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Space making and home making in the world's first villages: Reconsidering the circular to rectangular architectural transition in the Central Anatolian Neolithic

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ABSTRACT

In the beginning of the 8th millennium BCE, the people of Aşıklı Höyük dramatically changed how they constructed their buildings. People no longer constructed circular, semi-subterranean residential buildings and instead started to build above ground rectangular buildings. The long-term Aşıklı Höyük excavations help us understand the tempo and organization of this important evolutionary transition. This study advances discussion in three ways: 1) it provides a fine grained understanding of the diachronic shift in social and economic practices, 2) through broad horizontal excavation, this research provides new insights into the built environment, including the opportunity to understand the synchronic organization of residential and non-residential spaces, and 3) this study puts forth a detailed understanding of the evolutionary shift from circular-oval to rectangular architectural practices within a single residential setting. Collectively, the long-term research project at Aşıklı Höyük, with extensive horizontal excavations and detailed radiocarbon dating project, advances our understanding of the changing social and economic context of the transition from circular to rectangular residential buildings.

1. Introduction

In the early 1970s Kent Flannery (Flannery, 1972) put forth an influential model for the changing nature of the household. Focusing on the archaeology of Southwest Asia, Flannery (1972, 2002) suggested that the transition from circular to rectangular houses reflected a significant change in household and kin relationships. To Flannery (1972, 2002) the evolutionary transition from nuclear to extended household in early Southwest Asian villages were defined by two types of societies living in different types of buildings: 1) encampments of circular huts, with the encamped group being a large extended family (Flannery, 1972: 30-38), and 2) "true villages of rectangular houses, each large enough for a nuclear family" (Flannery, 2002: 417). In his original essay, Flannery (1972) compared the Natufian and Pre-Pottery Neolithic A period (PPNA) cultures of Southwest Asia (c. 10,500 cal BCE) to the Pottery Neolithic villages (c. 6,000–5,500 cal BCE). Drawing upon ethnographic data from African societies, he argued that the clusters of circular houses of the Natufian and Pre-Pottery Neolithic A period from roughly 11,000 years ago reflected a patriarchal and polygamous social structure. Examining the archaeology from Pottery Neolithic settlements occupied thousands of years later, such as Hassuna, Flannery (2002: 427) looked at the placement of fire hearths, storage features, mortars, and architectural evidence and argued that rectangular buildings were the material manifestations of very different types of households living in larger agricultural communities. Collectively he argued that the reasons for the replacement of one settlement type by another, basically the shift from round house to rectangular houses and from nuclear to extended family household over thousands of years, were linked to the importance of labor, the economic entrenchment of agriculture, the privatization of storage, and emergence of ranking and differential authority. Flannery's (2002) framing of the transition from nuclear to extended households is now frequently held to be transportable to multiple world areas, such as Southwest Asia and Mesoamerica.

Recent research has raised questions as to Flannery's arguments (e.g., Banning, 1998; Banning and Chazan, 2006; Saidel, 1993, and Parker Pearson and Richards, 1994). It is now clear that Flannery's original

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interpretation and synthetic analysis is weakened by the methodological comparison of archaeological data from different sites from different periods, separated by significant distance, and that a more nuanced understanding of this significant social, economic and architectural shift, can be provided by looking at the occupational sequence from a single archaeological settlement that bridges this transition.

The transition from circular to rectangular buildings, and the subsequent long-term adoption of rectangular residential buildings, has long been a topic of discussion among scholars of archaeology and the history of architecture. From an architectural standpoint this transition can be seen in the shape of buildings, the selection of construction materials, and the number of households in a community. In Southwest Asia the architectural transition occurs at the end of the Pre-Pottery Neolithic A (PPNA) and the beginning of the Pre-Pottery Neolithic B (PPNB) periods. Importantly this shift later occurred independently in other parts of the world at slightly different times (e.g., in the Andes and Mesoamerica) (Table 1; for detailed discussions on the cultural chronology of the Pre-Pottery Neolithic Period in Southwest Asia cf. Asouti, 2006, 2011; Baird, 2012; Bar-Yosef, 2017; Esin, 2007; Duru, 2002; Gebel, 2004; Hodder, 2017; Kuijt and Goring-Morris, 2002; Özbaşaran, 2011; Watkins, 2017; Zeder, 2009). The rise of rectangular architectural forms is widely recognized as one diagnostic criterion of the Pre-Pottery Neolithic (PPN) period between the 11th and 7th millennia cal BCE. This was a period of profound social and economic changes that included the onset of sedentism and domestication of certain plant and animal species, reinforced by the accumulation and exchange of know-how and experience among communities, and reflected changes in how households and villages were organized (Acar, 2001; Bar-Yosef and Belfer-Cohen, 1989; Goring-Morris and Belfer-Cohen, 2016; Ibáñez et al., 2018; Peters et al., 2013; Willcox, 2013, 2014; Zeder, 2006, 2011).

Following a detailed review of the current picture of the round to square house transition in Southwest Asia, we present the architectural characteristics of the circular and rectangular buildings at Aşıklı Höyük over time. The site of Aşıklı Höyük, occupied from 8,350–7,350 cal BCE (see Table 1), on the Cappadocian plateau provides a rare uninterrupted habitation sequence that fully encapsulates the transition from circular to rectangular architecture. While Aşıklı Höyük is the main focus of this study, we draw on contemporaneous settlements in the region to highlight variability in this process. As part of this we explore how the organization and size of buildings changed, people changed how they constructed buildings and materials they used, the internal features within structures, and the presence/absence of storage facilities, burials and symbolic associations. Central to this we evaluate building continuity, the social and ritual associations of the houses, and food preparation, consumption and storage patterns. Ultimately, we explore the technical, social and symbolic aspects of the transition from circular to rectangular buildings at Aşıklı Höyük, and the social organization of the community at the household and supra-household scales during this transition. This is followed by a discussion of the technical and social changes that accompanied this architectural transition in the broader region of central Anatolia throughout the Pre-Pottery Neolithic. To start this conversation, however, it is first necessary to briefly consider how people lived and organized space before the advent of early villages.

