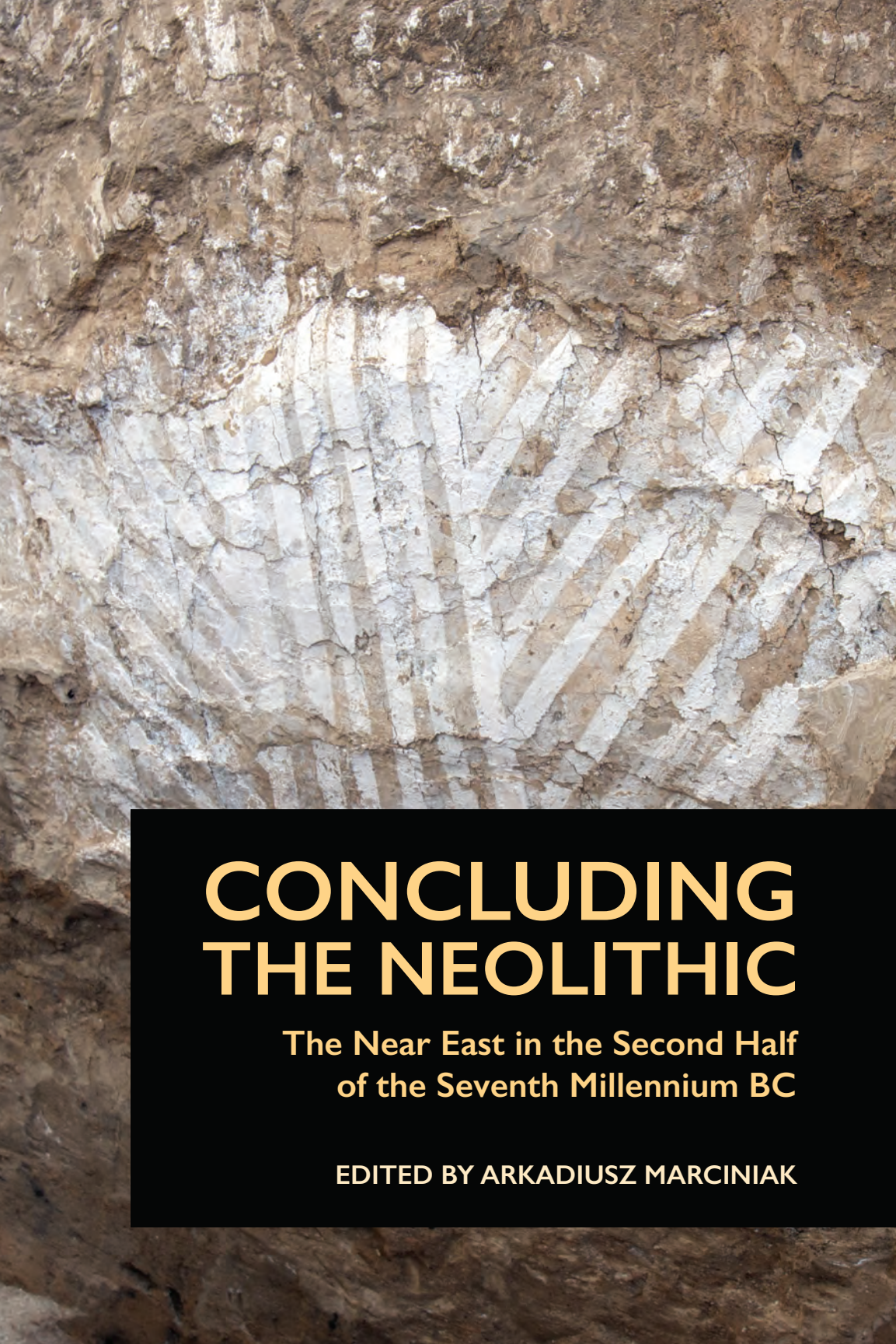


CONCLUDING THE NEOLITHIC

The Near East in the Second Half of the Seventh Millennium BC

EDITED BY ARKADIUSZ MARCINIAK

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Introduction

Arkadiusz Marciniak

The Neolithic is rightly regarded as a major threshold in the development of humankind. It marks the emergence of constituent elements of human existence that irreversibly transformed its nature. Among the most profound changes were the sedentary mode of life, domestication of plants and animals, aggregation of big groups in urban settings, new forms of social organization, and the development of a range of innovative technologies, in particular use of clay as a material for house construction and production of containers.

The previously dispersed and loosely bounded hunting and gathering groups were transformed into large social groupings inhabiting ever-growing urban centers. The forager mode of food procurement was replaced by food production based upon agriculture and husbandry organized in a wide range of forms. New technologies transformed the hitherto dominant dwelling structures from light shelters into solid multiroomed houses. The emergence of a set of new tools led to significantly more efficient food procurement and food-preparation strategies. These revolutionary developments are often referred to as the first Neolithic transition. The process was extended over a couple of millennia and its constituent elements appeared at different times across different areas of the Near East. The origin of the Neolithic, along with its different components, was and remains one of the most intensively and hotly debated issues in archaeology. A wide range of different theories and hypotheses has been proposed, alluding to all sorts of theoretical underpinnings. They have been published in uncountable numbers of scholarly books and essays in all possible languages as well as discussed at numerous conferences of different format and character (e.g., Bar-Yosef 2001; Belfer-Cohen and Goring-Morris 2012; Cauvin 2000; Flannery 2002; Harris 1996).

The process of transformation, consolidation, and integration of constituent elements of the Neolithic revolution has attracted far less attention. The same is true regarding the outcome of this complex process in the form of a new version of the Neolithic. As compared to the first Neolithic transition, this process was much shorter and took place in the final centuries of the Near Eastern Neolithic, that is, in the second half of the seventh millennium BC. The revolutionary

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developments taking place in this period can rightly be labelled the Late Neolithic transition (see Marciniak 2016).

This volume aims to fill in an evident void in the study of this profoundly important stage in the development of the Neolithic in the Near East. It aims to provide a comprehensive presentation and analysis of the constituent components of this major threshold in the history of farming communities across different parts of the region, discern their major developmental trajectories, reveal parallel growths, identify discrepancies, and scrutinize diverse consequences and far-reaching effects.

The volume has three intertwined objectives. First, it intends to grasp and conceptualize the character of the Neolithic across different parts of the Near East in the final phase of its development, in particular in comparison to the situation in the preceding Early Neolithic. To this end, it aims to scrutinize the nature of the Late Neolithic transition and identify its major constituent elements. The second objective involves a comprehensive overview and analysis of the corresponding developments in subsequent areas of the Near East and aims at revealing similar trajectories and pointing out local idiosyncrasies. It also scrutinizes causes of and mechanisms for these profound transformations. Empirical evidence facilitating a recognition of these transformations, such as the settlement layout, site architecture, both domestic and nondomestic, burial practices, and a wide range of material culture will be presented and discussed at length. The final objective of the volume comprises a presentation of the aftermath of the Late Neolithic transition including the dispersal of local groups out of their original oecumene, exploitation of different ecological zones, developing relations with neighboring communities, and building up a network of dependencies and mutual relations in these newly developed circumstances.

The book is arranged geographically. It begins by addressing the targeted developments in the southern Levant and northern Mesopotamia, moving subsequently to central Anatolia and then to southwestern, western, and northwestern Anatolia. The authors of the book are leading specialists in the field. Their chapters reflect their own research perspectives and interests. Hence, they focus upon different aspects and dimensions of the processes taking place in the second half of the second millennium BC and discuss them in a broader diachronic and synchronic perspective. Read together, the contributions to the volume bring about a comprehensive and heuristically viable overview of the transformative character of the Late Neolithic in the Near East.

