that it accords with the mostly domestic nature of ritual evidence at this time.

There is one exception to the last statement. At Nea Nicomedia, in an unusually large central building divided into three parts by parallel rows of heavy timbers, five female figurines were found together with "two outsize greenstone axes, two large caches [of hundreds] of unused flint blades, two very unusual gourd-shaped pottery vessels and several hundred clay 'roundels' of unknown function" (Rodden, 1964, p. 114). Considering the special nature of the finds, this provides a rare hint of a communal rather than domestic ritual locus. On the other hand, its location within the village may confirm that, in long-lasting settlements, the ideological focus was the village group rather than a larger community (Chapman, 1989).

THE LATE NEOLITHIC (PHASES 3 AND 4)

The following two millennia, ca. 6500–4600 B.P., are often squeezed together under the heading Late Neolithic. In recent schemes (Coleman, 1987; Sampson, 1989; Zachos, 1987), the LN has been divided into two, with LNII corresponding to the Final Neolithic or Chalcolithic of Diamant (1974), Phelps (1975), and Renfrew (1972). Even so, the LNI still covers nearly a millennium, and we therefore divide it further into Phases 3 and 4.

Chronocultural Problems: Cultural Breaks or Continuity?

Phase 3 is dated to about 6500–6100 B.P. The “destruction levels” (at Serbia and Sesklo, for example), shifts in settlements and the spread of a sharply carinated, black, burnished ware (initially thought to imitate metal vases) led to the hypothesis of migrations from Anatolia to the Balkans at the beginning of this phase (Milojcic, 1949, 1960). However, the stylistic break is not really very sharp: carinated vessels and black burnished pottery occur in the MN, painted wares do not disappear, and a local transition is observable at Kazanlak in Bulgarian Thrace and Plateia Magoula Zarkou in Thessaly (Demoule *et al.*, 1988). At the latter site, an interphase, called Zarko, is characterized by a destandardization of traditional techniques and the exploration of new ones, as though the previous stylistic template had been disorganized and a new one was being slowly and rather haphazardly established. Nevertheless, here, as elsewhere, the many new decorative styles make a striking change at the beginning of the LN.

Even though the various stylistic changes may have resulted from local processes, the widespread black burnished ware and the brown-on-brown “matt-painted” ware (Weinberg, 1970) remain useful chronological indicators and can provide a broad basis for the definition of Phase 3. With few radiocarbon dates and few published sequences outside Thessaly, they help to clarify relations between the numerous groups which have otherwise idiosyncratic styles: Paradimi, Sitagroi I-II, Vasilika, LN Serbia, early Dimini (Larissa, Tsangli, and Arapi phases), the “matt-painted” of the Peloponnese, Saliagos, etc. (Fig. 2). However, in the South, if we may judge from Franchthi, the local matt-painted ceramics appear later in Phase 3 than the black-burnished pottery (Vitelli, 1993, Tables 4–11).

Phase 4, the later LN, is clearly identified in northern Greece. It corresponds to the group of Dikili Tach in central Macedonia and to the recent (or “Classical”) Dimini in Thessaly. In contrast with Phase 3, it is characterized by very large cultural regions and much fewer local styles; it reflects increasing stylistic (and probably socioeconomic) spheres of interaction. Thus, northeastern Greece is linked to the graphite-painted facies of Bulgaria, central Macedonia is related to the Vinca province, and the Thessalian Classical Dimini extends to Albania. Converging stratigraphic and typological evidence, together with reciprocal imports, allows firm correlations between those groups, which are clearly dated between Phase 3 and Phase 5, i.e.: between 6100 and 5700 B.P.

The situation is far less clear in central and southern Greece, but here also, there certainly exists a Phase 4 distinct from Phase 3. First, there are clear parallels between northern and southern Greece during Phase 3 (in the black-burnished and matt-painted ceramics) and during Phase 5 (see below). Second, in southern Greece there are groups of ceramics, decorated with polychrome

meanders, which are never associated with either Phase 3 or Phase 5 material; this is the case at Gonia, Prosymna, and probably Corycian Cave. In terms of lithics, there is also a break at the end of the early LN and before the FN in the Franchthi sequence. In western Greece, the painted ceramics from Agios Nikolaos also probably belong in Phase 4, which would confirm new relations between eastern and western Greece.

The Saliagos group, known on several of the Cycladic islands from Keos to Amorgos, is striking in its originality (it was the only one that used matt white-on-red paint) and lasted a long time. At Saliagos, the oldest radiocarbon dates and presumably imported matt-painted sherds show that occupation started in Phase 3; it continued (although with periods of abandonment) into Phase 4 and perhaps even Phase 5 (cf. Phase III at Saliagos, which is characterized by an obsidian blade industry and the absence of painted wares). Ongoing excavations at Grotta and Zas Cave on Naxos also seem to show a gradual transition from Phase 4 to Phase 5 (Hatjianastasiou, 1988; Zachos, 1990).

New Settlement Patterns

Phase 3 was a period of territorial expansion when central and eastern Macedonia, Thrace, and some small Aegean islands were settled. Surveys in central Macedonia have discovered huge, but inconspicuous, flat sites, up to 50 or even 100 ha in area (Andreou and Kotsakis, 1986; Kotsakis, in press). Excavations at Vassilika, Thermi, and Arethoussa show an extensive, shifting pattern of occupation with important hiatuses at each site. This striking difference from the more permanent tell-like villages has been explained by different economic practices, including fallowing and nomadic pastoralism (Kotsakis, in press).

Significant changes are also observable in Thessaly: the number of sites increased by ca. 20% but two-thirds of the earlier sites were abandoned (especially in the hills) and half the sites are new settlements. Renewed erosion, considered anthropogenic, is shown by the accumulation of the Girtoni Formation (Demitrack, 1986; van Andel *et al.*, 1990) and by alluviation in the now-buried Dimini Bay (Zangger, 1991); this may explain the shift of settlement from the hills to the alluvial plain, where new villages were established among the older ones (Demoule *et al.*, 1988; Gallis, 1989; Halstead, 1984). The spatial distribution of sites became more regular and may indicate greater pressure on land, as may also the establishment of many small hamlets and farmsteads in the more poorly watered southern Larissa plain (Halstead, 1989a).

In southern Greece, the changes were different but equally marked. During Phase 3, some older villages were abandoned, while cave occupation increased and the overall number of sites may have changed little (Diamant, 1974; Phelps, 1975, 1981–1982). For the first time, smaller Aegean islands, like Paros, Saliagos, Naxos, Samos, and Rhodes, began to be settled (although the exact

relative and absolute chronology remains uncertain) (Cherry, 1981, 1990; Davis, 1992; Sampson, 1987).

During Phase 4, the various parts of Greece continued to show different patterns of development. In Thessaly, there were many fewer new sites (Gallis, 1989; Halstead, 1984, 1989a); according to Halstead (1984), many of the small hamlets recently created were abandoned, with a concentration of the population into fewer settlements. The main settlements of Boeotia were abandoned, and surveys have not revealed any new sites relating to either Phase 3 or 4 (Bintliff and Snodgrass, 1985). In the southern Argolid, four apparently late LN sites were discovered during recent surveys (Runnels and van Andel, 1987), but none in the Berbati-Limnes region (Wells *et al.*, 1990). In the islands, on the other hand, there may be an increase in small sites which might represent seasonal occupations (Cherry, 1981, 1990; Sampson, 1987). However, in the absence of a firm chronological framework, their attribution to the LN is not certain, and many may well actually date to Phase 5 (Cherry, 1990; Davis, 1992).

The Economic Basis

The contrasts in settlement patterns are echoed by the first regional differences in economy. The new settlement patterns in southern Greece suggest a greater emphasis on animals and transhumant or nomadic pastoralism. The limited lowland pastures in the region could not support large herds during the summer drought, and the mountains would be inhospitable in winter. Here, as in the Near East, mobile pastoralism may have developed as an adjunct to a sedentary economy (Cauvin, 1992). van Andel and Runnels (1987) suggest a connection to the development of wool production and an increasing demand for sheep, although, for example, at Kitsos, which could have been considered a pastoral site, the dominant species is goat (the abundance of hare is also noteworthy; Jullien, 1981).

In Thessaly, a more balanced representation of goats, pigs, and cattle relative to sheep has been claimed for Phases 3 and 4 (Halstead, 1981, 1989a). In fact, examination of the faunal data (Boessneck, 1955; Halstead, 1984; von den Driesch and Enderle, 1966) suggests an increase in pigs and a decrease in ovicaprids and sometimes even in cattle. The concentration of settlement on the plains might have favored a species which required less grazing and which could eat domestic garbage. Culling patterns indicate that meat production was still predominant: at Dimini and Agia Sofia (Phase 4), adult females still heavily outnumbered males and many animals were slaughtered young (Halstead, 1981, 1987). The same holds true farther away, in the Dodecanese (Halstead and Jones, 1987). The available data thus do not indicate a "secondary products revolution" (Sherratt, 1981, 1983), unless one considers the increase in loom weights (and the possible intensification in wool production they may suggest)

as sufficient to demonstrate such a "revolution" in animal exploitation (van Andel and Runnels, 1988). The economic basis was similar in Macedonia and Thrace, but the data from Sitagroi (Bökönyi, 1986) and Paradeisos (Larje, 1987) indicate more use of wild animals, especially cervids, boars, and fur-bearing species.

It has been claimed that more plant species were exploited. This is a crucial point, since the introduction of vine and olive cultivation on poorer soils is a major factor in many theories relating to the Neolithic/Bronze Age transition (Renfrew, 1972). However, the data do not support this claim (Hansen, 1988; Runnels and Hansen, 1986): only one olive stone, from Dimini, is known for all of Phases 3 and 4, and, while the grape had been known since the Early Neolithic, the progressive increase in size taken by J. Renfrew to indicate incipient domestication is based on too small a sample to be conclusive (Hansen, 1988). There seems to be no change in patterns of agriculture, except for possible intensification of the system, as evidenced by larger storage facilities. Typical storage jars (pithoi) multiply in Phases 3 and 4 at Sesklo, Dimini, Tsangli, Tsani, and Zerelia in Thessaly and in southern Greece at Asea, Franchthi, and Saliagos (Cullen and Keller, 1990; Wace and Thompson, 1912). Large storage pits also appear at the same time (at Argissa, Arapi, Otzaki, Agia Sofia, and Pevkakia) (Hourmouziadis, 1979; Kotsakis, 1983, p. 214 n. 3; Milojević *et al.*, 1976).

Architecture and Settlement Organization

Data on architecture and settlement organization come primarily from Dimini and Sesklo Phase 4. At Sesklo, settlement was restricted to an area of about 0.4 ha on the acropolis and seems have been surrounded by defensive walls (Theocharis, 1968, 1973; Tsountas, 1908). At Dimini, up to six or seven circuit walls of rough stones laid in clay were built and rebuilt, sometimes in pairs, around a central courtyard; some were up to 15 m apart, but others barely 1 m. Their thickness varies from 0.6 to 1.4 m and their original external height was <3 m (Hourmouziadis, 1979). Segments of possible surrounding ditches have also been observed for both Phase 3 and Phase 4 at Agia Sofia, Arapi, Soufli, Otzaki, Argissa, Servia, and Nea Nicomedia; on the stoneless alluvial plains, they may have played a role similar to that of the walls. The function of these structures is not certain, but whether or not they had any real defensive role, they would reinforce the ideological dichotomy between the inner village and the outside world, as is also seen throughout the Balkans at this period.

Within each large settlement is a large central building called [perhaps improperly (see Darcque, 1990)] the "megaron." The oldest and largest megaron (>30 m long) is that at Magoula Visviki, attributed to the end of Phase 3 (Benecke, 1942); all the others are Phase 4. At Sesklo, the largest megaron is

a two-room building with a porch, covering $>100\text{ m}^2$. The larger room had a floor of a reddish clay laid on small stones, three sturdy central wooden posts supporting the roof, and a large rectangular hearth. In the smaller room, two semicircular raised platforms, lined with vertical slabs, were made of packed earth mixed with straw and sherds; these also could have been hearths, used for parching grain. At the back was attached a smaller building of the same type, of which the doors were hinged on pivots resting in hollow stone bases (Tsountas, 1908). At Dimini, the central megaron was densely surrounded by structures between the second and the third circuit walls, divided into several sections by radiating pathways with houses, courtyards, and small buildings in each section (Hourmouziadis, 1979). Although the excavation was much smaller, Agia Sofia seems to have been similar, with a large central building resting on a mudbrick platform and cut off from the rest of the settlement by a large ditch (Milojčić *et al.*, 1976). The size and central location of these houses are our best evidence for status differences within the community.