2. Circular versus rectangular architecture: A temporal overview from Southwest Asia

In Southwest Asia, for thousands of years human communities have been hunting and gathering, and using existing spaces, such as caves and rockshelters. As early as the end of the Upper Palaeolithic hunter-gatherers living at Ohalo II were building simple circular brush huts (Nadel, 2003; Nadel et al., 2004), as well as at Kharaneh IV (Maher et al., 2012, 2021). Over time, early sedentary communities began constructing larger and more substantial shelters while improving their architectural skills and knowledge of building materials. People in the later Early Natufian period started to build increasingly complex circular semi-subterranean structures, ranging from approximately 3–6 m in diameter, with hearths, pits, activity areas and plastered floors (Goring-Morris and Belfer-Cohen, 2013; Grosman and Munro, 2017: 703). Haklay and Gopher (2015) suggest that the size, form, location and internal organization of the Early Natufian round structures at Eynan reflect significant standardization and symmetry in comparison to the more irregular, geometrically complex pre-Natufian round huts. While there are exceptions, such as at Nahal Ein Gev II (Grosman et al., 2016) in the southern Levant and Dederiyeh Cave in the middle Euphrates (Nishiaki et al., 2011), by the Late Natufian period people tended to build smaller buildings than people in the Early Natufian period (Grosman and Munro, 2017). Valla et al. (2010) argue that people in the Early, Late and Final Natufian of Eynan constructed their residential buildings in the same way—excavating a curvilinear hollow from the ground, and then building a stone wall around part of its circumference. By the PPNA, more people were living within settlements, now with substantial villages covering about ten times the horizontal area of Natufian settlements, and again using circular, semi-subterranean structures (see Tables 2 and 3 for a summary of Epipalaeolithic to PPNB residential structures in the southern Levant, the Euphrates and the Tigris basins, and central Anatolia).

By the PPNB people became more inventive in the architecture they created and used a more diverse range of construction materials when building structures. Collectively researchers have discussed how these changes reflect a major transformation of the organization of village life and an evolutionary threshold with lasting consequences (Acar, 2001; Atakuman, 2014; Banning and Chazan, 2006; Benz et al., 2017; Cutting, 2003, 2006; Düring and Marciniak, 2006; Love, 2013; Steadman, 2000, 2004; Trebsche, 2009; Weisdorf, 2005). This led to the appearance of more durable rectangular above ground structures. The appearance of standardized, molded, sun-dried mudbricks coincides with the rise of rectangular building forms. Walls made of molded or hand-shaped mudbricks became more common during the PPNA (Akkermans and Schwartz, 2003; Aurenche, 1993; Goring-Morris and Belfer-Cohen,

Table 1
Archaeological chronology of the Levant and comparison to central Anatolia. Date ranges are compiled from The Platform for Neolithic Radiocarbon Dates (PPND) Project of exoriente (https://www.exoriente.org/associated_projects/ppnd.php).

Time Period	Cultural affiliation (Levant)	cal BCE	Cultural affiliation (Central Anatolia: CA*)
Late Epipalaeolithic	Natufian	13,000–9,800	Epipalaeolithic**
Early Neolithic	PPNA	9,800–8,600	CA 10 (early)
Early Neolithic	EPPNB	8,600–8,300/8,200	CA 9 (late)
	MPPNB	8,300/8,200–7,900/7,500	CA 9/8
	LPPNB	7,900/7,500–6,900	CA 8
Late Neolithic	Pottery Neolithic	6,900–5,700	CA 7

*CA stands for central Anatolia; numbers next to CA stand for the millennia, where early indicates the first half and late indicates the second half of the relevant millennium.

** Epipalaeolithic of central Anatolia is currently known from the excavations at the Pınarbaşı rock shelter in the Konya Plain, dating to 13,000 cal BCE (Baird et al., 2013). Findspots yielding chipped stone material of a local Epipalaeolithic characteristic were also detected during the surveys in Cappadocia (Duru and Kayacan, 2018).

Table 2
Summary of Epipaleolithic and Pre-Pottery Neolithic domestic/residential structures in the southern Levant and the Euphrates and Tigris Basins.