Grasping the Nature of the Late Neolithic Transition

The last centuries of the Near Eastern Neolithic, the period known as the Late Neolithic, are characterized by profound changes in major constituent components of

the human existence. In Upper Mesopotamia, it is defined as a transformative era that saw profound changes in settlement organization, modes of subsistence, religious practices, and the formation of local and supralocal identities (Nieuwenhuyse and Akkermans). It brought about institutionalization of socioeconomic modalities moving into the Halaf and related cultural settings (Özdoğan). The Late Neolithic also marks an important transition in the Lakes District (Vandam) and is clearly detectable at different sites, for example, Ulucak on the Aegean coast (Çevik). This transition also brought about major changes in the newly inhabited western parts of Anatolia, peripheral to the main areas of primary neolithization, marked by the emergence of small farming communities that each followed its own trajectory. It is also the time of crystallization of differences between the eastern and western parts of the Anatolian peninsula (Özdoğan).

The Late Neolithic is most often defined by changes in social arrangements of local groups, particularly evident when compared with the Early Neolithic. The latter period was dominated by communities living in large settlements (Çevik) that were held together with particular dynamics or ideologies that unified them and preventing intercommunal tensions. This pattern is discernible in the Levant, Upper Mesopotamia, and central Anatolia. These may have been in the form of extended families, sodalities, or neighborhood communities, and are reported from a number of sites dated to the late Pre-Pottery Neolithic or early Pottery Neolithic, such as Bouqras, Basta, Tell es-Sawwan, Hassuna, or Çatalhöyük (e.g., Flannery 2002; Düring and Marciniak 2005).

The Late Neolithic marks the emergence of individualized social units, most likely in the form of households, which became increasingly independent, both economically and spatially. They are discernible at different settlements from this period, such as Çatalhöyük in central Anatolia (Marciniak 2016) and the Aegean settlement of Ulucak, at least from the late seventh millennium BC onwards (Çevik). This shift is manifested by settlement architecture, subsistence, and manufacturing practices. Architectural remains exposed in all western Anatolian sites reveal a more or less homogenous distribution of similar households, every building being similar to the other, with no apparent markers of social stratification (Özdoğan).

The Late Neolithic is also defined by major changes in economy. The increasingly autonomous households established an integrated management and procurement system and an integrated farming-husbandry economy. The process also involved a shift from the extensive exploitation of large areas to the use of locally available resources (e.g., Marciniak 2016; Marciniak et al. 2015a). These changes are particularly visible in husbandry practices. Sheep flocks were herded and tended by family (or smaller group) shepherds, with less separation by age and sex (Russell et al. 2013). By maintaining herds relatively close to the settlement it would have been possible to include less skilled family members

such as children, or those only available for short work periods such as older family members or women with babies (Grayzel 1990: 49). At the Late Neolithic Çatalhöyük, changes in sheep husbandry are indicative of a high degree of arable/pastoral integration and dependence requiring a range of advanced managerial skills, such as controlling the breeding cycle, keeping herds near growing crops, and providing dry fodder, which is most effectively achieved by a more fragmented household-based society than large social groupings (Henton forthcoming). Additionally, the variability of animals increased over time as herders increasingly moved their separate flocks across a range of different territories around the settlement (Pearson 2013).

These significant changes in social organization as well as in economy and subsistence bases resulted in the break down of a distinction between sacred and secular and removal of symbolism from the domestic realm. The house was no longer the focal point of the cultural universe but served only as ordinary dwellings. This is manifested by the disassociation of burials from its domain and the emergence of extramural cemeteries. These developments in turn enhanced the autonomy and independence of the house (Marciniak 2008; Hodder 2014), facilitated dispersal of local groups out of their original oecumene, and resulted in exploitation of a range of previously uninhabitable ecological zones (Özbaşaran 2012).

Consequently, the Early Neolithic mode of life was ultimately transformed into a qualitatively distinct and culturally and demographically powerful version of the Neolithic. It involved a shift from a system in which people were squeezed into collective social and ritual structures to a fragmentation and dispersal of human groups across the landscape. Hence, the first half of the seventh millennium cal BC marks a major threshold in the history of human groupings in terms of new arrangements in social organization, flexible economic systems, diversified subsistence bases, as well as new forms of religious and ritual practices. These were accompanied by significant changes in material culture.

The culture-forming nature of the Late Neolithic, however, is not discernible in some areas. This is particularly the case in the southern and central Levant (Goring-Morris and Belfer-Cohen), where this period lacks new unique characteristics that justify its assignment as a separate and distinct cultural period. There was no chronological gap between Pre-Pottery (Early) and Pottery Neolithic (Late) and the latter period is rather short and insignificant. The major changes, corresponding to the Late Neolithic in other areas, only took place in the Chalcolithic, in particular in the Wadi Rabah phase.

The Late Neolithic in Comparative Perspective

The transformative processes contributing to the Late Neolithic transition extended over centures. Viewed from a long-term perspective, it is estimated that

it took almost two millennia of slow, incremental change, punctuated by episodes of accelerated change culminating in the end of the seventh millennium BC (Nieuwenheyse and Akkermans). While unique in its character, this period maintains continuous references to the past and older traditions predating 6500 BC. Almost every component of the material assemblage in northwestern Anatolia, except for adaptation of wooden-post architecture, is traceable to the primary core area from the preceding period, though the social or symbolic value attained might be different (Özdoğan). Similarly, the Yarmukian phase in the southern Levant, marking the first stage of the Late Pottery Neolithic, reveals numerous similarities with the later stages of the Early Neolithic, in particular the PPNB (Goring-Morris and Belfer-Cohen). While Early Neolithic Çatalhöyük East refers in many respects to Aceramic Neolithic Aşıklı Höyük, Early Chalcolithic Çatalhöyük West refers to its Neolithic predecessor (Marciniak et al. 2015b). In more general terms, the "advanced farming village," the term used for describing the Late Neolithic situation, is often seen as the logical "end product" (Redman 1978: 176–77) of the agricultural transformations that began in the Early ("Pre-Pottery") Neolithic.

While the constitutive elements of the Late Neolithic transition are deeply embedded in the past, its emergence was triggered by a combination of factors that to a considerable extent were set up differently in subsequent parts of the Near East. The major trigger of these processes was a catastrophic collapse of the megacities by the end of eighth millennium with considerable depopulation, particularly distinct in the southern Levant. It contributed to a movement of their inhabitants into the previously unoccupied eastern badia in Jordan's Black Desert (Roleffson). An important trigger of these changes is often ascribed to new technologies. The adoption of ceramics around 7000 cal BC (e.g., Akkermans and Schwarz 2003; Tsuneki, Nieuwenhuyse, and Campbell, 2017) facilitated innovations in container technologies that in turn led to an intensification of secondary products exploitation and the establishment of social networks that interconnected dispersed village communities across Upper Mesopotamia, particularly towards the end of the sixth millennium BC, or Halaf period (Nieuwenhuyse and Akkermans). Another potentially important factor may have been health (Garfinkel), whereby increased population density at aggregated settlements caused a deterioration of overall conditions for their inhabitants. The sudden appearance of multiple burials may be indicative of poor health and possibly epidemics, including tuberculosis (Rollefson). Of a similar caliber may have been reduced space of the living conditions: buildings got reverted to single-room houses with dirt floors, where symbolic expressions were rare, as clearly see already at the PPNC settlement at 'Ain Ghazal (6,900–6,500 cal BC) in the southern Levant.