Domestic Equipment

Late Neolithic houses had large storage jars, domed ovens, and flat hearths. At Dimini, charred cereals and pulses were found around the oven and hearths, suggesting cooking activities rather than pottery kilns [but a kiln was identified by Hourmouziadis (1977)]. Querns and other grinding stones were numerous, together with pots, flaked stone tools, bone tools, and celts. Red-deer antlers are worked much more frequently than before, and some red-deer antler sleeves were preserved at Dimini and Tsangli (Moundrea-Agrafioti, 1987). Spindle whorls (often decorated), stone and clay spools, and loom weights are far more common now and seem to indicate the importance of weaving. Also perhaps related to weaving (see above) are the "sling-bullets," which are again found in hoards: at Rakhmani, 131 baked clay sling-bullets were found together in a LN house (Wace and Thompson, 1912). The earliest level of Sitagroi yielded the impression of a plain woven cloth on the bottom of a vase. Impressions of mats and baskets, made by plain weave or simple twills, are also found on pots and floors (Renfrew, 1973); in some cases, as at Saliagos, the mats were coiled rather than woven (Evans and Renfrew, 1968). Some house floors may have had fur rugs: at Dimini and Pevkakia, bears are represented by foot bones only, suggesting the introduction of skins with paws still attached (Halstead, 1985; Hinz, 1979). Finally, there may also have been some furniture, since stools and armchairs, at least, are shown among the seated figurines.

Ceramic Production

As noted above, Phases 3 and 4 were marked by important stylistic changes in ceramics (Figs. 8–10). Late Neolithic potters achieved new and striking effects; complex decoration often covered the whole vessel, inside and out, and

reached a rarely equaled density, intricacy, and precision (Otto, 1985; Washburn, 1983).

The regular presence of larger vessels could imply the development of new building techniques; pithoi, for example, are often built of several distinct sections, but this was already the case for the larger MN vessels at Franchthi (Vitelli, 1993). Similarly, the most common shapes during Phases 3 and 4 (shallow flat-based bowls, straight-sided open bowls, carinated bowls, fruit-stands, jugs, and jars with vertical handles) required no more skill than earlier forms (see, e.g., Hauptmann, 1981; Hauptmann and Milojcic, 1969; Theodoris, 1973; Wace and Thompson, 1912).

However, surface treatments and decoration certainly took more time, whether or not they required more skill. The quality of polishing on black Larissa ware of early Phase 3 is unprecedented, as is the ripple effect on some vessels. On other wares, polychrome effects were made easier by the use of new pigments, manganese and graphite; these obviated the need for the three-stage firing required when iron oxides only were used to achieve a black paint on a light background (Frierman, 1969; Jones, 1986). The control of color was further aided by the invention of new firing techniques, kilns and saggars (Renfrew, 1973; Vitelli, 1991). As in Phase 2, the very high level of skill suggests specialized production by only a few residents of the village.

These innovations permitted the great diversity of styles and techniques which is characteristic of Phases 3 and 4; however, they do not explain it and the relations among different decorative styles remain unclear. During Phase 3, we can see two opposite trends. There was a broadening of stylistic interaction spheres, forming, for example, the vast *koine* characterized by black-burnished and matt-painted ceramics. At the same time, against this common background, there were specific styles with very restricted distributions, such as the red-burnished, black-and-white, and polychrome wares of the Arapi phase. Geographic distributions differed for each ware: some were ubiquitous within Thessaly, while others were regional or almost local (Halstead, 1984; Rondiri, 1985). Halstead (1984) has aptly called this a "nested" distribution pattern. The same trends can be seen in Phase 4, with broad, well-defined, stylistic provinces cooccurring with highly specific forms with even more restricted distributions than before (such as the Classical Dimini "Palatial Style") or very uneven representation in the various contemporaneous sites (Wace and Thompson, 1912). Consequently, the contrast between western and eastern Thessaly became stronger.

Several factors are involved here. One was probably functional differences between wares, leading to different contexts of use and distribution (Halstead, 1984). Gray-on-gray ware, for instance, is markedly more abundant in the graves than in the tell at Plateia Magoula Zarkou (Demoule *et al.*, 1988). At Servia, Larissa ware was deposited in pits with wild fauna, as opposed to the domestic

species in the rest of the site (Watson, quoted in Halstead, 1984). Both may have been used preferentially in ritual contexts, as may also the "rhytons" of Boeotia and Corinth (see below). Another probable factor was the relative sphere of influence and interaction of each center of production. Chemical analyses on hundreds of sherds have shown that some "styles" correspond to particular clay compositions, produced in specific regions; they also demonstrate the circulation of these fine wares between villages (Schneider *et al.*, 1991). The prestige attached to each ware could have led to competition between the centers of manufacture, although we should not exclude the effects simply of changing fashions.

In summary, Phases 3 and 4 show several important trends in ceramic production: diversification of functions and domains of integration and use (culinary wares, storage wares, funerary wares, and the highly decorated wares probably related to social uses); reinforcement of intrasite part-time specialization; development of specialized centers of production; and an increased rate of ceramic exchange. This is the period when pottery seems to have had the widest range of roles and most diversely organized production. It is probably no coincidence that this is also the period when settlement density reached its maximum, requiring intense interaction and exchange to avoid economic and social conflicts.

Flaked Stone Production

There were also important changes in flaked stone production. In southern Greece, the proportion of obsidian increased sharply and use of local resources became negligible. The import of flint and jasper blades also declined, but arrowheads made of those materials were now integrated into wide exchange networks. Indirect percussion was more widely used and new platform preparation techniques were introduced (with plain butts in Phase 3 and faceted butts in Phase 4), probably related to the use of metal tips for pressure-flaking (Perlès, 1984, 1990). The larger quantity of obsidian, the more variable conditions in which it was imported (raw material, roughed-out cores, already flaked cores), and the variable standards of manufacture may be ultimately related to the colonization of the Cycladic islands (Cherry, 1981, 1990). Seafaring skills were now more widely known and access to Melos was easy from any of the colonized islands. Direct procurement would allow unlimited access to the sources, putting more obsidian into circulation (Torrence, 1986). There would then be local and less skilled manufacture, parallel to that of the specialized groups (Perlès, 1990a). More remote places, such as Thessaly, still lacked direct procurement, and raw material use remained unchanged, with obsidian coming as preformed or already flaked cores, flint and jasper still in use, and pressure-flaking (especially on obsidian) largely predominant.

This diversification of manufacture is echoed in the appearance of subtle stylistic differences in techniques of production and retouch. However, the overall variability is not fully understood, nor the typology well established. In the retouched tools, endscrapers, borers and marginally retouched blades are abundant, and we may eventually find within these groups changes through time and possible differences between Phase 3 and Phase 4 (Cherry and Torrence, 1984; Moundrea-Agrafioti, 1981). However, the most conspicuous contrasts between northern and southern Greece, such as the rarity of sickle blades in the south, may relate to economic conditions (and the pastoral occupation of many cave sites) rather than to stylistic or cultural differences. It is intriguing that in Thessaly also, during Phase 4, the so-called sickle blades show a marked reduction in frequency (at Dimini; Moundrea-Agrafioti, 1983).

The earliest Phase 3 arrowheads are asymmetrical notched points, but this transitional type was soon replaced by a variety of symmetrical points, ranging from fusiform to barbed-and-tanged. There is no intersite or regional patterning in morphological or technical variables, except that arrowheads become more numerous to the south, and their relative abundance is one of the distinctive features of the "Saliagos Culture" (Renfrew and Evans, 1968). In the Cyclades and southern Greece, at least some obsidian arrowheads were locally produced, but there is no evidence for local manufacture of the superb arrowheads of exotic flint or jasper, which occur in very small numbers at many sites (such as Agia Sofia, Kitsos, and Corinth). Their rarity and exceptional workmanship suggest that they may not be purely utilitarian pieces or reflect utilitarian exchange.

The First Metal Objects

Based on the excavation of Sitagroi, Renfrew (1969) suggested that Europe was an independent center for the invention of metallurgy. Greece does not, however, appear to have been one of the leading regions in this.

Sitagroi II and the old excavations of Agia Marina in central Greece (both supposedly our Phase 3) are usually presented as the earliest evidence for metallurgy but they are not convincing. The typology of the bronze daggers, awls, and bracelet from Agia Marina does not support a Neolithic date, and the copper beads claimed for Sitagroi II (Renfrew, 1973) are not mentioned in the first volume of the final monograph, where the earliest metalwork is attributed to Sitagroi III (our Phase 5) (Gimbutas *et al.*, 1986). Critical examination of the data leaves only one definite metal object from Phase 3: a single, very small, copper bead found in Level 14 of Sondage X29 at Dikili Tach (Seferiades, 1992), which dates to the very end of Phase 3.

The extraction of copper ores becomes certain only during Phase 4 at Ai Bunar in Bulgaria, after which small copper objects (beads, needles and daggers) are found throughout the Balkans. In Greece, only a small number of finds can

be attributed to Phase 4. The most secure are nine copper pins from Dikili Tach (Phase II) and two copper pins from Paradeisos Level 3. Yet another copper pin was found at Kitsos (Lambert, 1981), in a context which may belong to Phase 4. Several finds from Dimini and Sesklo, including copper pins and axes and a gold earring, might possibly date from Phase 4 but their stratigraphic context is unknown (McGeehan-Liritzis and Gale, 1988; Tsountas, 1908). The same is true of the dagger tip and copper scraps from Corinth (Kosmopoulos, 1948), while the copper artifacts from Zas Cave (Zachos, 1990) should probably be assigned to the beginning of Phase 5. Finally, copper is mentioned in the cave of Kalithies, in Rhodes (Sampson, 1987). Late Neolithic metal objects are, thus, rare in Greece; they could well have been recycled rather than discarded, because of their value. In any case, the absence of local manufacture before Phase 5 (see below) shows that they were traded as finished products, not as raw material.

Exchange Networks and Social Differentiation

There was also Late Neolithic exchange in celts and grinding tools [andesite millstones from Aegina now made up 30% of the total millstones in LN Argolid sites (Runnels, 1985)], shell bracelets (*Spondylus gaedoporus*) manufactured at coastal sites and traded inland (Hourmouziadis, 1979; Renfrew, 1973; Runnels, 1983; Shackleton, 1988; Tsuneki, 1989), rare marble figurines, and, most probably, textiles. These items can again be placed in different classes with very different parameters, but the content of each class shows interesting differences from earlier periods.

- (a) A larger proportion of ceramics was now purely utilitarian (cooking pots and storage jars), with minimal decoration and surface treatment. A few of them circulated between neighboring communities (Schneider *et al.*, 1991).
- (b) Some stone tools moved into the sphere of nonutilitarian exchange, such as the eccentric and often fragile arrowheads of Thessaly, which are too rare to be part of the basic tool-kit [one each at Sesklo and Agia Sofia, for instance (Tsountas, 1908; Milojevic *et al.*, 1976)].
- (c) Among the "rare goods," spondylus shell bracelets were more abundant (Renfrew, 1973), and stone vases less so, but the most obvious change was the introduction of metal ornaments and tools.

The classes still differed in rates of exchange and ranges of distribution. In northern Greece, exchange of utilitarian goods (obsidian, flint and jasper, celts, grinding tools) showed a further expansion of the circulation of Melian obsidian, which now reached Serbia (Ridley and Wardle, 1979), the Ptolemais basin (Fotiadis, 1987, 1988; identification as Melian by the present authors), and Nea

Nicomedia (Rodden, 1962, 1964), but in far smaller quantities than in Thessaly. On the other hand, there is a sharp boundary with central and eastern Macedonia, where Melian obsidian was extremely rare (personal observation). The frequencies of obsidian in northern Greece, with very high proportions (>80%) several hundred kilometers from the source, followed by a sharp drop and a well-defined limit, closely match Renfrew's curve for trade by middlemen, whose sphere of action is culturally bounded (Renfrew, 1984).