Time period & cultural affiliation	cal BCE	Buildings & structures				Interior features						
		Form	Mean sq m	Dia.	Const. mat.	PW	Hearth	NPGS	Intra. burial	Stor. Fac.	Ext. feat.	IAA
Southern Levant												
Early-Mid EP	21,000–13,000	Circ., semi-sub.	10.8	3.5	Organic, perishable materials	–	x	x	x	–	–	x
Late EP (Early Natufian)	13,000–11,000	Oval & circ., semi-sub.	10.1	7–15	Sw, mud or stone paved floors, org. roofing w/ph	x	√	√	√	–	x	√
Late EP (Late Natufian)	11,000–9,800	Oval & circ., semi-sub.	8.2	<10	Sw, mud floors, org. roofing w/ph	–	√	√	x	–	–	N/A
Early Neolithic (PPNA)	9,800–8,600	Oval & circ., semi-sub.	15.8	5.25–35	Stone foundation, w/d, mb and pisé walls, mud floors	x	√	√	√	x	√	√
Early Neolithic (PPNB)	8,600–6,900	Rec., fs.	12.8	5.8–21	Stone foundation w/mb or sw, mud or lime floors	√	√	√	√	√	√	√
Euphrates and Tigris Basins												
Late EP/ Proto-Neolithic	11.000–9,600	Oval & circ., semi-sub.	N/A	N/A	Organic, perishable materials	–	x	–	–	–	–	–
Early Neolithic (PPNA)	9,600–8,500	Oval & circ., semi-sub., rec. w/rounded corners*	23	2–10	Sw (stone slabs, unworked stones in single rows, limestone + mortar), stone foundation w/mb and pisé, w/d	x	√	x	√	x	x	x
Early Neolithic (PPNB)	8,500–6,400	Rec., fs.	37	N/A	Stone foundation w/mb, molded mb or pisé w/without foundation	√	√	x	√	√	√	√

√: common.
x: occasional.
-: absent.
N/A: lack of published data.
Abbreviations:
EP: Epipalaeolithic; Sq m: square meter; Dia: diameter; PW: partition wall; Const. mat.: construction material; NPGS.: non-portable groundstone; Intra. burial: intramural burial; Stor. Fac.: storage facility; Ext. feat.: extraordinary interior features (benches, niches, monoliths, pillars, decorated walls); IAA: interior activity area; Circ.: circular; Semi-sub.: semi-subterranean; Rec.: rectangular; Fs.: freestanding; sw: stone wall; ph: posthole; w/d: wattle and daub; mb: mudbrick.
Sites included:
Southern Levant: Ohalo II, Kharaneh IV, NEG I (Early-Mid EP); Eynan ('Ain Mallaha), Hayonim, Wadi Hammeh 27, NEG II, Rosh Zin (Late EP); Gilgal, Netiv Hagdud, Jericho, Dhra', WF16 (PPNA); Beidha, Jericho, Yiftahel, 'Ain Ghazal, Beisamoun (PPNB); Euphrates and Tigris Basins: Mureybet, Abu Hureyra I, Körtik Tepe (Late EP/Proto-Neolithic); Nemrik, Qermez Dere, M'lefaat, Tell Abr, Tell Qaramel, Mureybet, Jerf el Ahmar, Körtik Tepe, Gusir Höyük, Hasankeyf Höyük, Demirköy, Çemka Höyük, Hallan Çemi, Boncuklu Tarla, Çayönü (PPNA); Abu Hureyra II, Dja'de el-Mughara, Tell Halula, Sabi Abyad, Nemrik, Mureybet, Jerf el Ahmar, Çayönü, Cafer Höyük, Nevali Çori, Akarçay Tepe, Mezraa Teleilat (PPNB).
For southern Levant, date ranges are compiled from The Platform for Neolithic Radiocarbon Dates (PPND) Project of exoriente (https://www.exoriente.org/associated_projects/ppnd.php). Mean values for interior spaces are after Byrd, 2002: 72, Table 1; diameters are after Goring-Morris and Belfer-Cohen, 2008. Data is compiled from Bar-Yosef, 1998; Byrd, 2002; Finlayson et al., 2011; Goring-Morris and Belfer-Cohen, 2008; Grosman et al., 2016; Kuijt and Goring-Morris, 2002; Kuijt and Finlayson, 2009; Maher et al., 2012; Nadel et al., 2004; Samuelian et al., 2006. For Euphrates and Tigris basins, dates are after: Akkermans and Schwartz, 2003; Coqueugniot, 2000; Kodaş, 2018; Mazurowski et al., 2009; Özdoğan et al., 2011.

2008; Kozlowski and Kempisty, 1990). Circular wattle-and-daub structures and buildings with stone walls are also known from PPNA (Bar-Yosef and Gopher, 1997; Byrd, 2002; Kenyon, 1981; Kuijt and Mahasneh, 1998). At Tell Aswad IA, the vertical posts placed in the walls of some buildings were woven with reeds and plastered with mud. Eventually, with the rise and standardization of rectangular buildings, mudbrick production techniques and forms became even more standardized. In southeastern Anatolia, in some cases the dominant construction material included stone for the building foundation and then wood and mudbrick for the upright walls and roof of the rectangular buildings (Erim-Özdoğan, 2011).

In contrast to the southern Levant, it is only recently that archaeologists working in central Anatolia have started to push back our understanding of the periods before the appearance of larger villages such as Çatalhöyük. The earliest sedentary communities within Anatolia and northern Mesopotamia are known from the 10th and mid-9th millennium BCE settlements such as Çayönü, Nemrik 9, Qermez Dere, Pınarbaşı and Boncuklu, Hallan Çemi and Körtik Tepe, as well as Dja'de, Mureybet and Jerf el-Ahmar among others (Aurenche, 1980; Baird, 2007; Baird et al., 2012; Coqueugniot, 2000; Erim-Özdoğan, 2011; Kozlowski and Kempisty, 1990; Özkaya and Coşkun, 2011; Rosenberg, 2011; Stordeur, 2014; Watkins et al., 1989) (Fig. 1). Chronologically, this timeframe is contemporaneous with the Early-Middle PPNB periods in southeastern Anatolia and the southern Levant. Among the southern Levantine and Mesopotamian sites, the precursors of rectangular building forms emerge around 9500/9300–8700 cal BCE at Nemrik 9, Qermez Dere, Çayönü, Mureybet and Jerf el-Ahmar, as well as Netiv Hagdud and Gilgal (Cauvin, 1978; Évin and Stordeur, 2008; Noy et al., 1980). Meanwhile, the circular architecture of the early sedentary communities in central Anatolia exhibits some variability in construction materials and techniques and the use of space (cf. Baird, 2007). As seen at Boncuklu and Pınarbaşı (Baird, 2007; Baird et al., 2016), and the recently identified site of Balıklı (Duru and Kayacan, 2018), the pattern seen with mid-9th millennium BCE Neolithic life at Aşıklı Höyük, is broadly representative of how villagers organized their world during the mid-9th millennium BCE. The mid-9th millennium BCE occupation at Aşıklı Höyük is similar to contemporary sites on the Konya plain in some technical aspects, such as the choices in building materials, and internal features in the case of the circular buildings (cf. Baird, 2007; Baird et al., 2016).