The most hotly debated cause of the major transition in the Neolithic mode of life, however, remains climatic change, in particular the so-called "8200 cal

yr BP event" (e.g., Staubwasser, Weiss 2006; Weninger et al. 2006; Clare and Weninger 2015). The changing climatic conditions of the early Holocene played a significant role in the development of farming communities from the beginnings of Pre-Pottery Neolithic (Bar Yosef). However it is only the abrupt, adverse climatic change around 8,400/8,300 through 8,200/8,000 cal BP that arguably had a major impact on domestic subsistence, sometimes causing social turmoil on a regional scale. The apparent synchronicity of the later seventh millennium developments in settlement with the 8.2 ka abrupt climate event has led several scholars to argue for a strong causal role of climate change (Bar-Yosef). Initially, they hypothesized that this short-lived climate anomaly could only have had serious disastrous repercussions on Neolithic communities inhabiting the marginal Upper Mesopotamian landscapes (Staubwasser and Weiss 2006; Weninger et al. 2006).

The only direct evidence of changes in climate that originate from archaeological site comes from Çatalhöyük (Roffet-Salque et al. 2018). The abrupt 8.2 kyr BP climatic event was revealed in hydrogen isotopic compositions from animal fats preserved in pottery vessels. The local inhabitants reacted to these deteriorated conditions, which is particularly evident in a reorganization of herding practices. These included a reduction of cattle herd sizes accompanied by an increase in caprine herd sizes. The climate deterioration may have also led to food scarcity/dietary stress, as indicated by an increase in the degree of bone fragmentation for small and large ungulate grease and marrow-bearing parts as well as by a marked decrease in butchering efficiency and meat processing for both cattle and caprines.

In spite of scarce evidence in other areas, the results of this abrupt event are believed to have affected the course of technical, economic, and cultural developments. The immediate response to these rapidly deteriorating conditions was to dig wells, a technology known from Shillourokambos, Miloutkhia, Atlit-Yam, and Sha'ar HaGolan. However, this could have solved the problem of drinking water for humans and herds only when the water-table was not too deep for the available techniques (Bar-Yosef). Climatic change and prolonged culturally induced environmental degradation is believed to be responsible for the abandonment of many sites across the Levant and Anatolia. It included dislocations of populations requiring relocation to smaller communities but also massive migrations in others (Rollefson). However, a close reading of the available data suggests a more complex picture. A good number of Neolithic sites were possibly abandoned before the 8.2 cal BP event. At Tell Sabi Abyad, several key "adaptations" may in fact trace their roots to stratigraphic levels preceding those synchronizing with the climate event. Rather than causing these cultural changes, the climate anomaly appears to have accelerated trends that had already begun for reasons unrelated to climate change (Nieuwenhuyse et al. 2016).

Changes in the second half of the seventh millennium cal BC affected a majority of the domains of existence of Neolithic communities, albeit not all of them were equally significant or comparably discernible. Despite these idiosyncrasies, the Neolithic pathways were made of a number of distinct elements. Their profoundly transformative character, however, was not immediately evident.

As indicated above, one of the most significant changes had to do with economy and subsistence. Cattle exploitation dominant in the preceding period was reduced at the expense of steeply increased herding goats and sheep (Bar-Yosef). The pattern was clearly discerned at the settlements in northwestern Anatolia, in particular in Aktopraklık, Menteşe, and Fikirtepe (Karul). The history of domestic pig was significantly different (Arbuckle et al. 2014). It was never incorporated into Neolithic economies in central and northwestern Anatolia, where *Sus* remains were rare and comparable in size to early Holocene wild boar. At the same time, pigs and cattle represent larger portions of the animal economies in the Lakes District and western Anatolia. In southwestern Turkey, cattle and pigs together nearly match caprines in abundance (see also De Cupere, Duru, and Umurtak 2008: 372–75).

A mixed farming economy was particularly common in central and northwestern Anatolia. Farming-based agriculture and animal husbandry were adopted region-wide (Karul this volume and 2011). They were practiced from the beginning of the occupation of the settlement at Ilıpınar (Roodenberg). Economy of the inhabitants of Uğurlu on the Island of Gökçeada was based upon cereal crops dominated by einkorn wheat, emmer wheat, six-rowed barley, naked barley, and pea as well as domesticated animals, in particular sheep and goat (Erdoğu). This was supplemented by open-sea fishing and mollusc gathering, particularly at the settlements of Fikirtepe and Pendik. At the settlement at Barcın in this region wild taxa including boar, hare, deer, birds, fish, and molluscs were present only in very small quantities. Similarly, the cereals and pulses (lentils and peas) were of domesticated varieties, which were supplemented by wild resources like hazelnuts (Özbal and Gerritsen).

The Late Neolithic transition brought about significant changes in settlement architecture and material culture. The most recognizable changes are discernible in site architecture. They are attributed to transformations in social organization and the emergence of increasingly autonomous households. The size of the settlement at Tell Sabi Abyad decreased to between only 0.1 and 0.2 ha in extent, although it probably had several contemporaneous but spatially dispersed communities (Nieuwenhuyse and Akkermans). This individuality is indicative of changes in the forms of house construction, as recognized at both Çatalhöyük East and West (Marciniak; Rosenstock et al.). The dominant form of domestic architecture at Ulucak around 6300/6200–6000 cal BC comprised one-room rectangular houses with walls constructed either of wattle-and-daub or of mud-

slabs without stone foundations (Cevik). The dwelling structures in the Lakes District were made of mud brick, and had ovens and areas identified as open space/courtyards, as manifested at Hacılar (Mellaart 1970: 24). The quadrangular, fully equipped houses with the customary platforms, ovens, and prepared floors covered with wooden planks are also reported from the settlement at Barcın and Mentese (Roodenberg et al. 2003; Gerritsen, Özbal, and Thissen 2013: figs. 6 and 7). They have well-defined open spaces/courtyards placed in front of the buildings for collective use (Karul). Free-standing, single-room wattle and daub houses within a quadrangular plan, with internal ovens, storage bins, and working places were also also developed at the western Anatolian sites (Çilingiroğlu, Çevik, and Çilingiroğlu 2012: figs. 25–26). Quadrangular buildings with a stone foundation were also found at Uğurlu off the Aegean coast of northwestern Anatolia (Erdoğu 2013: 5–7).

The new form of house construction also resulted in remarkable changes in the settlement layout, particularly evident towards the end of the seventh millennium cal BC. It is characterized by adjacently placed buildings with well organized courtyards in front. Buildings arranged around large spaces or courtyards are known from the Lakes District (Derin 2012; Sağlamtimur 2012: fig. 2; E. Özdoğan 2015: 48). Similar spatial arrangements are reported from northwestern Anatolia, where settlements were transformed into well-organized villages constructed within a circular plaza serving as public areas, for example at Ilıpınar and Aktopraklık (E. Özdoğan 2015: 50). The new developments included enclosure walls, as seen in the Lakes District settlements at Kuruçay and Hacılar as well as in Ege Gübre and Yesilova in western Anatolia. The ultimate consequence of this process was the differentiation in domestic and nondomestic architecture. This is particularly discernible in the Lakes District where ceremonial-purpose structures emerged at Höyücek (Duru and Umurtak 2005).