In contrast, the circulation of fine wares was not related to technical needs: each community produced its own pots, which might differ stylistically but not functionally (shapes, sizes and fabric qualities are comparable). Therefore, the exchange of ceramics might, as before, relate to social interactions between groups. However, intracultural exchanges seem to have involved progressively smaller areas (see above), while intercultural exchanges appear to have been more developed: for instance, the gray-on-gray ware from Thessaly has been found in Boeotia (Weinberg, 1962), and some "Akropotamos" style pottery from Macedonia was exported to Bulgaria, as was the "black-on-red" pottery of Dikili Tach (personal observation). The mechanisms at work in intra- and intercultural exchanges probably differed. In long-distance trade, ceramics would be obviously exotic and might be prestige goods, like spondylus, marble, or metal objects. Securing external alliances might be part of a competitive process based on the acquisition of rare and valued goods. This process would favor the emergence of social differentiation indicated by village organization (see above). The distribution of the finest Classical Dimini wares ("Palatial Style"), for instance, might well have been controlled by an elite: many seemingly contemporaneous sites in western Thessaly do not possess them and are very poor overall in fine wares (Wace and Thompson, 1912).

These social dynamics obtained in the north, where population density was high and had been increasing steadily throughout the Neolithic. In the south, no population increase can be seen (at least until the end of Phase 4), nor is there evidence for the peculiar distribution of pottery styles observable in the north, for social inequality, or for intense interaction between groups. On the contrary, pottery styles seem to be quite specific to sites or small regions (Vitelli, personal communication). Thus, in the social domain as well, the LN saw increasing differences between northern and southern Greece.

Funerary Rituals and Ideology

In theory, funerary rituals also might reflect these different trends, but there are few available data. Pit burials of individuals and secondary burials do not suggest obvious status differences in rituals or funerary deposits. The cemetery associated with the early LN (Tsangli Phase) site of Plateia Magoula Zarkou (Gallis, 1982) lies >300 m from the settlement itself and is the earliest indi-

cation of a spatial separation between the world of the living and that of the dead. The only marked pattern among the burials (of cremations in jars) is the mutually exclusive distributions of collared jars and of concave-sided open bowls. Those two types occur in roughly equal numbers and might reflect sex differences, although this is difficult to determine from burnt bone fragments.

Agia Sofia revealed a curious funerary complex within the settlement itself (Milojčić *et al.*, 1976), although, unfortunately, it is neither very clearly described nor very firmly dated. Halstead (1984) considered the two burials cut into the top two enclosures to be exceptional and to indicate high hereditary status (one of them was a child), but the evidence for this is scanty, especially since there were almost no grave goods.

Figurines still occurred in domestic contexts. Their ritual function is confirmed by the spectacular discovery, at Plateia Magoula Zarkou, of a foundation offering beneath the floor of a house. It consisted of a baked clay model of a unroofed house with eight human figurines, apparently two larger, adult, couples and four children, with various household equipment and a raised platform (Gallis, 1985). The quality of the figurines is poorer than in Phases 1 and 2, and this was a general trend during the LN: plastic quality and surface treatment were less careful (Wace and Thompson, 1912), except in a few cases such as the seated woman holding a baby from Sesklo (Tsountas, 1908, Pl. 31). She had no head, and this also was a common feature: heads of various raw materials were often added to figurines after firing. We see here the origin of the characteristic Phase 5 practice of setting painted stone heads into baked clay bodies. Finely polished and painted stone (including marble) figurines (Tsountas, 1908, Pl. 31) became progressively more common.

Other elements possibly related to rituals are the beautiful square-sectioned spit supports from Sesklo, considered by Tsountas to be ritual objects and by Wace and Thompson to be simple domestic equipment (despite the rarity of such decorated pieces). Farther south, at Elateia, in the Kephissos valley (Weinberg, 1982), at Corinth [Forum West excavations (Lavezzi, 1978)], or at Franchthi (Jacobsen, 1973), a number of unusual four-legged, "ritual vessels" or rhytons were found, which strikingly resemble vessels from the Danilo culture in Dalmatia. According to Lavezzi (1978), they were used in household rituals; this is supported by their occurrence at Elateia in a large pit (1 m deep and 2.15 × 1.80 m in area), containing various objects for the most part unknown in the rest of the site. These included a "pillar" of unbaked clay (14 cm in diameter and 26 cm high) recalling the finer examples from Sesklo and interpreted by Weinberg (1965) as a cultic item. Special status is also claimed for the four-legged rhyton in Yugoslavia, where they have been found associated with large clay phalli (Korosec, 1958; quoted by Weinberg, 1965).

In summary, both funerary and domestic rituals involved new dynamics, leading (as in other domains) to an unprecedented diversity of rituals and ritual

contexts. This might be related to growing status differences within groups, but evidence for this remains elusive and restricted to a few Thessalian examples. Rather than the beginning of a trend that would develop during Phase 5 (as it did elsewhere in Europe during the second half of the sixth millennium B.P., shown by megalithic monuments, fortifications, rich burials, and caches of valuable objects), it is best seen as a short-lived phenomenon in what was then the richest and most densely settled region of Greece. On the other hand, the emerging dichotomies between northern and southern Greece continued well into the Bronze Age.

THE FINAL NEOLITHIC OR CHALCOLITHIC (PHASE 5)

Terminological and Chronocultural Problems

Despite lasting a thousand years (about 5800/5700–4800/4600 B.P.), the FN has only recently been distinguished from the Bronze Age (the Rakhmani Phase in Thessaly) and the Late Neolithic (the “Aegina-Attica-Kephala” culture of southern Greece). The terminology remains confusing: it is called “Late Neolithic” [together with Phases 3 and 4 (Treuil *et al.*, 1989)], “Late Neolithic II” (Coleman, 1993; Sampson, 1988; Zachos, 1987), “Chalcolithic” (a term used in Thessaly, following the Balkans terminology), “Early Bronze Age I” (due to problems with the Pevkokia stratigraphy), and “Final Neolithic” [mostly in southern Greece (Diamant, 1974; Phelps, 1975; Renfrew, 1972)].

The situation is similar in eastern Macedonia, where Level III of Sitagroi and Level II of Dikili Tach were called “Marica-Gulmenitsa,” even though the latter corresponds to two successive entities in Bulgaria, lasting at least a millennium. A detailed reexamination of the stratigraphies (Demoule, 1991, forthcoming) now permits a firm distinction between these two horizons (which correspond, respectively, to Phases 4 and 5), and regional facies can be defined (Fig. 2).

On the basis of the ceramics, the FN of Greece can be seen as a period of intense interaction, leading again to the formation of very large stylistic provinces, but without the additional local styles grafted onto the larger entities, as was characteristic of Phases 3 and 4. The Aegina-Attica-Kephala group, with its burnished or plastic decorations and crusted wares, covered all of central and southern Greece, including the Adriatic coast and the Cyclades. Nevertheless, one of the main characteristics is the predominance of coarse wares. Zachos (1987) distinguished two main horizons in this period: the earlier is characterized by patterned-burnished, crusted, fine incised, and red monochrome wares, and the later horizon includes heavy burnished wares and rolled-rim bowls. The later horizon is represented at Grotta on Naxos, Philakopi O on Melos, and Prosymna

East-Yerogalo, but the number of sites known seems to decrease substantially in mainland Greece, a phenomenon that continued and that has parallels elsewhere in Europe.

Rolled-rim bowls appeared slightly earlier in Thessaly, in agreement with the Balkan sequences (Vinca D, Karanovo VI, Sitagroi III). In the Rakhmani facies, the stratigraphy from Pevkakia shows a progressive impoverishment of ceramic decoration. Farther north, a vast stylistic zone, divided into three main areas, extended from the Black Sea to the Adriatic, while the Vinca and Thesalian spheres of influence were sharply restricted (Fig. 2). Western Thrace was related to the classic Gulmenitsa complex, Sitagroi III to the Salcutsa-Krivodol-Bubanj Hum complex, and western Macedonia to a series of groups that used white pigment instead of graphite.

Settlement Patterns and Subsistence Basis

Different settlement patterns typify these different cultural groups (van Andel and Runnels, 1988). In southern Greece and the Cyclades, there were two trends during the first half of the FN: an increase in the number of sites, usually of small size, and a continued increase in cave occupations (Diamant, 1974; Wickens, 1986). It is noteworthy that most of the Neolithic sites discovered during recent surveys of Boeotia (Bintliff and Snodgrass, 1985), Euboia (Sampson, 1981), the Berbati-Limnes region in Argolid (Wells *et al.*, 1990), and the southern Argolid (Runnels and van Andel, 1987) are attributed to the FN.

In excavated sites, the scarcity of large architectural remains is remarkable: at Kephala, small houses were scattered across the hillside; at Agios Dimitrios, bothroi (storage pits?), postholes, and hearths suggest small huts. This has been taken to indicate a greater emphasis on a seasonal, pastoral economy (Diamant, 1974; Zachos, 1987; Wickens, 1986), but the use of caves as sheep pens is not certain (see below). The Berbati-Limnes survey has shown a close correlation between FN sites and Late Medieval and Early Modern goatfolds (Wells *et al.*, 1990), indicating that such sites should not necessarily be looked for in caves.

The change in settlement patterns might also reflect dispersal into small farmsteads and hamlets. The latter, well documented by systematic surveys in the Argolid, has been attributed by Runnels and van Andel (1987; van Andel and Runnels, 1987) to the expansion of Aegean trade, leading to a denser population and more dispersed settlements, spreading into marginal agricultural areas on the hilltops and valley floors. Starting in the FN and continuing in the Bronze Age, a progressive hierarchical difference between settlement size and richness has been documented in the Argolid (van Andel and Runnels, 1987).

This extension into more marginal areas could have been favored by the shift from spring-fed to rain-fed agriculture (Wells *et al.*, 1990) and the use of less demanding crops, such as barley and legumes. Barley is now present in

almost all sites and was an important—sometimes predominant—crop in southern Greece and the Cyclades. At Franchthi, the peak in barley corresponds precisely to this period (Hansen, 1991); at Zas Cave on Naxos, barley predominates over wheat and is accompanied by lentils, peas, vetches, wild plums, and wild vines (Zachos, 1990). A phase of important soil erosion, starting during the FN, has been recently documented in the Argolid; it is considered to have been triggered by this extension of settlement on the hillslopes (Wells *et al.*, 1990; Zangger, 1991).

In Thessaly, in contrast, there was a marked decline in the number of sites for the whole of Phase 5 (Gallis, 1989). Very few new settlements were founded; the sites still occupied were large but less evenly distributed across the region than before. We do not know whether this was due to a smaller population or to its continued nucleation into larger settlements. There are few data on site organization, but excavations at Pevkakia and Rakhmani indicate that buildings were still densely packed (Wace and Thompson, 1912). Massive surrounding walls occurred at Pevkakia (Schachermeyr, 1976) and at Mandalo in western Macedonia (Pilali-Papasteriou and Papaevthimiou-Papanthimou, 1989), while a ditch, 6 m deep and 4.5 m wide, surrounded the Phase 5 settlement at Otzaki (Milojčić, 1955).

There is no obvious economic reason for the decrease in site density in Thessaly. We have found no archaeological evidence for a “secondary products revolution,” and the raw data on subsistence (Halstead, 1987; Hansen, 1988) show no major differences from Phase 4 [despite claims to the contrary by Cherry (1984), Halstead (1989a), and Renfrew (1972)]. In particular, no increase in olive (Runnels and Hansen, 1986) or vine remains can be demonstrated from the carpological remains. Social crisis, possibly in relation with changes in trade patterns, can be invoked (see below), but the lack of data on site organization does not permit us to test this hypothesis.

Finally, eastern Macedonia shows yet a third trend, typical of its cultural affiliation with the Balkans: the first half of Phase 5 was prosperous, with large, expanding tells, but was followed by a decline in the later part of Phase 5.