The first appearance of the rectangular buildings at Aşıklı Höyük during the early 8th millennium BCE marks the emergence of a new approach to settlement organization and can be framed as the "central Anatolian model", with structures characterized by closely spaced

Table 3
Summary of Epipaleolithic and Pre-Pottery Neolithic domestic/residential structures in central Anatolia.

Site	Buildings & structures					Interior features						
	Form	Sq m/Dia.	Const. mat.	Wall thickness (cm)	Mb size (cm)	PW	Hearth	NPGS	Intra. burial	Stor. Fac.	Ext. feat.	IAA
8th millennium BCE												
Suberde	Rec., fs.	~4.30	Mb	40	60 × 40 × 6	N/A	N/A	N/A	–	N/A	N/A	N/A
Can Hasan III	Rec., fs.	9.50–25	Mb	30	120 × 30 × 9	x	x	N/A	–	N/A	N/A	N/A
Çatalhöyük	Rec., fs.	~10–40	Mb	33–47	40–100 × 33–47 × 3.8–7.4	√	√	x	√	√	√	√
Aşıklı Höyük	Rec., fs.	~6–28	Mb	28–30	60–110 × 8	x	√	x	x	x	√	√
9th millennium BCE												
Boncuklu Höyük	Oval/circ., semi-sub.	2.90 × 4.6–4 × 5.25	Mb	~23	23 × 23 × 5, 23 × 23 × 9, 11 × 23 × 9	–	√	x	X	–	x	√
Pınarbaşı	Oval/circ., semi-sub.	N/A	w/d	–	–	–	x	N/A	X	–	x	x
Balıklı	Oval/circ., semi-sub.	4.30–4.85	Stone, mud	~50	–	–	√	√	√	x	x	x
Aşıklı Höyük	Oval w/ rounded corners	N/A	Mb	30–40	N/A	N/A	x	√	–	x	–	x
	Oval/circ., semi-sub.	4.00–5.80	Mb	28–30	60–100 × 28 × 7–10	–	√	√	√	–	√	√
	Oval/circ., semi-sub.	3.60–4.20	w/d	N/A	–	–	–	–	–	√	–	x

√: common.
x: occasional.
-: absent.
N/A: lack of published data.
Abbreviations:
Sq m: square meter; Dia: Diameter; Const. mat.: construction material; PW: partition wall; NPGS: non-portable groundstone; Intra. burial: intra-mural burial; Stor. Fac.: storage facility; Ext. feat.: extraordinary interior features (benches, niches, monoliths, pillars, decorated walls); IAA: interior activity area; Circ.: circular; Semi-sub.: semi-subterranean; Rec.: rectangular; Fs.: freestanding; w/d: wattle and daub; mb: mudbrick.
Data is compiled from Baird, 2012; Baird et al., 2012, 2013; Duru, 2002, 2018; Duru and Kayacan, 2018; Esin and Harmankaya, 1999; French et al., 1972; Hodder and Pels, 2010; Kay, 2020; Özbaşaran, 2011; Özbaşaran et al., 2018a.

buildings with freestanding walls made from mudbrick, flat roofs, roof entrances, and tight clustering (Özbaşaran, 2011: 112). Beyond construction materials, the design of circular and rectangular buildings differed substantially, both of which had benefits and trade-offs. Circular buildings were dug into the soil, were warmer in the winter and cooler in the summer (Gilman, 1987), but were potentially subject to greater humidity and moisture related issues with timber. Circular buildings, however, could not really be expanded, or built on. Circular semi-subterranean buildings were probably relatively easy to heat with a central fire hearth, but did not have a ground level source of air. Solutions such as the construction of ventilation shafts in some Neolithic circular buildings (Özbaşaran et al., 2018a) addressed some of this problem. The transition to rectangular architecture facilitated innovation of architectural practices and offered new potential in creating spaces. In brief, buildings were transformed into more durable and well-equipped living spaces. The flat roofs of Neolithic rectangular buildings, for example, potentially served as open air space (Duru, 2013) and rectangular buildings facilitated the addition of multiple supported rooms and internal features. Being above ground, structures would not have faced as many water drainage issues and open fires would have drawn air from the ground level and out through a hole in the celling. In many ways the development of above ground rectangular buildings brought about architectural innovation, such as with the development of basements, steps, doors, windows, and flat roofs, but also a formalization and compartmentalization of spaces with areas similar to walled compounds, alleyways, and something akin to streets. Importantly, these developments became entrenched, with rectangular architecture persisting throughout the Pre-Pottery and Pottery Neolithic period (Kuijt and Goring-Morris, 2002), and serving as the foundational design for constructing buildings in a contemporary context (Steadman, 2006; Kinzel et al., 2020). The evolutionary pathway of these developments, however, is complex and requires a nuanced understanding of practices within individual settlements. Complementing our discussion of early Neolithic villages, archaeological research at Aşıklı Höyük helps us understand and track the overall tempo and nature of the circular to rectangular building transition and demonstrate the relatively rapid reorganization of human practices within one of the world's earliest villages.