Pottery in the second half of the seventh millennium BC became widespread and the diversity of forms increased exponentially. This is attributed to the increasingly different functions the pots played in daily life, such as cooking, carrying, and storage (E. Özdoğan 2015: 35–38). Some vessels served ceremonial purposes, as exemplified by the animal-shaped vessels and cross-shaped bases from Höyücek and Hacılar (Mellaart 1970: pl. 57; Duru and Umurtak 2005: pls. 60, 61).

Across Upper Mesopotamia, a broad range of decorative techniques and styles were initially employed from the pre-Halaf period onwards. They ultimately resulted in the elaborated painted pottery style known to archaeologists as the Halaf ceramic tradition (Nieuwenhuyse 2007, 2013). The process has been labeled by Nieuwenhuyse (2009) as the "painted pottery revolution." Painted serving vessels were adopted for the expression of social identities and became important agents in symbolically charged commensality events. By facilitating

new opportunities for symbolic messaging and social networking, advanced possibilities for storing stuff in bulk, and innovative ways for preparing food and drink, pottery containers were an important factor contributing to the success of the Late Neolithic way of life (Nieuwenhuyse and Akkermans). Painted decoration became a main characteristic of the pottery in the Lakes District but was not adopted in central and northwestern Anatolia.

The lithics technology also underwent significant changes in the Late Neolithic. This is best exemplified in central Anatolia. While the Konya Plain, in particular Çatalhöyük, was dominated by pressure-blade assemblages, the eastern part of central Anatolia became dominated by the flake and percussion blade industries, best attested by assemblages from Köşk Höyük and Tepecik-Çiftlik. Similarly, a significant number of large spearheads from that region were made of flint, which was not the material used for projectile manufacture at Çatalhöyük. This may imply the continuous importance of hunting in the region (see Özdöl Kutlu et al. 2015). At the same time, the Lakes District assemblages contained a number of large, distinctive scrapers that also appear in the Konya Plain (Baykal-Seeher 1994).

The Aftermath of the Late Neolithic Transition

One of the major consequences of the Late Neolithic transition was increased mobility and rapid dispersal of Neolithic groups from the relatively restricted areas inhabited in the preceding period, resulting in a steady spread of sedentary settlement. This has been captured accurately by Akkermans (1993) in the phrase "villages in the steppe." This process is clearly discernible around the Mediterranean and in Anatolia, as manifested by the instant increase in the number of settlements (M. Özdoğan 2011; Düring 2013). The first sites in the Lakes District, western, and northwestern Anatolia appeared before 6500 cal BC and in the following centuries the development of these communities accelerated (see E. Özdoğan 2015; Vandam). A number of sites in northwestern Anatolia increased significantly in the third quarter of the seventh millennium cal BC (M. Özdoğan 1999; Karul 2011). In the second half of the seventh millennium BC onwards, settlement became widespread in Greece (Perlès 2001: fig. 6.4) and at the end of the millennium, settlements emerged across a wide area spreading beyond Greece to the west of the Balkans (Krauβ 2008).

An ultimate consequence of these processes was the exploitation of a wide range of new ecological niches. These triggered new forms of interaction with the environment, the character of social relations, routines of daily life, modes of subsistence, as well as social and ritual practices. One of the most dramatic developments happened in the southern Levant in relation to the influx of herding and farming communities to the desert regions of southern Syria and the panhandle

of Jordan in the so-called "Black Desert" of the basalt fields knowns as the *harrat.* This transition involved dislocation from a stable sedentary situation to one of impermanent settlement, moving from location to location on a seasonal basis (Rollefson). Of similar significance was the spread of settlements into the steppe (e.g., Akkermans 1993; Akkermans et al. 2006; Nieuwenhuyse et al. 2016). An Halaf "people" practiced continuous demographic spread of small communities as a result of never-ending splitting of these communities. The newly occupied sites were mostly small to very small, reaching one hectare at the most (Nieuwenhuyse and Akkermans).

This process is also clearly recognizable in the eastern part of central Anatolia. Around 6000 cal BC a number of settlements of different kind appeared in completely new areas while the previously occupied locations were abandoned. These include in particular the settlements at Köşk Höyük, Tepecik-Ciftlik, and Pınarbaşi-Bor. They had subsistence economies based on farming (Todd 1980: 118), but were also placed in strategic locations. Inhabitants of Köşk Höyük and Tepecik-Ciftlik focused on the exploitation Cappadocian obsidian (e.g., Bıçakçı, Godon, and Çakan 2012; Öztan 2012) while groups from Ilıcapınar, located to the southwest of the Salt Lake, most likely exchanged salt for obsidian. The third quarter of the seventh millennium cal BC marks the inhabitation of different ecological zones in western Anatolia, such as the Latmos region located in the hinterland of Miletos in western Anatolia (Peschlow-Bindokat and Gerber 2012).

The Late Neolithic transition also brought about the creation of bridges and the formation connectivities and interregional links. This is particularly evident between central Anatolia and the newly occupied western and northwestern regions. The Gelveri ceramic style of Cappadocia (Schoop 2005) found at Çatalhöyük West was more likely an import than a local variant. Supraregional developments are also indicated in the trend towards decreasing lithic on-site production and the increased importance of storage and pottery (Rosenstock et al.). A direct resemblance of the burial mural art from Çatalhöyük East to the later distinct relief-decorated pottery of Tepecik-Çiftlik and Köşk Höyük (Bıçakçı, Godon, and Çakan 2012: 104; cf. Düring 2011: 154) implies a bi-directional flow of influences between Cappadocia and the Konya Basin. Similarities in pottery production and burial practices between Çatalhöyük East and northwestern and western Anatolia (Marciniak 2018a, 2018b) imply close interregional links. Some elements of the classic Çatalhöyük tradition at northwestern Anatolian sites appear already in the third quarter of the seventh millennium cal BC. These comprise ceremonial consumption of cattle and deer, sporadic burials beneath the house floors, and burials with grave goods (Özbal and Gerritsen; Karul). The "Fikirtepe Culture" in the Marmara Region appears to have had a greater influx along an eastern, inland route, in particular with the central Anatolian plateau and the Lakes District. Uğurlu on the island of Gökçeada is characterized by

striking evidence of long-distance communications, including seafaring, as indicated by the presence of Melian and central Anatolian obsidian, Balkan honey-flint and marble, as well as nephrite from outcrops at the foot of Ganos Mountain in the Gelibolu Peninsula for the production of ground-stone axes (Erdoğu). Similarly, sites like Hoca Çeşme and Aşağı Pınar in Turkish Thrace (Erdoğu 2013; M. Özdoğan 2013, 2014) show cultural affinities with sites along the Aegean coast of Turkey and the Balkans (Özbal and Gerritsen).

Final Remarks

The volume offers a comprehensive overview of a wide range of processes taking place across different parts of the Near East in the second half of the seventh millennium BC. It examines the diverse ways in which the inhabitants of the region transformed the Neolithic into a qualitatively different phenomenon. A reading of the contributions in this volume together make it clear that the Late Neolithic transition took place locally and largely independently, but the process was enhanced by emerging connectivities and interregional links. At the same time, this transition remained strikingly similar across the region and arguably was guided by some kind of logic. As with the Early Neolithic transition, this process did not take place simultaneously in different parts of the Near East, but instead was repeated over and over again in a number of different zones. A dearth of in-depth comparative studies (but see notable exceptions, e.g., Bar-Yosef 2011; Vigne 2011) makes it difficult to grasp the precise nature of this logic. This volume offers the first comprehensive overview of the transformative character of changes taking place in the first half of the seventh millennium in the Near East within a necessarily broad comparative perspective. Furthermore, it addresses the road these development paved for the spread of the Neolithic outside its core area and its influx into previously uninhabited zones.