Technology

Domestic equipment remained rich and varied. The partially preserved House P at Rakhmani seems to have been a medium-sized, apsidal house without internal partition, with a hearth and a variety of equipment: grain storage, pottery, grinders, milling-stones, celts, flaked stone tools, bone tools, and numerous spindle whorls (Wace and Thompson, 1912). The use of wild animal skins is again indicated at Pevkakia (Hinz, 1979) but weaving and matting were more important: Franchthi (Jacobsen, 1973), Kitsos (Lambert, 1981), Tharounia (Sampson, quoted in Davis, 1992), Kephala (Coleman, 1977), Alimnia on

Rhodes, Partheni on Leros (Sampson, 1987), Giali near Nissiros (Sampson, 1988), and Grotta on Naxos have all yielded mat impressions on sherds. At least four techniques were used at Kephala: simple twine, split twine, plain weave, and coiled matting, using very fine grasses or plant fibers as warps and strands of reeds or grasses as weft (Carington Smith, 1977). Tharounia and Kephala also yielded impressions of a fine linen or wool, plain-woven cloth. At Kephala, the cloth was built into the walls of coarse pots, presumably in order to strengthen them, showing, as noted by Carington Smith, the commonplace status of such textiles.

Deer antlers were frequently used during the FN. In Thessaly, several perforated "club heads" of red-deer antler are assigned to this period. One burnt specimen was associated with barley, suggesting their use for threshing cereals (Wace and Thompson, 1912). Perforated axes or "club heads" of polished stone also appeared; an unfinished specimen from Sesklo shows the use of a tubular, hollowed drill to make the hole (Tsountas, 1908).

Part of the problem of recognizing and defining Phase 5 comes from the pottery, often described as crude and lacking diagnostic characters. Certainly, comparison with earlier periods shows an increase in coarse wares (now predominant throughout Greece), the quasi-disappearance of painted wares (except in Macedonia), and rapidly produced decorations. Grit, grog, and plant fibers were used as temper for vessels which were often much thicker than in earlier periods. Slips were rarely used, and most surface treatments range from simple smoothing to light burnishing, particularly on the red monochrome, black burnished, and patterned burnished wares of southern Greece (Diamant, 1974; Phelps, 1975; Zachos, 1987). As in much of eastern and central Europe, crusted wares are typical of this period: a thick, white or pink-red crust was applied after firing. The combination of white, reddish, and sometimes black paints on a single pot permitted vigorous but very simple geometric motifs. Small incisions (lines and dots) were sometimes, but infrequently, used. Plastic decoration (raised cordons, usually with finger impressions, simple raised bands, and vertical cordons) is usually, but not always, found on large coarse vessels. Open dishes, jars, and large pithoi were the most common shapes, with the characteristic rolled-rim bowls in the later part of the period.

That the pottery seems inferior in quality to earlier ceramics may indicate a transformation in the system of production (Vitelli, personal communication). However, a shift in function and social role was also clearly involved: more and more of the pottery was now domestic and utilitarian, and cooking pots, simple domestic vessels, and, above all, large storage jars now outnumbered the previously predominant fine vessels.

A similar decline in craftsmanship has been suggested for lithics. In fact, they are very variable and the suggested decline is probably related to different modes of procurement and manufacture: domestic production after direct pro-

curement or exchange with other nonspecialized villagers versus procurement and production by specialists. The most characteristic (but rare) elements are fine, elongated, obsidian arrowheads, with almost no barbs but a well-developed tang, and large, imported, triangular points of jasper and flint, worked by invasive bifacial pressure-retouch. They are found (in very small numbers) all over Greece, but we do not know where they were made. Since exactly the same type is known in the Balkans (in the Gulmenitsa and Salcutsa cultures, for instance), it is not even certain that they are Greek in origin.

Copper, gold, and silver artifacts have been found at about a dozen sites, including Sitagroi III, Dikili Tach, Mandalo, Pevkakia, Kitsos, Tharounia, Thorikos, Marathon, Kephala, and Knossos (Davis, 1992; McGeehan-Liritzis, 1983; McGeehan-Liritzis and Gale, 1988). The largest series is from the ongoing excavations at Zas Cave on Naxos and includes two flat copper axes, awls, pins, spatulae, and a gold strip of a form common at Varna in Bulgaria (Zachos, 1990). Coming from a less secure context, but typologically assignable to Phase 5, is the "hoard" from Alepotrypa in southern Greece, which contained, as well as some copper tools, four gold bracelets, a gold necklace, and a silver pendant, all resembling items from Bulgaria (Hauptmann, 1971). As noted by Muhly (1985), the presence of silver is surprising, given its extreme scarcity in Bronze Age Europe (and, obviously, in the Neolithic). However, the discovery at Agios Sostis on Siphnos of silver-rich lead ores, which may have been exploited during Phase 5 (Kephala period), may shed new light on this problem (Gropengiesser, 1986; Zachos, 1990).

Copper artifacts are usually found as finished objects, with no evidence for local manufacture, but at Kephala stratified fragments of crucibles or furnace lining indicate local melting, possibly of ore from the nearby Lavrion sources (Coleman, 1977). This is corroborated by copper crucibles at Giali near Nissiros (Sampson, 1988) and copper slags at Sitagroi III together with 11 copper objects and a gold bead (Renfrew, 1986). McGeehan-Liritzis's and Gale's analyses (1988) suggest the melting of already smelted pieces, initially obtained by trade. A lead object was also found on the surface at Kephala; it might be later or might be related to the exploitation of silver-rich lead ores in Lavrion (Coleman, 1977).

The paucity of finds contrasts markedly with the Balkans, where early metallurgy was far more developed. The number of find spots in Greece is not many more than in Phase 4, and the nature of the finds is similar. However, all the earliest well-dated artifacts are pins or awls; in this respect, Phase 5 saw a diversification of metal objects, but overall, Phase 5 does not appear much more "Chalcolithic" than Phase 4, which may explain why the two phases are usually not distinguished in studies of early metallurgy (for an exception see Muhly, 1985).

Trade

The scarcity of metal finds and their exceptional quality in cave sites of southern Greece strongly suggest that they were high-status artifacts, traded far from their production centers. At least two potential centers are known, again in southern Greece (Lavriion and Siphnos), emphasizing the key position of this region in FN exchange systems (Perlès, 1992). With more numerous settlements and a large sphere of diffusion, there was a greater demand for utilitarian goods such as emery, andesite, and, above all, obsidian: even the low-quality obsidian from Giali in the Dodecanese was traded to neighboring islands (Sampson, 1988). There was also active trade in prestige goods, including (as well as metal objects and jasper points) spondylus ornaments, marble vases (Zas Cave, Kephala), and marble figurines (Alepotrypa, Kitsos). In all cases, the Cyclades appear to have been the main production area.

The geographical range of the trade in prestige goods is impressive. The abundance of Aegean spondylus artifacts in Bulgaria is well-known, but the similarity in shape of conical marble vases from Kephala and from Varna is also noteworthy (Eluère, 1989, cat. 293). The gold strip from Zas Cave and the gold bracelets and silver pendants from Alepotrypa have almost perfect matches at Varna but none in Thessaly. (In Attica, a stone pendant from Kitsos is similar in shape.) Although the data are scanty, they hint at export from the Cyclades of both utilitarian and prestige goods, with links up to Bulgaria. It may be, as suggested by Davis (1992), that trade was a prerequisite for the permanent settlement of these islands of low agricultural potential.

However, the trade networks seem to bypass most of southern Greece, and Thessaly even more so, as though the economic position of Thessaly had become more precarious and less prominent (van Andel and Runnels, 1988). This is not altogether surprising since Thessaly, which had been heavily involved in all the earlier trade systems, produced mostly fine wares and, probably, food. The new economic patterns in southern Greece and the Cyclades may have rendered Thessaly's food exports less attractive (perhaps simply by opening new production centers and new markets elsewhere). At the same time, ceramics became predominantly utilitarian and lost much of their social role; the only evidence for trade in fine pottery is a few examples of Macedonian sherds found in the south (Renfrew, 1973) and Classical Dimini sherds found at Polyplatamon near Nea Nicomedia (Rodden, 1964). If demand for its food and fine wares was decreasing, Thessaly may have been in a weaker position in the exchange networks. This, in turn, could have brought about important social changes, because of the restricted access to exotic goods and consequent difficulty of maintaining social ranking.

Rituals

Changes in social and economic organization were thus occurring at different rates and in different ways in the various regions of Greece. How were they reflected in the symbolic and ritual spheres?

New elements entered the symbolic sphere, and others changed in form and perhaps in role. In Thessaly, human figurines had rather shapeless bodies made of rough clay mixed with straw, and a deep hole between the shoulders to hold a painted, stone head in the shape of a truncated cone. Several such bodies and heads were found in Dimini, Zerelia, and Rakhmani (Wace and Thompson, 1912), including six bodies (four whole and two broken) and five heads in House Q, which suggests that human figurines were still associated with domestic cult activities. In contrast, the Cycladic pattern of figurines associated with burials was already developing in southern Greece: at Kephala, for the first time in the Neolithic, clay figurines were found in the area of the cemetery (Coleman, 1977), which leads Talalay (1991) to infer an ancestor cult.

This cemetery, with its stone-built tombs and domestic jars used for infant burials, presages ritual practices common in the Bronze Age. More importantly, it is part of a trend toward spatial segregation of the living and the dead. On the Paralia of Franchthi (Collins Cook and Cullen, forthcoming) and at Lerna (Caskey, 1958), burials are still associated with living or specialized activity areas. Elsewhere, however, burials are also found either in separate cemeteries such as that of Kephala or the recently excavated cemetery at Tharounia (Sampson, quoted by Davis, 1992) or in separate areas of caves. The collective, secondary burial at Alepotrypa (Lambert, 1972; Papathanassopoulos, 1971) is a spectacular example of the latter.

Human remains are also often found in FN caves (and probably LN caves—precise dating of the strata with human bones is not always easy), as scattered bones mixed with faunal remains, sherds, and lithics (Kitsos, Tharounia, Ayia Triada, Marathon, Agios Petrochoros, Fournospilia, Hagios Nikolaos, Kalythies, etc.). Diamant (1974) observed that many of these caves are on high hills, often on steep slopes, away from good pasture and even, in several cases, away from water. They have been interpreted as shepherds' camps, but this is problematical. Why choose caves of such difficult access, or such deep caves without natural light? As an extreme example, at Rodochori Cave, in western Macedonia, the Neolithic material was 100 m deep into the mountain (Rodden, 1964). In Attica, at least half of the LN/FN caves have small entrances, dark interiors, and often dripping water (Wickens, 1986), yet the most spectacular Phase 5 finds in southern Greece come from cave sites. Apart from Zas Cave and Alepotrypa, there are other, more modest, finds which would be equally unexpected in what are often considered as small, seasonal, sheep-herding sites, such as the exceptionally fine vases, ornaments, and jasper tools associated with the several

hearths at Kitsos in Sondage 2 (Lambert, 1981). Finally, why should these caves so often have scatters of human bones, sometimes in large numbers? [A minimum of 18 (incomplete) individuals have been identified at Kitsos (Duday, 1981)].

For the Kalythies cave on Rhodes, Halstead and Jones (1987) concluded that eight juveniles and adults (that is, all but the infants) were removed for secondary burial elsewhere, since only bones of the feet and hands and some front teeth were present. This would accord with the hypothesis of a temporary pastoral site and the removal of the dead to a more permanent settlement. However, the exceptional quality of some of the finds in most caves suggests that, by the end of Neolithic, caves were not used only for habitation. Cultic and funerary caves are a classic feature of the European Mediterranean Chalcolithic. They are often associated with rituals concerning water, either drip water or underground springs and streams (see Malone, 1985); the same may have been true in Greece.

CONCLUSION

The relative importance of the Near East and Europe in the origins and development of the Greek Neolithic has long been disputed, but early views of the Greek Neolithic as an impoverished offshoot of the Near East are now rejected in favor of local dynamics and integration into southeastern Europe.

A detailed examination of the Greek Neolithic underlines its originality, while showing (especially during the LN and FN) that it was also part of a larger, southeastern European *koine*. However, contrasts with temperate Europe are equally strong and help us to understand the real status of the Greek Neolithic. Although the cultural traditions—both technical traditions and stylistic expression—are clearly original, many basic features initially resembled the Near East more than Europe.

Summarizing the data presented above, we can characterize the Greek Neolithic as having the following characteristics.

A true farming economy, based on exogenous species and making very little use of wild local resources.