3. Managed foods, delayed consumption, processing location, and the restructuring of early villages

As part of the broader economic and subsistence shift known as the forager-farmer transition, researchers have documented a general shift in the use of circular to rectangular buildings. Given the methodological challenges and limitations of reconstructing regional and temporal practices from a patch work of settlement data from different sites and periods (e.g., Flannery, 1972), it is now critical to advance our understanding of the forager-farmer transition based on occupational data from a single settlement, and to model how small-scale decision making and daily practices resulted in a restructuring of the critical relationships between multiple interlinked and co-dependent variables.

In this paper, we explore the forager-farmer transition as an economic and social process, and consider some of the interconnected aspects of the long-term evolutionary movement from hunting and gathering of wild resources to that of agricultural economies among early villages in the Old and New World. Our focus is to consider diachronic change in general, and more specifically, how people produced and stored food, how people created the physical setting in which they lived, and where these activities occurred within settlements

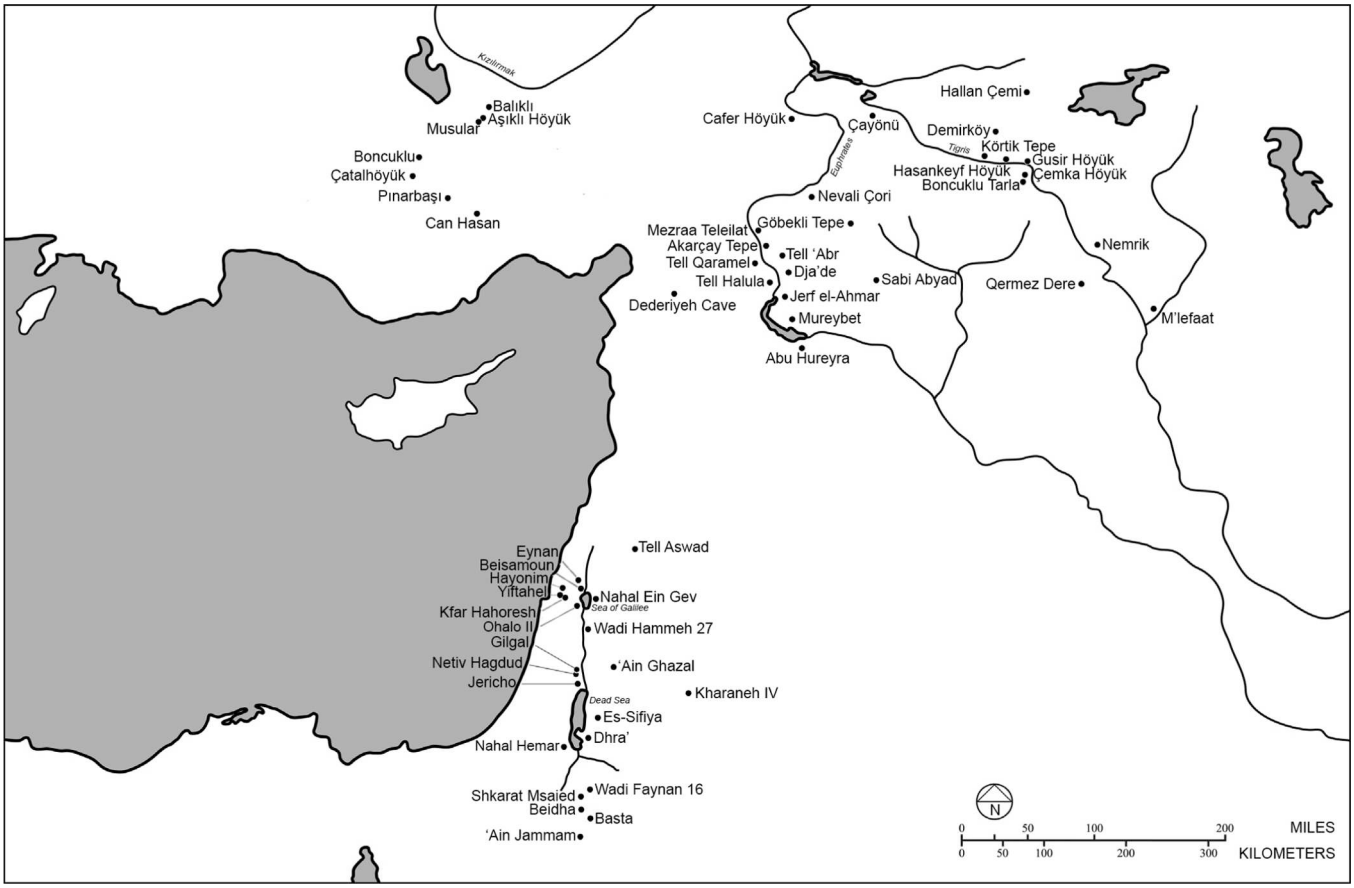

Fig. 1. Epipaleolithic, Pre-Pottery Neolithic and Pottery Neolithic sites discussed in this paper.