Social organization with task-focused groups inhabiting individual houses played a dominant role in the process. This involved the formation of nuclear households with an increasing degree of autonomy in terms of the regimes of acquisition, production, consumption, and reproduction of different resources. Each of them had a well-defined space comprising the house and its immediate surroundings. The shift from communal organization to individual households is evident across different parts of the region, from the southern Levant through northern Mesopotamia, and central Anatolia through western and northwestern Anatolia. As a result, Late Neolithic society was made of smaller, more dynamic, flexible entities that were in position to exploit a wide range of environments. This kind of social arrangement led ultimately to differentiation among contemporaneous units and some form of inequality among their inhabitants. Houses

became more dependent on their own production and the relationships with their counterparts were based on the exchange of labor and goods.

Social and ideological changes taking place at the end of Neolithic and the beginning of Chalcolithic not only contributed to the disintegration of constitutive principles binding larger social groupings of the preceding period and initiated the development of a new social system, but more importantly contributed to the development of fully fledged farming communities in the Near East and beyond. The developments constituting the Late Neolithic transition created conditions for strengthening and consolidating local groups and provided prerequisite foundations for their spread across vast areas, making the Neolithic a truly global phenomenon. The potential of these fundamental changes emerged at the beginning of the Neolithic but were fully manifested and realized only after a few millennia of uninterrupted development in the earliest and the most important centers of the Neolithic culture in the Near East.

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The "8200 cal BP Cold Event" in the Levant

Ofer Bar-Yosef

Abstract*:* The climate of the eastern Mediterranean was and is characterized by rainy winters and dry summers. Changes in the basic pattern such as variability in yearly or monthly amounts of winter rains as well as their geographic distribution led to shifts in the predictability of animal and vegetal food resources during the Pleistocene. Under these conditions, Paleolithic foragers succeeded by shifting their territories according to the optimal conditions. Cultural changes or population replacements occurred due to competition and conflicts among local foragers and others who invaded the region. With the emergence and establishment of agro-pastoral societies at the onset of the Holocene, known as the Neolithic Revolution, all this changed. Minor but frequent annual climatic fluctuations had a major impact on domestic subsistence, sometimes causing social turmoil on a regional scale. The "8200 cal BP cold event," a term coined by palaeoclimatic researchers on the basis of various research, is seen as the reason for the collapse of a suite of archaeological cultures that successfully persisted and developed during the Pre-Pottery Neolithic B period (PPNB). In spite of evidence for a few local cultural continuities, the results of this abrupt event affected the course of technical, economic, and cultural developments during the ensuing millennia across the Fertile Crescent and the Nile Valley. That larger populations were able to survive several harsh decades, it is argued here, is because of their social organization, whereby only complex social organizations such as chiefdoms will create the adequate buffer to survive natural calamities.

Keywords: Levant, Pre-Pottery Neolithic, climate change, abandonment, resilience, 8200 cal BP cold event

The Neolithic Revolution and Abrupt Climatic Changes

Paleolithic societies were not impacted by macro- and micro-scale climatic changes as Holocene farmers. The degree of resilience among Paleolithic foragers depended on the "cultural filter" of each group, clan, or tribe. The role of individual hunter-gatherers resulting in poor or good decisions by temporary leaders, determined the fate of their own people. Natural selection had the final verdict, but the cumulative and final evolutionary success of Paleolithic societies is archaeologically and biologically recorded across Eurasia and Africa (e.g., Gamble 1999; Dennell 2009). When faced with a resource crisis, foragers could

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relocate to another area, assuming they did not need to compete with others. Long-distance movements were possible because the continents were still relatively empty.

Options for successful survival by migrations changed during the Terminal Pleistocene, in particular in the Levant, a region that stretches from the Taurus-Zagros arc to the tip of the Sinai peninsula. In the southern Levant, population increase, or what is often referred to as "relative demographic pressures," resulted in partial or full sedentism of forager societies, as known for the Natufian (ca. 15–11.7 ka cal BP). Territorial ownership resulted from social pressures first caused by the Heinrich 1 cold event in the Levant, although its exact dates in the region are not well established (Torfstein et al. 2013). The terminal Pleistocene in the northern Levant is so far poorly studied. The emergence of settlements of large sedentary communities of hunter-gatherers, which spread along the Tigris River Valley during the first millennium of the Holocene, was probably connected to the impact of contemporary farming communities along the Euphrates River and its tributaries (Bar-Yosef 2014b). Only additional excavations of the earliest layers in these mounds will determine whether their origins date to earlier times as suggested in Körtik Tepe (Coşkun et al. 2012).

Whether worsening or variable environmental conditions during the Younger Dryas led to the onset of cultivation and the emergence of large early Neolithic villages in the Levant is still debated. But the abandonment of most Natufian sites that represent sedentary communities of foragers who exploited cereals and other plants is an established observation. The Neolithic Revolution was therefore heralded by a combination of socioeconomic markers, including houses constructed with bricks or adobe on stone foundations; permanent domestic and public storage facilities; and new types of arrowheads, axes, adzes, sickles, and grinding stones. Their economic basis was the cultivation of wild cereals, similar to the short-term experimental cultivation evidenced at Ohalo II some 23,000 years ago (Snir et al. 2015) that later became domesticated. Hunting and gathering continued and the first trials of animal domestication took place by the end of this millennium (Vigne 2008; Vigne et al. 2011). All major villages enjoyed the commodities of long-distance exchanges in, for example, obsidian, chlorite bowls, and Red Sea shells.

The consumption of carbohydrates from the onset of the Holocene and in the course of several millennia was responsible for population increase (Bocquet-Appel 2011a, 2011b and references therein). However, when winter precipitation became infrequent or irregular, farming communities were vulnerable to repeated droughts and poor grain harvests. Five successive years of decreased amounts of winter rains in the marginal areas of their normal distribution became detrimental and may have forced people to leave the village due to the lack of food supplies channeled by a central authority. Ceremonial aggregation sites

were constructed in order to build and strengthen social cohesion, but social organization was not sufficiently hierarchical and efficient to serve as a buffering mechanism in bad years. Domesticated cereal species became available only by the end of the first millennium and a half of the Holocene and the addition of tended and domesticated goat, sheep, cattle, and pigs, together with continued hunting and gathering, provided a sound economic base. The successful social entities across the Levant (i.e., tribes), endured over the next two millennia, but faced a harsher event known as the "8200 cal BP cold event."

Understanding the assumed social upheaval caused by this abrupt climatic change requires the following information: (1) description of the societies affected by the climatic event; (2) proxy paleoclimatic evidence that indicates the occurrence of an abrupt crisis over a large or small geographic region, and (3) secured archaeological records that demonstrate that the observed occupational gap was caused by a climatic crisis.

Village abandonment is a poorly studied subject in archaeology. Often it is explained as the result of successive raids, or as due to epidemics, soil salinization, or drought. Reoccupation after a century or more is a phenomenon observed in a fair number of cases. Similar cultural markers recorded before and after the crisis may indicate the return of the same people, but discernible differences reflect occupation by a new group. The observation of similarity or differences, however, depends on the evaluation of archaeologists who may use different measures for identifying peoples known only through the material record.