Permanent villages of very long (several centuries) duration, developing as tells rather than flat, expansive settlements, with unusually dense concentrations in alluvial basins.

Extensive trade in utilitarian goods and evidence for early craft specialization.

An unusual proportion of fine, highly decorated wares and a surprising scarcity of cooking wares until late in the Neolithic.

The ephemeral character of signs of social inequality or hierarchical organization.

The absence of funerary or ritual monumental architecture.

These features did not develop at random, but must be seen as parts of a coherent pattern. The concentration of Early Neolithic sites in the driest regions of Greece obviated the problems of forest rejuvenation and gave the Near Eastern domesticates an environment to which they were already adapted. With adequate manuring, land could be kept under cultivation for many generations and there was no need for shifting settlement. This allowed a high population density in the most fertile areas. The building of villages on good agricultural land would have limited their room to grow, if the land around the initial core was already under cultivation and allotted to specific families. Consequently, "vertical" development prevailed over horizontal expansion.

The density of settlement in the alluvial basins could have led to conflicts over resources, but it is also characteristic that very few sites have clearly defensive structures (at least in the EN and MN), so there must have been strong integrative mechanisms. The predominance of fine decorated wares and the scarcity of cooking wares may be related to this: it seems as though pottery was more important as an item of social display and interaction than as part of the private, domestic equipment.

The settlement patterns, distribution of raw material sources, and emphasis on highly skilled manufacturing all contributed to the early development of craft specialization. In spite, or perhaps because, of inherent risks of crop failure under such a dry climate, there was enough surplus that people could rely, even for vital utilitarian tools, on procurement through exchange. The data also reveal several distinct production and exchange systems and the fact that not all exchange networks had the same status and role.

In spite of this complexity, hints of social differentiation are limited, mostly confined to the Late Neolithic, and they do not appear (unlike the rest of Europe) to intensify at the dawn of the Bronze Age, at least in those areas where they appear early (Thessaly). There, ideology may have helped to maintain overall egalitarianism, and in this respect, the absence of monumental, collective architecture (whether temples or burials) is also in striking contrast to much of Europe. The stable, ancestral village seems to have been the ideological focus and to have favored domestic, rather than collective, rituals [except for a few (late) examples]. Perhaps, as Chapman suggested (1989), the independence of the household as a social, economic, and ritual unit explains why attempts to integrate into wider socioeconomic units apparently failed. In any case, most communities controlled their own surpluses and used them for their own benefit—to obtain a variety of exotic goods.

This conclusion may seem at odds with the development of centralized

societies in Bronze Age Greece, but regional differences must be taken into account. The earliest signs of centralization are not found in the rich agricultural regions of Greece, but in southern and Cycladic Greece, where social dynamics became increasingly different throughout the Neolithic. There, smaller-scale agriculture, more dispersed settlement, independent pastoralism, and trade in valued goods may have set the stage for a sharper division of roles between and within groups, for control of specific resources and skills, and for a progressive shift from horizontal to vertical differentiation of status. It is precisely in these areas that a later and more progressive trend toward a hierarchical differentiation of settlement can be documented.

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REFERENCES

- Anastasiades, P. (1949). General features of the soils of Greece. *Soil Sci.* **67**: 347-362.
- Andreou, S., and Kotsakis, K. (1986). Diastaseis tou chorou stin Kentriki Makedonia: Apotyposis tis endokoinotikis kai diakoinotikis choroorganosis. In *Amitos. Timitikos tomos gia ton Kathigiti M. Androniko*, Aristoteleio Panepistimio Thessalonikis, Thessaloniki.
- Aslanis, I. (1988). I Neolithiki kai i proimi epochi tou chalkou stin agaiaki Thraki. In *I Istoriki, archaiologiki kai laografiki erevna gia ti Thraki*, Simposion Xanthi-Komotini-Alexandroupoli, 5-9 Dekembriou 1985, Thessaloniki, pp. 139-158.
- Aslanis, I. Befestigungsanlagen in Nordgriechenland von dem Chalkolithikum bis zum Beginn der frühen Bronzezeit. In *Vinca and Its World: The Danubian Region from 6,000 to 3,000 B. C.*, Beograd (in press).
- Benecke, J. (1942). Steinzeitdörfer in den Ebenen am Olymp. Ester Bericht über die Ausgrabungen des Reichsamtes für Vorgeschichte in Griechenland. *Völkischer Beobachter* **18 februar 1942**: 6.
- Bintliff, J. L. (1977). *Natural Environment and Human Settlement in Prehistoric Greece, Based on Original Fieldwork*, British Archaeological Reports, S28, 2 vol., Oxford.
- Blegen, C. W. (1937). *Prosymna, the Helladic Settlement Preceding the Argive Heraeum*, Cambridge University Press, Cambridge.
- Bloedow, E. F. (1991). The "Aceramic" Neolithic phase in Greece reconsidered. *Mediterranean Archaeology* **4**: 1-43.
- Boessneck, J. (1955). Zu den Tierknochen aus neolithischen Siedlungen Thessaliens. *Bericht der Römisch-Germanischen Kommission* **36**: 1-51.

- Boessneck, J. (1962). Die Tierreste aus der Argissa-Magula vom präkeramischen Neolithikum bis zur mittleren Bronzezeit. In Milošević, V., Boessneck, J., and Hopf, M. (eds.), *Die deutschen Ausgrabungen auf der Argissa-Magula in Thessalien, I. Das präkeramische Neolithikum sowie die Tier- und Pflanzenreste*, Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturräumens 2, Rudolf Habelt, Bonn, pp. 27-99.
- Bökönyi, S. (1986). Faunal remains. In Renfrew, C., Gimbutas, M., and Elster, E. (eds.), *Excavations at Sitagroi. A Prehistoric Village in Northeast Greece, Vol. 1*, UCLA, Institute of Archaeology, Monumenta Archaeologica 13, Los Angeles, pp. 63-96.
- Bottema, S. (1974). *Late Quaternary Vegetation History of Northwestern Greece*, Ph.D. dissertation, Biologisch-Archäologisch Institute, Groningen.
- Bottema, S. (1990). Holocene environment of the Southern Argolid: A pollen core from Kiladha Bay. In Wilkinson, T. J., and Duhon, S., *Franchthi Paralia, The Sediments, Stratigraphy, and Offshore Investigations*, Indiana University Press, Excavations at Franchthi Cave, Greece, fasc. 6, Bloomington/Indianapolis, pp. 117-138.
- Broodbank, C., and Strasser, Th. F. (1991). Migrant farmers and the Neolithic colonization of Crete. *Antiquity* 65(247): 233-245.
- Carington Smith, J. (1977). Appendix 2: Cloth and mat impressions. In Coleman, J. E., *Keos I. Kephala*, American School of Classical Studies, Princeton, NJ, pp. 114-125.
- Caskey, J. L. (1957). Excavations at Lerna, 1956. *Hesperia* 26: 142-162.
- Caskey, J. L. (1958). Excavations at Lerna, 1957. *Hesperia* 27: 125-144.
- Cauvin, J. (1992). A propos de l'ouvrage de C. Renfrew: L'enigme néolithique. Le modèle oriental de la diffusion néolithique. *Topoi. Orient-Occident* 2: 91-106.
- Chapman, J. C. (1989). The early Balkan village. In Bökönyi, S. (ed.), *Neolithic of SE Europe and its Eastern Connections*, Varia Archaeologica Hungarica II, Budapest, pp. 33-53.
- Cherry, J. F. (1981). Pattern and process in the earliest colonization of the Mediterranean islands. *Proceedings of the Prehistoric Society* 47: 41-68.
- Cherry, J. F. (1990). The first colonization of the Mediterranean islands: A review of recent research. *Journal of Mediterranean Archaeology* 3(2): 145-221.
- Cherry, J. F., and Torrence, R. (1984). The typology and chronology of chipped stone assemblages in the prehistoric Cyclades. In MacGillivray, J. A., and Barber, R. L. N. (eds.), *The Prehistoric Cyclades*, Department of Classical Archaeology, Edinburgh, pp. 12-25.
- Cherry, J. F., Davis, J. L., Demitrack, A., Mantzourani, E., Strasser, Th. and Talalay, L. (1988). Archaeological survey in an artifact-rich landscape: a Middle Neolithic example from Nemea, Greece. *American Journal of Archaeology* 92: 159-176.
- Coleman, J. E. (1977). *Keos I. Kephala, A Late Neolithic Settlement and Cemetery*, American School of Classical Studies, Princeton, NJ.
- Coleman, J. E. (1993). The Late Neolithic period: questions of terminology and chronology. In Sixth International Colloquium on Aegean Prehistory, *The Prehistoric Aegean and its Relations to Adjacent Areas*, Athens, Sept. 1987 (in press).
- Cullen, T. (1985a). *A Measure of Interaction Among Neolithic Communities: Design Elements of the Greek Urfinis Pottery*, Ph.D. dissertation, Program in Classical Archaeology, University of Indiana, Bloomington.
- Cullen, T. (1985b). Social implications of ceramic style in the Neolithic Peloponnese. In Kingery, W. D. (ed.), *Ancient Technology to Modern Science*, American Ceramic Society, Columbus, OH, pp. 77-100.
- Cullen, T., and Keller, D. R. (1990). The greek pithos through time: Multiple functions and diverse imagery. In Kingery, W. D. (ed.), *The Changing Roles of Ceramics in Society: 26,000 B.P. to the Present*, American Ceramic Society, Westerville, pp. 183-209.
- Darque, P. (1990). Pour l'abandon du terme "megaron." In Darque, P., and Treuil, R. (eds.), *L'habitat égéen préhistorique*, Ecole Française d'Athènes, de Boccard, Paris, pp. 21-31.
- Davis, J. L. (1992). Review of Aegean prehistory I: the islands of the Aegean. *American Journal of Archaeology* 96(4): 699-756.
- Deith, M. R., and Shackleton, N. J. (1988). Oxygen isotope analysis of marine molluscs from Franchthi Cave. In Shackleton, J. C., *Marine Molluscan Remains from Franchthi Cave*, Excavations at Franchthi Cave, Greece, fasc. 4, Indiana University Press, Bloomington-Indianapolis, pp. 133-156.