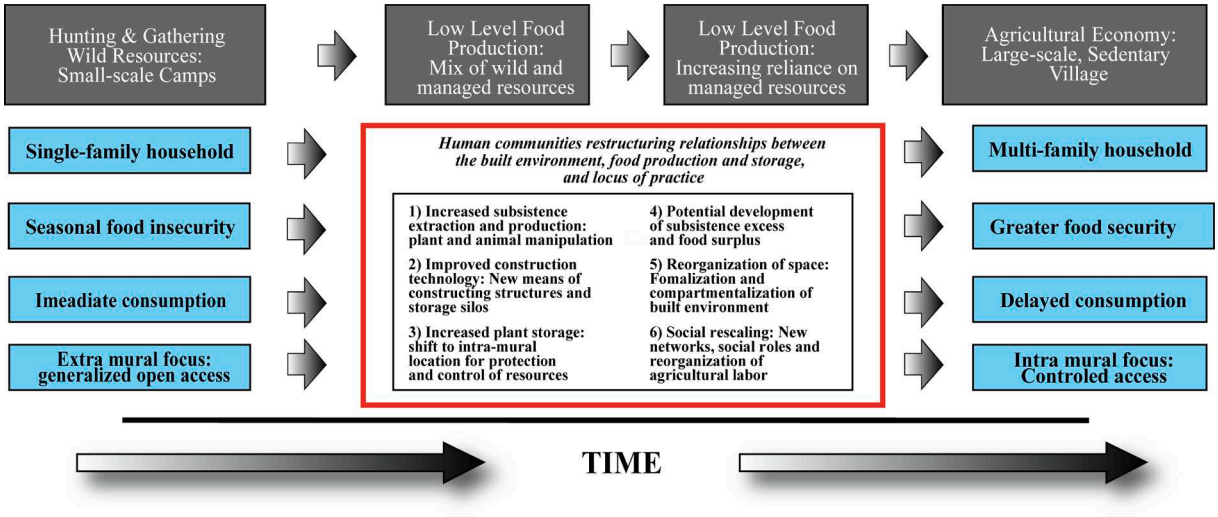

Fig. 2. Interlinked and co-dependent variables associated with the shift from small-scale semi-sedentary lifeways based on broad-spectrum with hunting, gathering and cultivation, to large-scale sedentary communities based on an agricultural economy (based on Zeder, 2006; Kuijt, 2018).

(Fig. 2). Building upon previous research we see general, but not universal, commonalities in the development of Neolithic Southwest Asian villages that include temporal shifts related to the nature of the household, food insecurity, the nature of immediate to delayed food consumption, the compartmentalization of space, and a general shift in the locus of action from extra-mural to intra-mural locations (Fig. 2). A number of researchers (Asouti and Fuller, 2013; Harris, 2002; Smith, 2001a, 2001b; Zeder, 2006; Stiner and Kuhn, 2016) argue that in some ways the long-term shift from hunting and gathering of wild resources to that of agricultural economies among early villages in the Old and New World can be modeled as an incremental and relatively gradual development on regional scale, and yet that this transition occurred relatively rapidly over 200–300 hundred years at individual settlements. The development of low-level food production demonstrates how people initially relied upon a mixture of wild and managed resources and later increasingly focused upon managed plant and animal resources (Smith,

2001a, 2001b; Zeder, 2006).

In some ways, at least when one drills down on a practical level, the evolutionary core of the foraging-to-farming transition is that this transition reflects a fundamental reframing of the relationship between humans, wild and managed resources, and the development of systems of delayed consumption. At its broadest, researchers have correctly recognized that the foraging-to-farming transition reflects a shift from immediate to delayed consumption (e.g., Hayden, 1982; Testart, 1982; Woodburn, 1982). Among others Testart (1982) notes that the fundamental aspect of hunting and gathering is that captured or gathered resources are processed and consumed relatively quickly, normally within days or perhaps weeks, from when food was acquired. In contrast, delayed consumption is when food can be consumed over an extended period of time, perhaps months or potentially years. This includes things such as grains which can be dried and stored in a cool, low humidity location, and sheep and goats that can be managed and exist as a mobile larder. The concept of delayed consumption, above all else, reflects a reframing of time and food shelf-life (to use a modern framing), one under which the degradation of the caloric and nutritional value of food is slowed down and, in some cases, temporarily stopped all together. As outlined elsewhere (e.g., Bogaard et al., 2011; Kuijt, 2008, 2015), agriculturalists and pastoralists are well aware of the fact that specific types of resources have a shelf-life and recognize that storage planning is critical. Ethnographic planning, of course, would have been dictated by anticipated use and shelf-life, for specific animal and plants, probably had variable shelf-life based on their individual characteristics, as well as available processing and storage technology. For example, dried plants can only be successfully stored as long as conditions (temperature, humidity, air circulation, protection from insects) are maintained.

In modeling some of the interrelationships between food intensification and the increasing reliance on managed resources and fully agricultural economies, it is important to recognize that the move to delayed consumption and expanding shelf-life is both conceptual and linked to technology. Beyond water irrigation, the use of grinding stones for processing and better extractive tools for hunting animals and harvesting plants, and the development of systems of food storage was linked to the development of new technologies, or perhaps the improvement of existing technologies. This includes the improvement of how buildings and storage structures were made, the ways in which people employed construction materials such as clay to shed water from the tops and sides of buildings, to dissipate moisture with clay silos, and protect valuable seeds from rodents and insects.