There is a wealth of literature that deals with disasters of all kinds—earthquakes, volcanic eruptions, tsunamis, local wars, and more. However, I assume that the main impact of the 8200 cal BP cold event, which is not necessarily an exact historical date, was due to a series of droughts and their various outcomes. Indirectly, site abandonment following the crisis hints at the effects of inequality and subordination in societies that failed to cope with challenges. Their vulnerability was determined by their capacity to anticipate common disasters in a region that enjoys winter precipitation and generally dry summers. Therefore, the degree of resilience of farming societies relied on their recognition that, in spite of a past characterized by good harvests and full storage facilities, they needed to be able to cope with repeated bad harvests and depleted storage that result in famine, as malnutrition leads in many cases to loss of natural immunization to various sicknesses and increased mortality.

Calamities are generally first seen on a local level, be it a village or a small territory. The impact on the local population triggers a "domino effect" and other areas become unwillingly involved. In the following, I mainly aim to address these issues within the context of the Levantine Neolithic. In order to describe the impact of the 8200 cal BP cold event in this region I begin with a description of the main socioeconomic characteristics of the Levantine PPNB, the proposed

demographic reconstructions and social organizations, followed by the proxies of this climatic event. Detailed discussion of the case of Sabi Abyad (Syria) is presented, leading to the final conclusions of the cultural impacts of the 8.2 cal BP event. In addition I discuss the issues involved in dating site abandonment, which is directly relevant to the issue of what happened to the people who lived there before.

Levantine Neolithic Archaeological Records

The establishment of permanent villages during the first millennium of the Holocene, the Pre-Pottery Neolithic A period (PPNA), brought dramatic cultural and economic changes to the Natufian foraging societies. This was also the first major step in the formation of the Anthropocene landscapes. A century after V. Gordon Childe coined the term, whether the Neolithic Revolution is viewed as a gradual process depends on the personal view of individual scholars. A recent example may clarify my own opinion: Viewing the "computer and digital age" as the culmination of the technological and social processes that began about four centuries before the full expression of the Industrial Revolution in the nineteenth century, results in a time frame of about twenty generations or five hundred years. This period is short compared to the Neolithic Revolution, which took perhaps some four millennia to complete, and both are of very minimal duration compared with most of the dated technological transitions in the course of 3.3 Ma of human evolution.

The majority of the evidence and the varying interpretations regarding the early Neolithic in the Levant can be found in numerous publications, several of which are referenced in this paper. The onset of the cultural change, as mentioned above, is expressed in the technical improvements of domestic and public structures. Buildings constructed during the Pre-Pottery Neolithic A required more energy expenditure than the brush huts built on stone foundations by the Natufians or other contemporary foraging groups. Early cultivators constructed houses on stone foundations dug into the ground, with walls erected with wattle and daub, plano-convex bricks made of rocks (e.g., Jerf el Ahmar) or clay (e.g., Jericho, Netiv Hagdud), and flat roofs (e.g., Stordeur 2015; Goring-Morris and Belfer-Cohen 2008). Digging up clay to be mixed with straw and other ingredients for making the material for the walls or the bricks and felling and shaping trees as poles or roof supporters demanded more skill and time. Neolithic villages required more wood for various purposes than any Natufian site. This activity justified the manufacturing of axes-adzes of various types, which in the northern Levant were made of polished stones and in the south by bifacial flaking finished with transverse removals creating a sharp working edge.

PPNA farming sites were larger than the Natufian hamlets but not larger than the mounds of sedentary hunter-gatherers along the upper Tigris River, which are mostly dated to the first millennium of the Holocene (Bar-Yosef 2014b). Occupied year around, abandoned every few years, and then reoccupied, they were smaller in size than the ensuing PPNB sites and demonstrate a chronological gap of a century or more prior to the onset of the PPNB. This "mini-gap" is thought to be related to a short climatic dry period (Borrell, Junno, and Barcelo 2015).

The PPNB (ca. 10,500/200–8400/200 cal BP) is commonly subdivided into four subperiods, namely, Early, Middle, Late, and Final PPNB (abbreviated as EPPNB, MPPNB, LPPNB, FPPNB). The latest phase, also defined as PPNC (Rollefson, Kafafi, and Simmons 1990), is based on a change from the blade production that dominated during most of the PPNB to flake production in the PPNC. The calibrated radiocarbon chronology of each of these phases is open to certain inconsistencies but it is generally agreed that the longest phase (ca. 900 years) was the MPPNB. Many of the components of the Levantine PPNB are summarized in various writings (e.g., Aurenche and Kozlowski 1999; Cauvin 2000; Stordeur 2000, 2012; Stordeur et al. 2010; Kuijt 2000; Kuijt and Goring-Morris 2002; Akkermans and Schwartz 2003; Kozlowski and Aurenche 2005; Asouti 2006; Simmons 2007; Watkins 2008; Özdoğan 2011a; Goring-Morris and Belfer-Cohen 2011; Belfer-Cohen and Goring-Morris 2011; Willcox and Stordeur 2012; Bar-Yosef 2014a).

In a previous publication I defined this cultural matrix as "the PPNB civilization" (Bar-Yosef 2001), a term that differs from the "PPNB interaction sphere" (Bar-Yosef and Belfer-Cohen 1989), which covers a larger geographic region. I used this term despite the lack of evidence for the presence of writing systems. Others prefer to employ the label of "PPNB *koine*," a Greek term that designates all the people who spoke the same language or several related dialects. Using this term as a synonym for the "PPNB Interaction sphere" assumes that the recorded connections across sites and geography had a similar connotation, undoubtedly a hypothesis worth testing.

The climatic conditions during the PPNB were characterized by stable winter rainfall that contributed to the success of the agricultural communities, which grew an increasing number of domesticated plants (e.g., Lev-Yadun, Gopher, and Abbo 2000; Tanno and Willcox 2006; Zohary, Hopf, and Weiss 2012). Stable carbon isotope of wheat seeds from Tell Halula, on the banks of a tributary of the Euphrates River, provide ratios that indicate wetter conditions than today (Araus et al. 2001). Despite the success of the PPNB economy, we cannot assume that over more than two millennia no droughts hit the region, whether in its entirety or in part. One suggestion, for example, would date ca. 9,200 cal BP as a mini-crisis (Flohr et al. 2015). However, the 8200 cal BP cold event was the harshest event, lasting one or two centuries, and had major social impacts beyond the Levant.

The basis for the flourishing economy of the PPNB was cultivation of domesticated species of cereals that supplied the main staple food with legumes such as peas, broad beans, and chickpeas (Willcox, Buxo, and Herveux 2009; Zohary, Hopf, and Weiss 2012). Goat, sheep, cattle, and pigs were already domesticated (Vigne 2011, 2015; Zeder 2008, 2011; Arbuckle 2013; Arbuckle et al. 2014). The four domesticated animals were herded from the northern Levant southward and spread through exchange among neighboring communities during the Middle and Late PPNB. Cultivated flax was employed for making linen for ropes and other products while species of wild cereals were used for making baskets (McCorriston 1997; Schick 1989; Stordeur 1989). Wood, roots, and reeds were exploited for making different objects. Gathering continued, as did hunting.

I should note that, before dispersed domesticated species of plants arrived in a certain area, the hunter-gatherers were triggered to cultivate local plants when the population faced food shortages. This kind of adaptation process was suggested with respect to the spread of goats or the notion of their domestication reached the Lebanese mountains and could have been the cause for a secondary center of domestication (Wasse 2001).