- Demitrack, A. (1986). *The Late Quaternary Geologic History of the Larissa Plain, Thessaly, Greece: Tectonic, Climatic and Human Impact on the Landscape*, Ph.D. dissertation, Stanford University, Palo Alto, CA.
- Demoule, J.-P. (1991). Les recherches récentes en Grèce septentrionale et les problèmes chronologiques et régionaux des cultures à céramique au graphite. In Lichardus, J. (ed.), *Kupferzeit als Historische Epoche*, Universität des Saarlandes and Rudolf Habelt, Saarbrücker Beiträge zur Altertumskunde, pp. 227–236.
- Demoule, J.-P. La céramique du Néolithique récent de Dikili Tach. In Treuil, R. (ed.), *Dikili Tach. Village préhistorique de Macédoine orientale. Fouilles de Jean Deshayes (1961–1975)*, II. Suppl. XXVI du BCH, Ecole Française d'Archéologie, Athènes (forthcoming).
- Demoule, J.-P., Gallis, K., and Manolakakis, L. (1988). Transition entre les cultures néolithiques de Sesklo et de Dimini: les catégories céramiques. *Bulletin de Correspondance Hellénique* 112(1): 1–58.
- Dennell, R. (1983). *European Economic Prehistory: A New Approach*, Academic Press, London.
- Diamant, S. R. (1974). *The Later Village Farming Stage in Southern Greece*, Ph.D. dissertation, Department of Anthropology, University of Pennsylvania, Philadelphia.
- Diamant, S. R. *The Ground Stone Objects from Franchthi Cave, Greece*, Excavations at Franchthi Cave, Greece, fasc. 10, Indiana University Press, Bloomington/Indianapolis (in press).
- Elia, R. J. (1982). *A Study of the Neolithic Architecture of Thessaly, Greece*, Ph.D. dissertation, Department of Archaeology, Boston University, Boston.
- Efstratiou, N. (1985). *A Neolithic Site in the Northern Sporades. Aegean Relationships During the Neolithic of the 5th Millennium*, British Archaeological Reports, S241, Oxford.
- Elster, E. (1989). The chipped stone industries. In Gimbutas, M., Winn, Sh., and Shimabuku D. (eds.), *Achilleion, a Neolithic Settlement in Thessaly, Greece, 6,400–5,600 B.C.*, Monumenta Archaeologica 14, UCLA, Los Angeles, pp. 273–306.
- Evans, J. D. (1964). Excavations in the Neolithic settlement of Knossos 1957–1960, part I. *Annual of the British School in Athens* 59: 132–240.
- Evans, J. D., and Renfrew, C. (1968). *Excavations at Saliagos near Antiparos*, Supplementary Volume 5, The British School in Athens, Thames and Hudson, Oxford.
- Forbes, H. (1989). Of grandfathers and grand theories: the hierarchised ordering of responses to hazard in a Greek rural community. In Halstead, P., and O'Shea, J. (eds.), *Bad Year Economics. Cultural Responses to Risk and Uncertainty*, Cambridge University Press, Cambridge, pp. 87–97.
- Fotiadis, M. (1987). Kitrini Limni, Nomou Kozanis, 1987. Proistoriki erevna. *To Archaologiko Ergo sti Makedonia kai Thraki, 1*, Thessaloniki, pp. 51–61.
- Fotiadis, M. (1988). Proistoriki erevna stin Kitrini Limni, N. Kozanis, 1988. Mia syntomi ekthesi. *To Archaologiko Ergo sti Makedonia kai Thraki, 2*, Thessaloniki, pp. 41–54.
- French, D. (1972). Notes on prehistoric pottery groups from Central Greece. Ms. on file, British School of Archaeology, Athens.
- Frierman, J. (1969). Appendix II. The Balkan Graphite ware. In Renfrew, C. The autonomy of the South-East European Copper Age. *Proceedings of the Prehistoric Society* 35: 42–44.
- Gallis, K. (1975). Kafseis necron apo tin archaioteran neolithikin ephoin eis tin Thessalian. *Athens Annals of Archaeology* 8(2): 241–258.
- Gallis, K. (1982). *Kafseis Nekron apo tin Neolithiki Epochi sti Thessalia*, Ekdoti Tameiou archaeologikon poron kai apallotrioseon, Athens.
- Gallis, K. (1985). A Late Neolithic foundation offering from Thessaly. *Antiquity* 59: 20–24.
- Gallis, K. (1989). Atlas proistorikon oikismon tis anatolikis thessalikis pediaas. *Thessaliko Imerologio* 16: 6–144.
- Gallis, K., and Orphanidi, D. L. (1991). Portreta apo ti Neolithiki Thessalia. *Arhaiologia* 38: 44–49.
- Gallis, K., and Orphanidou-Georgiadou L. Some new faces in the Neolithic society of Thessaly. In Decourt, J.-C., Helly, B., and Gallis, K. (eds.), *La Thessalie, Colloque international d'archéologie: 15 années de recherches (1975–1990) bilans et perspectives*, Lyon, 1990, Tameio Arhaiologikon poron kai apallotrioseon, Athens (in press).
- Gardner, E. J. (1978). *The Pottery Technology of the Neolithic period in Southeastern Europe*, Ph.D. dissertation, University of California, Los Angeles.
- Gifford, J. A. (1990). Analysis of submarine sediments off Paralia. In Wilkinson, T. J., and Duhon,

- S., *Franchthi Paralia, The Sediments, Stratigraphy, and Offshore Investigations*, Excavations at Franchthi Cave, Greece, fasc. 6, Indiana University Press, Bloomington/Indianapolis, pp. 85–116.
- Gimbutas, M. (1982). *The Goddesses and Gods of Old Europe, 6000–3500 B.C. Myths and Cult Images*, Thames and Hudson, London.
- Gimbutas, M. (1989). Figurines and cult equipment: Their role in the reconstruction of Neolithic religion. In Gimbutas, M., Winn, Sh., and Shimabuku, D. (eds.), *Achilleion, a Neolithic Settlement in Thessaly, Greece, 6,400–5,600 B.C.*, Monumenta Archaeologica 14, UCLA, Los Angeles, pp. 251–258.
- Gimbutas, M., Winn, Sh., and Shimabuku, D. (1989). *Achilleion, a Neolithic Settlement in Thessaly, Greece, 6,400–5,600 B.C.*, Monumenta Archaeologica 14, UCLA, Los Angeles.
- Grammenos, D. (1991). *Neolithikes erevnes stin Kentriki kai Anatoliki Makedonia*. Athinaios Arhaiologikis Etairias 117, Athens.
- Greig, J. R. A., and Turner, J. (1974). Some pollen diagrams from Greece and their archaeological significance. *Journal of Archaeological Science* 1: 177–194.
- Gropengiesser, H. (1986). Siphnos, Kap Agios Sostis: Keramische prähistorische Zeugnisse aus dem Gruben- und Hüttenrevier. *Athenische Mitteilungen* 101: 1–39.
- Guest-Papamanoli, A. (1978). L'emploi de la brique crue dans le domaine égéen à l'époque néolithique et à l'âge du bronze. *Bulletin de Correspondance Hellénique* 102: 3–24.
- Halstead, P. (1981). Counting sheep in Neolithic and Bronze Age Greece. In Hodder, I., Isaac, G., and Hammond, N. (eds.), *Patterns of the Past. Studies in Honor of David Clarke*, Cambridge University Press, Cambridge, pp. 307–339.
- Halstead, P. (1984). *Strategies for Survival: An Ecological Approach to Social and Economic Change in Early Farming Communities of Thessaly, N. Greece.*, Ph.D. thesis, University of Cambridge, Cambridge.
- Halstead, P. (1987). Man and other animals in later Greek prehistory. *Annual of the British School in Athens* 82: 71–83.
- Halstead, P. (1989a). The economy has a normal surplus: economic stability and social change among early farming communities of Thessaly, Greece. In Halstead, P., and O'Shea, J. (eds.), *Bad Year Economics. Cultural Responses to Risk and Uncertainty*, Cambridge University Press, Cambridge, pp. 68–80.
- Halstead, P. (1989b). Like rising damp? An ecological approach to the spread of farming in south east and central Europe. In Milles, A., Williams, D., and Gardner, N. (eds.), *The Beginnings of Agriculture*, British Archaeological Reports International Series 496, pp. 223–253.
- Halstead, P. (1990). Waste not, want not: Traditional responses to crop failure in Greece. *Rural History* 1(2): 147–164.
- Halstead, P., and Jones, G. I. (1980). Early Neolithic economy in Thessaly: Some evidence from excavations at Prodromos. *Anthropologica* 1: 93–117.
- Halstead, P., and Jones, G. I. (1987). Bioarchaeological remains from Kalythies Cave, Rhodes. In Sampson, A., *I Neolithiki Periodos sta Dodekanisa*, Ekdoti tou Tameiou Arhaiologikon poron kai apallotrioseon, Athens, pp. 135–145.
- Hansen, J. M. (1988). Agriculture in the Prehistoric Aegean: Data versus speculation. *American Journal of Archaeology* 92: 39–52.
- Hansen, J. M. (1991). *The Palaeoethnobotany of Franchthi Cave*, Excavations at Franchthi Cave, Greece, fasc. 7, Indiana University Press, Bloomington/Indianapolis.
- Hatjianastasiou, O. (1988). A Late Neolithic settlement at Grotta, Naxos. In French, E. B., and Wardle, K. A. (eds.), *Problems in Greek Prehistory*. Papers presented at the Centenary Conference of the British School of Archaeology at Athens, Manchester, April 1986, Bristol Classical Press, Bristol, pp. 11–20.
- Hauptmann, H. (1971). Forschungsbericht zur ägäischen Frühzeit. *Archäologischer Anzeiger* 1971: 348–387.
- Hauptmann, H. (1981). *Die deutschen Ausgrabungen auf der Otzaki-Magula in Thessalien. III. Das späte Neolithikum und das Chalkolithikum*. Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturräume 21, Rudolf Habelt, Bonn.
- Hauptmann, H., and Milojicic, V. (1969). *Die Funde der frühen Dimini-Zeit aus der Arapi-Magula*,

- Thessalien*. Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes 9, Rudolf Habelt, Bonn.
- Helmer, D. (1992). *La domestication des animaux par les hommes préhistoriques*, Masson, Paris.
- Hillman, G. (1981). Reconstructing crop husbandry practices from charred remains of crops. In Mercer, R. (ed.), *Farming Practices in British Prehistory*, Edinburgh University Press, Edinburgh, pp. 123–162.
- Hillman, G. C., and Davies, M. S. (1990). Measured domestication rates in wild wheats and barley under primitive cultivation, and their archaeological implications. *Journal of World Prehistory* 4(2): 157–222.
- Hinz, G. (1979). *Neue Tierknochenfunde aus der Magula Pevkakia in Thessalien. I: Die Nichtwiederkäufer*, Ph.D. dissertation, Munich.
- Hourmouziadis, G. (1971). Dio neai egkastaseis tis archaioteras Neolithikis eis tin dytikin Thessalian. *Athens Annals of Archaeology* 4(2): 164–175.
- Hourmouziadis, G. (1973). Burial customs. In Theocharis, D. R., *Neolithic Greece*, National Bank of Greece, Athens, pp. 210–212.
- Hourmouziadis, G. (1974). *I Anthropomorphi Eidoloplastiki tis Neolithikis Thessalias*, Etaireia Thessalikou Erevnon, Athens.
- Hourmouziadis, G. (1977). Ena eidikevmeno ergastirio kerameikis sto neolithiko Dimini. *Athens Annals of Archaeology* 10(2): 207–226.
- Hourmouziadis, G. (1979). *To Neolithiko Dimini*, Etaireia Thessalikou Erevnon, Volos.
- Jacobsen, T. W. (1981). Franchthi Cave and the beginning of settled village life in Greece. *Hesperia* 50(4): 303–319.
- Jacobsen, T. W. (1984). Seasonal pastoralism in Southern Greece: A consideration of the ecology of neolithic Urfirms pottery. In Rice, P. M. (ed.), *Pots and Potters. Current Approaches in Ceramic Archaeology*, Institute of Archaeology, Monograph 24, UCLA, Los Angeles, pp. 27–43.
- Jacobsen, T. W., and Cullen, T. (1981). A consideration of mortuary practices in Neolithic Greece: Burials from Franchthi Cave. In Humphreys, S. C., and King, H. (eds.), *Mortality and Immortality: The Anthropology and Archaeology of Death*, Academic Press, London, pp. 79–101.
- Jones, G. (1987). A statistical approach to the archaeological identification of crop processing. *Journal of Archaeological Science* 14: 311–323.
- Jones, R. E. (1986). *Greek and Cypriot Pottery. A Review of Scientific Studies*, The British School at Athens, Fitch Laboratory Occasional Paper 1.
- Jordan, B. (1975). *Die Tierknochenfunde aus der Magula Pevkakia in Thessalien*, Dissertation, University of Munich, Munich.
- Jullien, R. (1981). La faune des vertébrés, à l'exclusion de l'homme, des oiseaux, des rongeurs et poissons. In Lambert, N. (ed.), *La Grotte Préhistorique de Kitsos (Attique), missions 1968–1978*, ADPF-Ecole Française d'Athènes, Paris, pp. 569–594.
- Korosec, J. (1958). *The Neolithic Settlement at Danilo Bitinj: The Results of Excavations Performed in 1953*, Yugoslav Academy of Sciences and Arts, Zagreb.
- Kosmopoulos, L. M. (1948). *The Prehistoric Inhabitation of Corinth, Vol. I*, Bisher F. Bruckmann, Munich.
- Kotsakis, K. (1981). Tria oikimata tou oikismou tou Sesklou. Anaskafiki erevna. *Anthropologika* 2: 87–107.
- Kotsakis, K. (1983). *Kerameiki technologia kai kerameiki diaforopoiisi. Provlimata tis graptis kerameikis tis mesis ephois tou Sesklou*, Didaktoriki Diatrivi, Thessaloniki.
- Kotsakis, K. (1986). Aspects of technology and distribution of MN Pottery of Sesklo. In Jones, R. E., and Catling, H. W. (eds.), *Science in Archaeology*. Proceedings of a meeting held at the British School at Athens, January 1985, British School at Athens, Fitch Laboratory Occasional Paper 2, pp. 1–2.
- Kotsakis, K. The use of habitational space in Neolithic Sesklo. In Decourt, J.-C., Helly, B., and Gallis, K. (eds.), *La Thessalie, Colloque international d'archéologie: 15 années de recherches (1975–1990) bilans et perspectives*, Lyon, 1990, Tameio Arhaiologikon poron kai apallotrioseon, Athens (in press).
- Kroll, H. (1991). Südosteuropa. In Van Zeist, K., Wasylikowa, K., and Behre, K., (eds.), *Progress in Old World Palaeoethnobotany*, Balkema, Rotterdam, pp. 161–177.