The increased reliance of humans on stored foods also changed the physical relationship of humans to food, for food storage requires supervision and intervention. On some level food storage leaves a material footprint, and this footprint illustrates that the changing relationship of people to their food, the increased physical proximity of people to stored food, and the privatization of space. In the case of animal stock, we see this in the penning of animals in open areas, the use of abandoned buildings, and pens placed around buildings. For example, research at the early Neolithic villages of Aşıklı Höyük and Çatalhöyük clearly indicates that stock was regularly kept on site at least seasonally (Portillo et al., 2019, 2020; Stiner et al., 2014). Similarly, Wright (2014) demonstrates that plant processing provides another means by which research can better understanding the restructuring of food intensification and processing. The increased use of grinding stones through time, as well as the dedication of specific rooms for food processing, such as milling bins, help us understand that while some processing occurred off site, such as the removal of wheat from chaff, specific processing occurred within the settlement, and with time, processing became spatially associated with the location in which the plant resources would be stored.

As with processing, the storage of plants within early villages can leave physical traces. This includes the construction of above-ground features, such as clay silos and bins designed to store plants, the construction of below-ground pits for storing food, and the construction of dedicated rooms used for storing food (Kuijt, 2015). Most of these features do not reflect new technological developments so much as the application of existing technologies to a new purpose. This includes, for example, greater use of below-ground features, and the incorporation of clay linings and use of straw along the edge of grain storage pits. All of these reconfigured storage technologies, such as clay silos and rooms, were focused on minimizing the impact of rodents and insects, and spoilage due to mold and rot, with the aim of increasing the storage life of grain (Bogaard et al., 2011; Kuijt, 2008, 2015).

Our current knowledge on this transition is based on the evidence from a few key Neolithic sites throughout Southwest Asia. Among these, Aşıklı Höyük in central Anatolia, provides a rare, uninterrupted, habitation sequence that incorporates the full transition from circular to rectangular architecture. These architectural changes were accompanied by the gradual adoption of animal domestication and the full establishment of sedentary village life. In this article we address several questions concerning the mutually reinforcing interaction between the first human societies that built permanent structures and villages during the Neolithic period approximately ten thousand years ago. In particular, we explore how the transition from round to square buildings, a widespread and dramatic shift, was linked to foundational shifts in how people organized the built environment, how the development of new and enhanced storage systems required on-going intervention and monitoring by people, and how storage required a reorganization of the relationship of where and how humans live, and how they organized their families for seasonal labor (Fig. 2). Building on previous explanations for the round to rectangular house transition, we ask: a) what factors led to the transition from circular to rectangular buildings at Aşıklı Höyük?, b) why was the rectangular form adopted at Aşıklı Höyük and why did it persist?, c) what are the implications of the architectural changes for social and community organization at Aşıklı Höyük? (i.e., privatization, social cohesion/community integration, labor organization, personal identity, and social differentiation) and d) what are the implications of these architectural and social and community transformations within the greater picture of this transition in Southwest Asia and the Neolithization process more generally?.

In many ways pan-Neolithic, single cause framings of why human communities invented rectangular architecture misses the point: changes in the built environment are linked to numerous social, economic, and structural considerations. It is unlikely that these shifts were driven by a single universal factor. An alternative way to approach the transition from foraging to farming, as well as from the construction of round to rectangular buildings, is to frame this as social process brought about by the complex interplay of multiple interrelated decisions, which collectively led to changes in daily practices, and in the end, led to long-term changes and resulted in observable material and social by-products. Thus, researchers need to better understand the interplay and interconnectivity of multiple, small-scale, decisions, such as where to store food. Central to this goal is gaining a high-resolution understanding of the shifting ways in which people created and used domestic spaces. To advance this conversation in this paper we focus on archaeological evidence from Aşıklı Höyük including the development through time of residential and community cooking facilities, the movement of cooking and food preparation areas inside of buildings, how people buried their dead within residential areas, and the consolidation of food storage inside of buildings. In brief, we suggest that these embedded practices, within villages characterized by more people living in closer proximity to each other, and with a greater reliance on upon managed food resources, required more predictable access to labor to harvest, prepare and store food. In the end, the critical issue has less to do with did villagers design and build residential spaces, and more to do with how to organize the people and actions taking place within and around structures.

4. Home making at Aşıklı Höyük: The transition from circular to rectangular buildings

Why did human societies in Southwest Asia change how they built and organized residential spaces at the start of the Holocene? Historically studies have focused on the broad evolutionary description of this transition (Flannery, 1972), have looked to functional questions such as labor, time investment and structural issues (Saidel, 1993; Steadman, 2006), explored how this shift reflects economic and social changes in the household (Byrd, 1994; Flannery, 1972), or reflected on the conceptual spaces and relationships between the household and supra-household (Watkins, 2004: 105). Some, such as Steadman (2006), espouse the practical advantages of rectangular buildings, claiming that "…the causes of rectangularity in multi-room plan lies in the constraints of packing those rooms closely together". While we agree with this practical observation, this single cause explanation is not entirely satisfying for there is so much more going on with the transition. Focusing on energetics, Saidel (1993) emphasized that the construction of round houses required more labor and time investment than rectangular structures, indicating a greater dependence on sedentism, emphasizing labor investment rather than changes in social structure and kinship relations. For many years, archaeologists interpreted the early round houses in villages as dwellings of the first agriculturalists, each inhabited by a "nuclear family" with co-existing households forming early villages (Braidwood and Howe, 1960; Watkins 1990: 337). More recently, however, scholars have suggested that the round form, large size, interior features and spatial arrangement of Early Natufian buildings imply multi-family residences, while the smaller Late Natufian structures may have housed only single families (Byrd 2002, 2005; Goring-Morris and Belfer-Cohen, 2013: 34). Watkins (2004: 105), on the other hand, argued that the increasing symbolic paraphernalia of Pre-Pottery Neolithic communities in Southwest Asia further concretized the division between the public and domestic spheres (Duru, 2018). Collectively, a number of researchers (Banning and Chazan, 2006; Kent, 1990, 1991; Kuijt, 2000; Steadman, 2004) point to cross-cultural practices in which storing food and the increased privatization of households led to a simultaneous increase in the number of buildings and internal divisions within these buildings.