A rapid population growth is represented by the size of the villages and their domestic architecture. Buildings exhibit a shift from the round/oval house plan of the various rectangular plans that began to appear in late PPNA (Stordeur 2000, 2015). Subregional variability is exemplified when large, long, rectangular houses such as at Nevalı Çori (Hauptman 1999), "grill plan" houses at Çayönü, and later the multiroom houses at, for example, Bouqras became common (e.g., Özdoğan and Özdoğan 1998; Akkermans et al. 1983). The cultural impact from the north is visible in the architectural sequence of Beidha (southern Jordan) when, during the PPNB, rounded, polygonal buildings were replaced by rectangular plans.

PPNB houses were built above ground with stone foundations, rectangular mud-brick or adobe walls, and flat roofs. In southern Jordan two-story houses were built from stones at Basta, Ghwair, and Ba'aja. A unique type named "corridor houses" exposed at Beidha and 'Ain Ghazal (Kuijt and Goring-Morris 2002; Simmons 2007; Byrd 2005b). The corridor was formed by a series of parallel well-built cells serving as the basement. The floor above and the walls were constructed from wood, plaster, and adobe. In several villages, living quarters were arranged as compounds of domestic units, as, for example, at Basta (Gebel, Nissen, and Zaid 2006), Beidha (Kirkbride 1966; Byrd 2005a), Ba'ja (see below), and 'Ain Jamam (Gebel, Nissen, and Zaid 2006), as well as Sha'ar Hagolan (Garfinkel and Ben-Shlomo 2009). The walls of the houses, whether one- or two-story, were attached to each other, with a very narrow space or an alley between them which was often used as dumping zone.

The unanswered questions are: (1) why did people at the time of the Late PPNB build two-story houses, as there are no indications that the potential area

of the village was limited by social rules or a wish to avoid construction on agricultural land?; and (2) how did the movement from one unit to another take place? Did they walk across the roofs as in the famous case of Çatalhöyük? A potential explanation would be that defensive needs expressed in such arrangements reflect increasing levels of conflict within the local clans or between villages, and the fear of raids by outsiders (e.g., Bar-Yosef 2010a, 2010b). In addition, such a dense settlement plan could be interpreted as reflecting symbolic security demands (e.g., Hodder 2006; Roscoe 2009).

Building of houses required supplies of wood obtained by felling trees in the Mediterranean forests, a process that began during the PPNA. Other anthropogenic activities affected the immediate environments of the villages, including clearing fields, digging clay for making mud bricks and wattle and daub, and clearing pastures sometimes by using fire. Another important invention, plaster, first appeared in the Natufian period (Kingery, Vandiver, and Pickett 1988); the process involved collecting limestone fragments, burning them in a kiln, and later pounding them in mortars to make a powder to be mixed with water. Several domestic and most public buildings had plastered floors and some wall coatings (e.g., Jericho, 'Ain Ghazal, Yiftahel, Beisamoun, Nevali Çori, Çayönü, and others). Plaster was also employed in reshaping skulls removed from burials and molding statues as in 'Ain Ghazal, Jericho, and the broken piece uncovered in Nahal Hemar cave. In certain areas, such as the El-Kowm basin, gypsum was used for similar purposes.

The increasing site size of PPNB villages is noticed across the Levant but more particularly by the phenomenon entitled "mega-sites" located on the Jordanian plateau and mostly dated to the LPPNB and PPNC (Bienert, Gebel, and Neef 2004 and papers therein). The overall estimated surfaces range from 6 to 15 ha (e.g., Gebel 2006; Simmons 2007), therefore the abandonment of these large villages raises two questions: (1) How did the major villages emerge and what was the nature of their intersite relationships?; and (2) what caused the collapse of a complex socioeconomic system, which is suspected even to represent a chiefdom (Rollefson 2004a, 2004b)?

The spatially distributed PPNB sites that share cultural attributes are seen as resembling the Greek "amphictyony" (Belfer-Cohen and Goring-Morris 2011) or even the earlier Sumerian example of Nippur (for which see Hallo 1960). This term refers to neighboring states that form an association with one another in their common interest. Whether a loosely coordinated regional organization can be referred to by a Greek term or simply be defined as the territory of a Neolithic tribe, is a matter of choice (Bar-Yosef 2001; Barzilai 2010).

Among the PPNB sites there are a few that could be considered as central or unique in their area. These include the outstanding examples of Göbeklı Tepe, Kefar HaHoresh, Ba'ja, and Nahal Hemar cave. Göbeklı Tepe, on top of a hill

watching over the Balikh River is known for the series of polygonal buildings (the lower layer) constructed with the rock-cut T-shaped limestone pillars, mostly decorated by carving various animals and schematic human features. Quarrying, shaping, and carving these as well as smaller sculptures embedded in the walls, as well as the "windows" required organized labor and steady food supplies, joint operations, once suggested by the excavator as resulting from coercion (Schmidt 1999, 2005, 2012). Somewhere else I proposed (Bar-Yosef 2014a) that the construction of this site and the presence of similar buildings in others within a radius of some 100 km could have been a chiefdom that failed. Clear hints for the presence of central authority during the PPNA were suggested by Stordeur (2015) in her analysis of the village of Jerf el Ahmar.

The lower complex at Göbeklı Tepe, which included more than one structure, was filled in and rebuilt with smaller rectangular buildings that mirror the architecture of PPNB sites with smaller T-shaped pillars. Dating the construction of the first sanctuaries is critical for social interpretations, but the current radiocarbon dates provide as yet a somewhat ambiguous chronology (e.g., Dietrich et al. 2013).

Ba'ja is located in a hidden, difficult-to-access, valley in the Petra area. The excavations exposed numerous buildings, often attached to each other, several with two floors. The remote setting of this village and its association with water installations (Gebel 2004; Gebel and Kinzel 2007), as well as a wall painting and some unique small finds, separate it from nearby sites such as Ghwair I in the open valley of Wadi Feynan, where similar buildings, all constructed of stones, were uncovered. This type of building, common in Late PPNB sites in Jordan, was also uncovered in Basta, Ain Jamam and others (Gebel, Nissen, and Zaid 2006).

Kefar HaHoresh is interpreted as a central place for burying the dead and feasting during ceremonies. Graves with multiple burials were covered by plaster floors and the majority encircled by rectangular walls imitating the ground plans of PPNB domestic buildings (Goring-Morris 2005; Goring-Morris and Kolska-Horowitz 2007).

A unique site is the small dark cave of Nahal Hemar, in the Judean desert, used as a storage facility for ritual paraphernalia (Bar-Yosef and Alon 1988). The large number of objects, mostly of PPNB age, including a stone mask, baskets, strings, a linen head cover, wooden arrowheads, painted wooden beads, bone figurines, several human skulls modeled with blackened collagen (first misidentified as asphalt), a collection of bone objects, a large assemblage of Nahal Hemar "knives" (elongated blades with two side-retouched notches near the proximal end), a sickle hafted in an ibex sheath, and more. In sum, Nahal Hemar cave represents a repository of modeled skulls and other objects as well as a storage of objects used during several ritual events thus marking the cave as a special place within the landscape of this period.

In the contexts of domestic rituals selected skulls were often removed a year or two after burial, modeled with plastered and were placed in various types of domestic loci in the occupational deposits. Their relatively small number probably indicates the presence of a local elite. The known plastered skulls were uncovered in Jericho, Ramad, Aswad, Beisamoun, Kefar HaHoresh, 'Ain Ghazal, Yiftahel, and in Anatolia (e.g., Khalaily et al. 2010; Rollefson, Schmandt-Besserat, and Rose 1999; Schmandt-Besserat 2002; Hershkovitz et al. 1995; Bonogofsky 2005, 2006 and references therein).