- Lambert, N. (1972). Grotte d'Alépotrypa (Magne). *Bulletin de Correspondance Hellénique* 96: 845-871.
- Lambert, N. (ed.) (1981). *La Grotte Préhistorique de Kitsos (Attique), missions 1968-1978*, ADPF-Ecole Française d'Athènes, Paris, 2 vol.
- Larje, R. (1987). Animal bones. In Hellström, P. (ed.), *Paradeisos. A Late Neolithic Settlement in Aegean Thrace*, Medelhavsmuseet, Memoir 7, Stockholm, pp. 89-118.
- Lavezzi, J. C. (1978). Prehistoric investigations at Corinth. *Hesperia* 47(4): 402-451.
- Malone, C. (1985). Pots, prestige and ritual in Neolithic Southern Italy. In Malone, C., and Stoddart, S. (eds.), *Papers in Italian Archaeology IV. The Cambridge Conference*, British Archaeological Reports, Int. Ser. 244, Oxford, pp. 118-151.
- Maniatis, Y., and Perdikatsis, V. (1983). Technologiki kai proelevisiaki meleti tis kerameikis tou Sesklou. In Kotsakis, K., *Kerameiki technologia kai kerameiki diaforopoiisi*, Didaktoriki Diatrivi, Thessaloniki, pp. 483-492.
- Maniatis, Y., and Tite, M. S. (1981). Technological examination of Neolithic-Bronze Age pottery from Central and Southeast Europe and from the Near-East. *Journal of Archaeological Science* 8: 59-76.
- Maniatis, Y., Perdikatsis, V., and Kotsakis, K. (1988). Assessment of in-site variability of pottery from Sesklo, Thessaly. *Archaeometry* 30(2): 264-274.
- Marangou, Chr. (1992). *Eidolia. Figurines et miniatures du Néolithique récent et du Bronze Ancien en Grèce*, British Archaeological Reports, Int. Ser. 576, Oxford.
- McGeehan-Liritzis, V. (1983). The relationships between metalwork, copper sources and the evidence for settlement in the Greek Late Neolithic and Early Bronze Age. *Oxford Journal of Archaeology* 2(2): 147-180.
- McGeehan-Liritzis, V., and Gale, N. H. (1988). Chemical and lead isotope analyses of Greek Late Neolithic and Early Bronze Age metals. *Archaeometry* 30(2): 199-225.
- Milojčić, V. (1949). *Chronologie der jüngeren Steinzeit Mittel- und Südosteuropas*, Gebrüder Mann, Berlin.
- Milojčić, V. (1955). Vorbericht über die Ausgrabungen auf der Otzaki-Magula 1954. *Archäologischer Anzeiger* 70: 157-182.
- Milojčić, V. (1960). *Hauptergebnisse der deutschen Ausgrabungen in Thessalien, 1953-1958*, Rudolf Habelt, Bonn.
- Milojčić, V., Boessneck, J., and Hopf, M. (1962). *Die deutschen Ausgrabungen auf der Argissa-Magula in Thessalien, I. Das präkeramische Neolithikum sowie die Tier- und Pflanzenreste*, Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes 2, Rudolf Habelt, Bonn.
- Milojčić, V., von den Driesch, A., Enderle, K., Milojčić-v.Zumbusch, J., and Kilian, K. (1976). *Die deutschen Ausgrabungen auf Magulen um Larisa in Thessalien 1966. Agia Sofia-Magula. Karagyös-Magula. Bunar Baschi*, Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes 15, Rudolf Habelt, Bonn.
- Mottier, Y. (1981). *Die deutschen Ausgrabungen auf der Otzaki-Magula in Thessalien. I: Das Mittlere Neolithikum*. Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes 22, Rudolf Habelt, Bonn.
- Moundrea-Agrafioti, H. A. (1980). Palaiοethnologika simperasmata apo ti meleti ton lithinou kai osteinon ergaleion tou neolithikou oikismou Prodromou Karditsas. Praktika apo ta A'synedrio thessalikou spoudon. *Thessalika Chronika* 13: 489-497.
- Moundrea-Agrafioti, H. A. (1981). *La Thessalie du sud-est au Néolithique: outillage lithique et osseux*, Ph.D. dissertation, Department of Ethnology, University of Paris X, Paris.
- Moundrea-Agrafioti, H. A. (1983). Pièces lustrées du Néolithique thessalien: Essai de classement. In Cauvin, M.-C. (ed.), *Traces d'utilisation sur les outils néolithiques du Proche-Orient*, Maison de l'Orient, Lyon, pp. 199-207.
- Moundrea-Agrafioti, H. A. (1987). Problèmes d'emmanchement dans le Néolithique grec: les gaines et manches en bois de cervidé. In Stordeur, D. (ed.), *La Main et l'outil. Manches et emmanchements préhistoriques*, Maison de l'Orient, Lyon, pp. 247-256.
- Moundrea-Agrafioti, A. (1992). Agios Petros Kyra-Panagias. Stoiheia tis lithotechnias tou laxemenou lithou. *Diethnes synedrio gia tin Archaia Thessalie sti mnimi tou Dimitri P. Theochari*, Athens, pp. 191-202.

- Moundrea-Agrafioti, A., and Gnardellis, Ch. (1991). Outils tranchants thessaliens en pierre polie: Un réexamen de la typologie de Christos Tsountas. *Les Cahiers de l'analyse des données* 16(2): 161-178.
- Muhly, J. D. (1985). Beyond typology: Aegean metallurgy in its historical context. In Wilkie, N. C., and Coulson, W. D. E. (eds.), *Contributions to Aegean Archaeology. Studies in Honor of William A. McDonald*, Center of Ancient Studies, University of Minnesota, Minneapolis, pp. 109-141.
- Otto, B. (1985). *Die verzierte Keramik der Sesklo- und Diminikultur Thessaliens*, Philipp von Zabern, Mainz.
- Özdoğan, M. (1989). Neolithic Cultures of Northwestern Turkey. A general appraisal of the evidence and some considerations. In Bökönyi, S. (ed.), *Neolithic of Southeastern Europe and Its Near Eastern Connections*, Varia Archaeologica Hungarica II, pp. 201-215.
- Papathanasopoulos, G. A. (1971). Archaiologika Chronika. Spilaia Dirou, 1971. *Athens Annals of Archaeology* 4(3): 289-304.
- Payne, S. (1973). Kill-off patterns in sheep and goats; the mandibles from Asvan Kale. *Anatolian Studies* 23: 281-303.
- Payne, S. (1975). Faunal change at the Franchthi Cave from 20,000 B.C. to 3,000 B.C. In Clason, A. T. (ed.), *Archaeozoological Studies*, Elsevier, The Hague, pp. 120-131.
- Payne, S. (1985). Zoo-archaeology in Greece: A readers' guide. In Wilkie, N. C., and Coulson, W. D. (eds.), *Contributions to Aegean Archaeology: Studies in Honor of William A. McDonald*, Center of Ancient Studies, University of Minnesota, Minneapolis, pp. 211-243.
- Perlès, C. (1979). Des navigateurs méditerranéens il y a 10 000 ans. *La Recherche* 96: 82-83.
- Perlès, C. (1987). *Les industries lithiques taillées de Franchthi (Argolide, Grèce). Tome I: Présentation générale et industries paléolithiques*, Excavations at Franchthi Cave, fasc. 3, Indiana University Press, Bloomington/Indianapolis.
- Perlès, C. (1988). New ways with an old problem: Chipped stone assemblages as an index of cultural discontinuity in the early Greek Prehistory. In French, E. B., and Wardle, K. A. (eds.), *Problems in Greek Prehistory. Papers Presented at the Centenary Conference of the British School of Archaeology at Athens, Manchester, April 1986*, Bristol Classical Press, Bristol, pp. 477-488.
- Perlès, C. (1989). La néolithisation de la Grèce. In Aurenche, O., and Cauvin, J. (eds.), *Néolithisations: Proche et Moyen Orient, Méditerranée orientale, Nord de l'Afrique, Europe méridionale, Chine, Amérique du Sud*, British Archaeological Reports, Int. Ser. 516, Oxford, pp. 109-127.
- Perlès, C. (1990a). L'outillage de pierre taillée néolithique en Grèce: Approvisionnement et exploitation des matières premières. *Bulletin de Correspondance Hellénique* 114(1): 1-42.
- Perlès, C. (1990b). *Les industries lithiques taillées de Franchthi (Argolide, Grèce). Tome II: Les Industries du Mésolithique et du Néolithique initial*, Excavations at Franchthi Cave, fasc. 5, Indiana University Press, Bloomington/Indianapolis.
- Perlès, C. (1992). Systems of exchange and organization of production in Neolithic Greece. *Journal of Mediterranean Archaeology* 5(2): 115-164.
- Perlès, C. Le Mésolithique de Grèce: données et problèmes. In Villaverde Bonnilla, V., and Auro Tortosa, E. (eds.), *Transformaciones Culturales y Economicas durante el Tardiglacial y el inicio del Holoceno en el Ambito Mediterraneo*, University of Valencia (in press).
- Perlès, C., and Vaughan, P. (1983). Pièces lustrées, travail des plantes et moissons à Franchthi (Xème-IVème mill. B.C.). In Cauvin, M.-C. (ed.), *Traces d'utilisation sur les outils néolithiques du Proche-Orient*, Maison de l'Orient, Lyon, pp. 209-229.
- Phelps, W. W. (1975). *The Neolithic Pottery Sequence in Southern Greece*, Ph.D. thesis, Institute of Archaeology, London.
- Phelps, W. W. (1981-1982). Three Peloponnesian Neolithic problems. In *Praktika B' Diethnous syndriou peloponniakon spoudon*, Athens, pp. 363-372.
- Phelps, W. W. (1987). Prehistoric figurines from Corinth. *Hesperia* 56: 235-253.
- Pilali-Papasteriou, A., and Papaevthimiou-Papanthimou, E. (1989). Nees anaskafikez evresnes sto Mandalo D. Makedonias. *Egnatia* 1: 17-27.
- Rackham, O. (1982). Land-use and the native vegetation of Greece. In Bell, M., and Limbrey, S.

- (eds.), *Archaeological Aspects of Woodland Ecology*, British Archaeological Reports, Int. Ser. 146, Oxford, pp. 177-198.
- Renault-Miskovsky, J. (1989). Paleobotanical evidence of anthropic desertification in mediterranean plains. In Spanier, E., Steinberger, Y., and Luria, H. (eds.), *Environmental Quality and Ecosystem Stability: Vol. IV-B. Environmental Quality*, ISEEQS, Jerusalem, pp. 41-51.
- Renfrew, C. (1965). *The Neolithic and Early Bronze Age Cultures of the Cyclades and Their External Relations*, Ph.D. thesis, University of Cambridge.
- Renfrew, C. (1969). The autonomy of the south-east European copper age. *Proceedings of the Prehistoric Society* 35: 12-47.
- Renfrew, C. (1972). *The Emergence of Civilization: The Cyclades and the Aegean in the Third Millennium B.C.*, Methuen, London.
- Renfrew, C. (1973). Trade and craft specialisation. In Theocharis, D. R., *Neolithic Greece*, National Bank of Greece, Athens, pp. 179-191.
- Renfrew, C. (1984). Trade as action at a distance. In Renfrew, C., *Approaches to Social Archaeology*, Harvard University Press, Cambridge, MA, pp. 86-134.
- Renfrew, C., Gimbutas, M., and Elster, E. (eds.) (1986). *Excavations at Sitagroi. A Prehistoric Village in Northeast Greece, Vol. 1*, Institute of Archaeology, Monumenta Archaeologica 13, UCLA, Los Angeles.
- Renfrew, J. (1966). A report on recent finds of carbonized cereal grains and seeds from prehistoric Thessaly. *Thessalika* 4: 21-36.
- Rhomiopoulou, K., and Ridley, C. (1973). Prehistoric settlement of Serbia (W. Macedonia). Excavations 1972. *Athens Annals of Archaeology* 6: 419-424.
- Rhomiopoulou, K., and Ridley, C. (1974). Prehistoric settlement of Serbia (W. Macedonia). Excavations 1973. *Athens Annals of Archaeology* 7: 351-360.
- Ridley, C., and Wardle, K. A. (1979). Rescue excavations at Serbia 1971-1973: A preliminary report. *Annual of the British School at Athens* 74: 185-226.
- Rodden, R. J. (1962). Excavations at the Early Neolithic site at Nea Nikomedeia, Greek Macedonia (1961 season). *Proceedings of the Prehistoric Society* 28: 267-288.
- Rodden, R. J. (1964). Recent discoveries from prehistoric Macedonia. An interim report. *Balkan Studies* 5: 109-124.
- Rodden, R. J. (1965). An Early Neolithic village in Greece. *Scientific American* 212(4): 82-88.
- Rondiri, V. (1985). Epifaneiaki kerameiki neolithikon theseon tis Thessalias: katanomi sto choro. *Anthropologika* 8: 53-74.
- Roux, V. (1990). *Le tour du potier. Spécialisation artisanale et compétences techniques*, CNRS, Monographies du CRA No. 4, Paris.
- Runnels, C. N. (1981). *A Diachronic Study and Economic Analysis of Millstones from the Argolid, Greece*, Ph.D. dissertation, University of Indiana, Bloomington.
- Runnels, C. N. (1983). Trade and communication in prehistoric Greece. *Ekistics* 302: 417-420.
- Runnels, C. N. (1985). Trade and demand for millstones in Southern Greece in the Neolithic and the Early Bronze Age. In Knapp, A. B., and Stech, T. (eds.), *Prehistoric Production and Exchange. The Aegean and Eastern Mediterranean*, Institute of Archaeology, Monograph XXV, UCLA, Los Angeles, pp. 30-43.
- Runnels, C. N. (1988). A prehistoric survey of Thessaly: New light on the Greek Middle Paleolithic. *Journal of Field Archaeology* 15: 277-290.
- Runnels, C. N., and Hansen, J. M. (1986). The olive in the prehistoric Aegean: The evidence for domestication in the Early Bronze Age. *Oxford Journal of Archaeology* 5(3): 299-308.
- Runnels, C. N., and van Andel, Tj. J. (1987). The evolution of settlement in the southern Argolid, Greece. An economic explanation. *Hesperia* 56(3): 303-334.
- Runnels, C. N., and van Andel, Tj. H. (1988). Trade and the origins of agriculture in the Eastern Mediterranean. *Journal of Mediterranean Archaeology* 1(1): 83-109.
- Sampson, A. (1981). *I Neolithiki kai i Protoelladiki I stin Euboia*, Arheion Euboikon Meleton, Suppl. 24, Athens.
- Sampson, A. (1987). *I Neolithiki Periodos sta Dodekanisa*, Ekdosi tou Tameiou Arhaiologikon Poron kai Apallotrioseon, Athens.
- Sampson, A. (1988). *I Neolithiki Katoikisi sto Giali tis Nisirou*, Euboiki Arhaiofilos Etaireia, Athens.

- Sampson, A. (1989). Some chronological problems of the end of the Neolithic and the Early Bronze Age. In Maniatis, Y. (ed.), *Archaeometry*, Elsevier, Amsterdam, pp. 709–718.
- Schachermeyr, F. (1976). *Die agaische Frühzeit. I: die vormykenischen Perioden*, Austrian Academy of Sciences, Vienna.
- Schneider, G., Knoll, H., Gallis, K., and Demoule, J.-P. (1991). Transition entre les cultures néolithiques de Sesklo et de Dimini: Recherches minéralogiques, chimiques et technologiques sur les céramiques et les argiles. *Bulletin de Correspondance Hellénique* 115(1): 1–64.
- Schwartz, C. A. (1981). The fauna from the Early Neolithic Sesklo. In Wijnen, M., *The Early Neolithic I Settlement at Sesklo: An Early Farming Community in Thessaly, Greece*, Universitaire Pers Leiden, Leiden, p. 112.
- Séfériades, M. (1992). L'outillage. Le métal. In Treuil, R. (ed.), *Dikili Tash. Village préhistorique de Macédoine orientale. Fouilles de Jean Deshayes (1961–1975)*, I. Suppl. XXVI du BCH, Ecole Française d'Athènes, Athènes, diff. de Boccard, pp. 113–119.
- Shackleton, J. C. (1988). *Marine Molluscan Remains from Franchthi Cave*, Excavations at Franchthi Cave, fasc. 4, Indiana University Press, Bloomington/Indianapolis.
- Sivignon, M. (1975). *La Thessalie. Analyse géographique d'une province grecque*, Institut des Etudes Rhodaniennes des Universités de Lyon, Mémoires et Documents 17, Lyon.
- Sordinas, A. (1969). Investigations of the prehistory of Corfu during 1964–1966. *Balkan Studies* 10(2): 393–424.
- Stos-Gale, Z. A., and Macdonald, C. F. (1991). Sources of metal and trade in the Bronze Age Aegean. In Gale, N. H. (ed.), *Bronze Age Trade in the Mediterranean*, SIMA 90, Jonsersed 1991, pp. 249–288.
- Talalay, L. E. (1987). Rethinking the function of clay figurine legs from Neolithic Greece: An argument by analogy. *American Journal of Archaeology* 91: 161–169.
- Talalay, L. E. (1991). Body imagery of the Ancient Aegean. *Archaeology* 44(4): 46–49.
- Talalay, L. E. (1993). *Deities, Dolls and Devices: Neolithic Figurines from Franchthi Cave, Greece*, Excavations at Franchthi Cave, fasc. 9, Indiana University Press, Bloomington/Indianapolis.
- Theocharis, D. R. (1958). Ek tis prokeramikis Thessalias. *Thessalika* 1: 70–86.
- Theocharis, D. R. (1968). Anaskafai en Sesklo. *Praktika Arhaiologikis Etairias* 1968: 24–30.
- Theocharis, D. R. (1973). *Neolithic Greece*, National Bank of Greece, Athens.
- Torrence, R. (1986). *Production and Exchange of Stone Tools, Prehistoric Obsidian in the Aegean*, Cambridge University Press, Cambridge.
- Toufexis, G. Neolithic animal figurines from Thessaly. In Decourt, J.-C., Helly, B., and Gallis, K. (eds.), *La Thessalie, Colloque international d'archéologie: 15 années de recherches (1975–1990) bilans et perspectives*, Lyon, 1990, Tameio Arhaiologikon poron kai apallotrioseon, Athens (in press).
- Treuil, R. (1983). *Le Néolithique et le Bronze ancien Egéens*, Ecole française d'Athènes, diffusion de Boccard, Paris.
- Treuil, R., Darcque, P., Poursat, J.-CL., and Touchais, G. (1989). *Les civilisations égéennes du Néolithique et de l'Age du Bronze*, Presses Universitaires de France, Nouvelle Cléo, Paris.
- Tsountas, Ch. (1908). *Ai proistorikai akropoleis Diminiou kai Sesklou*, Sakellariou, Athens.
- Tsuneki, A. (1989). The manufacture of *Spondylus* shell objects at neolithic Dimini, Greece. *Orient* 25: 1–21.
- van Andel, Tj. H., and Runnels, C. N. (1987). *Beyond the Acropolis. A Rural Greek Past*, Stanford University Press, Stanford.
- van Andel, Tj. H., Zangger, E., and Demitrac, A. (1990). Land use and soil erosion in prehistoric and historical Greece. *Journal of Field Archaeology* 17: 379–396.
- van Zeist, W., and Bottema, S. (1971). Plant husbandry in Early Neolithic Nea Nikomedeia, Greece. *Acta Botanica Neerlandica* 20: 524–538.
- Vitelli, K. D. (1974). *The Greek Neolithic Patterned Urfinis Ware from the Franchthi Cave and Lerna*, Ph.D. dissertation, University of Pennsylvania, Philadelphia.
- Vitelli, K. D. (1984a). Greek Neolithic pottery by experiment. In Rice, M. P. (ed.), *Pots and Potters. Current Approaches in Ceramic Archaeology*, Institute of Archaeology, Monograph XXIV, UCLA, Los Angeles, pp. 113–131.
- Vitelli, K. D. (1984b). Social implications of the EN pottery assemblage at Franchthi Cave. Manuscript.

- Vitelli, K. D. (1988). From ceramic technique to social behavior. Paper presented at the Symposium on Ceramic Replication, SAA meeting, Phoenix, April 29.
- Vitelli, K. D. (1989). Were pots first made for foods? Doubts from Franchthi. *World Archaeology* 21(1): 17–29.
- Vitelli, K. D. (1991). The possible uses of plant extracts by prehistoric potters. Paper presented at the 1991 SAA meeting, New Orleans, LA.
- Vitelli, K. D. (1993). *Franchthi Neolithic Pottery: Classification and Ceramic Phases 1 and 2*, Excavations at Franchthi Cave, fasc. 8, Indiana University Press, Bloomington/Indianapolis.
- von den Driesch, A., and Enderle, K. (1976). Die Tierreste aus der Agia-Sofia Magula. In Milošević, V., von den Driesch, A., Enderle, K., Milošević-v. Zumbusch, J., and Kilian, K. (eds.), *Die deutschen Ausgrabungen auf Magulen um Larisa in Thessalien 1966. Agia Sofia-Magula. Karagyös-Magula. Bunar Baschi*, Beiträge zur ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes 15, Rudolf Habelt, Bonn, pp. 15–54.
- Wace, A. J., and Thompson, M. S. (1912). *Prehistoric Thessaly*, AMS Press, New York.
- Washburn, D. K. (1983). Symmetry analysis of ceramic design: Two tests of the method on Neolithic material from Greece and the Aegean. In Washburn, D. K. (ed.), *Structure and Cognition in Art*, Cambridge University Press, Cambridge, pp. 138–164.
- Washburn, D. K. (1984). A study of the red on cream and cream on red designs on Early Neolithic ceramics from Nea Nikomedia. *American Journal of Anthropology* 88(3): 305–324.
- Weinberg, S. S. (1962). Excavations at prehistoric Elateia, 1959. *Hesperia* 31(2): 158–209.
- Weinberg, S. S. (1965). Ceramics and the supernatural: Cult and burial evidence in the Aegean world. In Matson, F. (ed.), *Ceramics and Man*, Aldine, Chicago, pp. 187–201.
- Weinberg, S. S. (1970). The Stone Age in the Aegean. *Cambridge Ancient History I, Part 1*, Cambridge University Press, Cambridge, pp. 557–672.
- Wicks, J. (1986). *The Archaeology and History of Cave Use in Attica, Greece, from Prehistoric Through Late Roman Times*, Ph.D. dissertation, Indiana University, Bloomington.
- Wijnen, M. (1981). *The Early Neolithic I Settlement at Sesklo: An Early Farming Community in Thessaly, Greece*, Universitaire Pers Leiden, Leiden.
- Wijnen, M. Neolithic pottery from Sesklo—technological aspects. In Decourt, J.-C., Helly, B., and Gallis, K. (eds.), *La Thessalie, Colloque international d'archéologie: 15 années de recherches (1975–1990) bilans et perspectives*, Lyon, 1990, Tameio Arhaiologikon poron kai apallotrioseon, Athens (in press).
- Zachos, K. (1987). *Ayios Dhimitrios, a Prehistoric Settlement in the Southwestern Peloponnese: The Neolithic and Early Helladic Periods*, Ph.D. dissertation, Boston University, Boston.
- Zachos, K. (1990). The Neolithic period in Naxos. In *Cycladic Culture. Naxos in the Third Millennium BC*, N. P. Goulandris Foundation, Museum of Cycladic Art, Athens, pp. 29–38.
- Zangger, E. (1991). Prehistoric coastal environments in Greece: The vanished landscapes of Dimini Bay and Lake Lerna. *Journal of Field Archaeology* 18(1): 1–15.