Increasing variability across the north–south axis of the Levant can be seen in the domestic toolkits. Axes/adzes in the north, as mentioned above, were made of basalt and limestone by polishing but in the south shaped by bifacial knapping with transverse removals shaping the working edge. Burins, scrapers, awls and borers, sickle blades, and different types of projectile points have been given site or regional names such as Byblos, Amuq, Jericho points and the like (e.g., Gopher 1994; Aurenche and Kozlowski 1999; Kozlowski and Aurenche 2005). Sickles, for harvesting the cereals, were hafted blades used together with V-shaped bone tools for stripping the seed heads from straw, and and were later supplemented by the invention of the the threshing board or *tribulum* (Anderson 1998).

The geographic distribution of the typical Levantine arrowheads made on blades were named "Big Arrowheads" and their distribution westward into Anatolia was considered as marking the expansion of agricultural communities (Kozlowski 2001). In addition, certain types had a particular distribution. For example, Jericho points characterize the central area of the Levant. Cultural differences identified by particular knapping techniques are obvious if we compare the Levant to the eastern province. In the foothills of the Zagros, obsidian or pre-heated flint cylindrical cores with a pointed base, known as "bullet cores," were pressure flaked to obtain bladelets that were often shaped into microliths, thus reflecting another interaction sphere of lithic technology. Obsidian is present in many sites in both areas in different quantities, testifying to an exchange network rather than "down the line" trade (Ortega at al. 2013, and references therein).

Storage facilities were public, built installations, and mini-rooms in houses such as Basta served the same purpose (e.g., Kuijt 2008, 2009). Indeed, there is hardly any unambiguous evidence (except for rare hints in the excavated sites in the Levant) for a shift from nuclear-family consumption to larger social units or institutional control of public granaries (Kuijt and Goring-Morris 2002; Stordeur 2015). This observation supports those who see the social structure as more or less egalitarian. Unfortunately, most excavated areas of Levantine PPNB sites are relatively small (several hundred square meters). It is therefore only a matter of luck, such as occurred in the excavations of a later early Chalcolithic site, Tel Tsaf,

in the Jordan Valley, where a large building (temple? palace?) was exposed, encircled by several large granaries, dated to less than a millennium after the PPNB (Garfinkel, Ben-Shlomo, and Kuperman 2009). Searching in the published maps of PPNB sites for round structures that were not domestic buildings, whether floored or not by plaster, may indicate the presence of public storage. For example, the round structure in 'Ain Ghazal with its plaster floor (Rollefson and Kafafi 1996) could have been a storage facility.

In sum, sites in the northern Levant seem to be richer in precious commodities than those of the southern Levant. The rich stone-bowl assemblage recovered in Bouqras, is a good example for the ability to purchase or produce locally thin-walled bowls made of calcite, marble, alabaster, and hard rocks (Roodenberg 1986). It could have been a continued regional tradition practiced by hunter-gatherers living in sedentary sites (now tells) such as Körtik Tepe in the Upper Tigris steppe (Kozlowski and Aurenche 2005; Bar-Yosef 2014b and references therein).

The technological advancements in the northern Levant are also expressed by the production of experimental small clay recipients that appeared during the Early and Middle PPNB in various sites, and by the Late PPNB, larger common-size pots for storage and cooking made in the area between the Amuq and the Khabur Valleys (see, e.g., Akkermans and Schwartz 2003). In this area Tell Seker-al-Aheimar produced a series of radiocarbon dates of the "Pre-Proto-Hassuna" levels of ca. 8600 cal BP. As the pottery seems to resemble the Dark-Faced Burnished Ware known from the Amuq it was labeled as Dark Ware (Nishiaki and Le Mière 2005). Several of these recipients were modeled from lime and ashes (like the plaster employed for PPNB floors), and are known as "White Ware" (e.g., Garfinkel 1999). Most of the evolution of clay pots occurred during the following centuries, after the 8200 cal BP cold event as indicated by the dates from Kashkashok and Thalatat in the same valley (Akkermans and Schwartz 2003).

Cyprus became an integral part of the Levant from the moment it was first colonized during the PPNA (see, e.g., Vigne et al. 2012). Connection by seafaring, apparently from the Anatolian coast some 35 nautical miles away, continued during PPNB times, mainly from ca. 10,200 cal BP. Wild goat, sheep, cattle, and pigs were transported together with fallow deer and dogs to Shillourokambos (Vigne 2008; Vigne et al. 2013; Vigne and Cucchi 2005). Later, fox and cat were brought in as well.

Understanding the "PPNB interaction sphere" requires the recognition that the population inhabiting areas east and south of the "sown land" were hunter-gatherers. Interactions between farming communities and foragers in this semi-arid belt evolved since the time of the PPNA. However, most reported sites date to the PPNB (Bar-Yosef 1984, 2001; Garrard, Betts et al. 1988; Garrard, Baird

et al. 1994). Mutualistic interactions between the two societies could have been in constant flux. The relations could be either amicable, including exchange of grains for precious stones or finished products, or even for hunted game and hides. These intricate relationships, still poorly understood, may have led to intermarriage, perhaps with forager women marrying into farming communities; as suggested by ethnographic records, or they may have been hostile, leading to acts of violence and fighting.

PPNB mobile foragers' sites are generally up to 1,000 m^2 indicating the camping of a small band. Animal bones, some plant remains, and large collections of grinding slabs testify to a mixed subsistence based on hunting and gathering. Bone tools and large collections of marine shells and beads document the use of body decorations and the making of elements for long-range exchange. Site locations, in distinct topographic features such as mountains, hills, or open plains, reflect past seasonality. For example, employing an environmentally determined distribution of the annual site pattern among historical and recent Bedouin camps in southern Sinai allows for certain observations. Locations in well protected narrow wadis were suitable as winter camps, and those of open exposures in valleys were probably summer occupations. Similar information was obtained in a series of excavations in Jordan, where oases facilitated the presence of larger sites (e.g., Garrard, Betts et al. 1988; Wright and Garrard 2003). Winter camps had very few burials and summer camps had constructed storage pits and secondary burials (Gopher 1994; Dayan et al. 1986; Hershkovitz, Bar-Yosef, and Arensburg 1994). The large collections of marine shells were mostly shaped to serve as items of jewelry and elements of barter and exchange (Bar-Yosef Mayer 1997). In one case in Jordan, the camp of rounded dwellings of the locals was joined by a square one, possibly erected by a "foreigner" (Garrad et al. 1994) that could be a mobile artisan or a traveling merchant that came from a village society.

The "desert kites," special traps created by two converging lines of stones leading to a final enclosure that served as a killing area, were probably first laid out during the PPNB in order to hunt gazelles or onagers (Betts 1998). Employing this technique, which is also known from other locations in the world, must mean that there was a demand for meat, hides, and horns. Similar structures were used until historical times in various regions of the world.

In sum, the data summarized above allow us to recognize the main social entities across the Levant, and thus to explain why the 8200 cal BP cold event had such a major impact on the settlements and their populations. The growth of the Levantine PPNB entities (or civilization) over 2,200 to 2,400 years was due to a successful agro-pastoral economy. Several of the archaeological markers employed here in identifying different Neolithic tribes have been discussed elsewhere (Bar-Yosef 2001; Bar-Yosef and Bar-Yosef Mayer 2002).