4.1. Aşıklı Höyük: Background and chronology

The central Anatolian plateau, bordered by the Northern Anatolian Mountains to the north and the Taurus Mountains to the south, covers an area larger than 150,000 km^2. The region consists of four main basins: the Cappadocian plateau, Lake Tuz, the Konya plain and the Lake District. Each subregion exhibits ecological diversity characterized by macro and micro-niches that host various raw material sources and plant and animal species. This diverse landscape influenced site location, foraging and later agricultural and herding strategies of early sedentary communities. Archaeological research on the beginnings of Neolithisation in the region has concentrated on the geomorphologically and ecologically diverse Konya plain and Cappadocian plateau. Excavations over the last 15 years at Aşıklı Höyük on the Cappadocian plateau have exposed a 16 m-deep stratigraphic sequence that can be divided into five main levels of occupation. These are numbered from 1 to 5 from top to bottom (Özbaşaran et al., 2018a). Radiocarbon dating illustrates a continuous occupation of the site between c. 8,350–7,350 cal BCE (Quade et al., 2018). Level 1, which dates to the most recent period of the Neolithic village has been severely damaged by modern day ploughing and natural erosion and is not discussed in detail in this paper. Özbaşaran et al. (2018a) outline that the Aşıklı Höyük cultural chronology can be divided into three general cultural/architectural horizons: Level 4–5 covering the initial forming of the village between > 8,350–8,050 cal BCE (>10,35–10 kyr BP); Level 3 when the village was occupied from 8,050–7,750 cal BCE (10–9,7 kyr BP); and then Level 2 that lasted from 7,750 to 7,350 cal BCE (9,7–9,3 kyr BP) and is the last major preserved occupation of Aşıklı Höyük (Fig. 3).

Through time the broad-spectrum hunting of a variety of wild animals in the early levels at Aşıklı Höyük was largely replaced by caprine exploitation (Buitenhuis et al., 2018; Peters et al., 2018; Stiner et al., 2014). Gathered wild legumes and cereals were important, as was the cultivation of cereals from the earliest levels onwards (Ergun et al., 2018). Artefactual evidence suggests that temporal changes in technological and social practices occurred alongside the transitions in building form, construction technology, and settlement layout. The circular architecture of the earliest phases (Levels 5 and 4) was gradually replaced first by intermediate forms, and then entirely replaced by rectangular above ground buildings in Level 2.

4.2. Aşıklı Höyük buildings: Forms, sizes, techniques, and materials

Most large Neolithic villages are built on top of the remains of smaller, earlier, villages. In the case of Aşıklı Höyük people first started farming and raising animals at around 8,350 cal BCE on the edge of the Melendiz River (Fig. 4). In Levels 5 and 4 people constructed their buildings away from other buildings, in a dispersed pattern, separated by exterior activity areas, and probably with many, if not most, daily activities being conducted in outdoor areas. People constructed 4 to 5.5-meter semi-subterranean circular buildings that kept them warm in the winter and cool in the summer. As seen in deep trench 4GH, excavations along the northwest edge of the mound along the river have revealed semi-subterranean circular buildings dug down about 1 m into the natural sediment of the river floodplain (Fig. 5). These circular buildings measured between 4.0 and 5.8 m in diameter (cf. Özbaşaran et al., 2018a: 72, Table 2). The walls were about 40–60 cm above ground, reaching a total height of 1.60 to 1.95 m. The walls were made of hand-shaped or molded and sun-dried rectangular mudbricks, 60–100 cm in length, placed at slight angles to create the circular wall of the building. The roofs were constructed with one or more central vertical wooden posts, horizontal beams, all of which was likely supported by more wooden cribbing and reeds, and probably covered in mud. It is unclear if the roofs were flat, or were sloped to drain off water.

Surprisingly archaeologists have only a limited idea as to how Neolithic buildings were constructed. Recent experimental research by Duru (2014) provides insights into how people constructed buildings, how much time was required to construct individual buildings, how people organized their village, and how people incorporated new construction methods to improve the durability of the structures (Fig. 6, Fig. 7). Experimental research (see Duru, 2013: 142, 2014), demonstrates that the construction of the circular buildings followed several steps (Table 4). During the earliest occupation phase (Level 5), people employed two different wall construction techniques with different materials. Walls of Building 27 and Building 39, both early circular, semi-subterranean buildings, were constructed from vertical wooden posts woven laterally with branches and reeds and plastered with mud. This wattle and daub technique was also employed for the construction of more ephemeral hut-like circular, above-ground structures that functioned as activity and penning areas (see Özbaşaran et al., 2018b and chapters therein). The walls of a different circular building (B.35/34/6) were made entirely from mudbricks, with the building reconstructed three times in the same spot (see Fig. 8). Circular, semi-subterranean buildings with mudbrick walls continued to dominate in Level 4. Some intermediate building forms, however, are also seen in Level 4. The circular buildings in Level 4 were similar to those from the earlier phase. Building 2, which is a semi-subterranean building, rectangular in form with rounded corners, differed in its construction technique and form. Its walls were made with rammed earth within a temporary frame. The structure was rebuilt in the same spot at least six time, although the location and size of internal arrangements and features changed with rebuilding (Özbaşaran et al., 2018a: 83).

Starting around 8,050 cal BCE, people started to build a combination of sub-rectangular and circular buildings. Excavations of the earliest

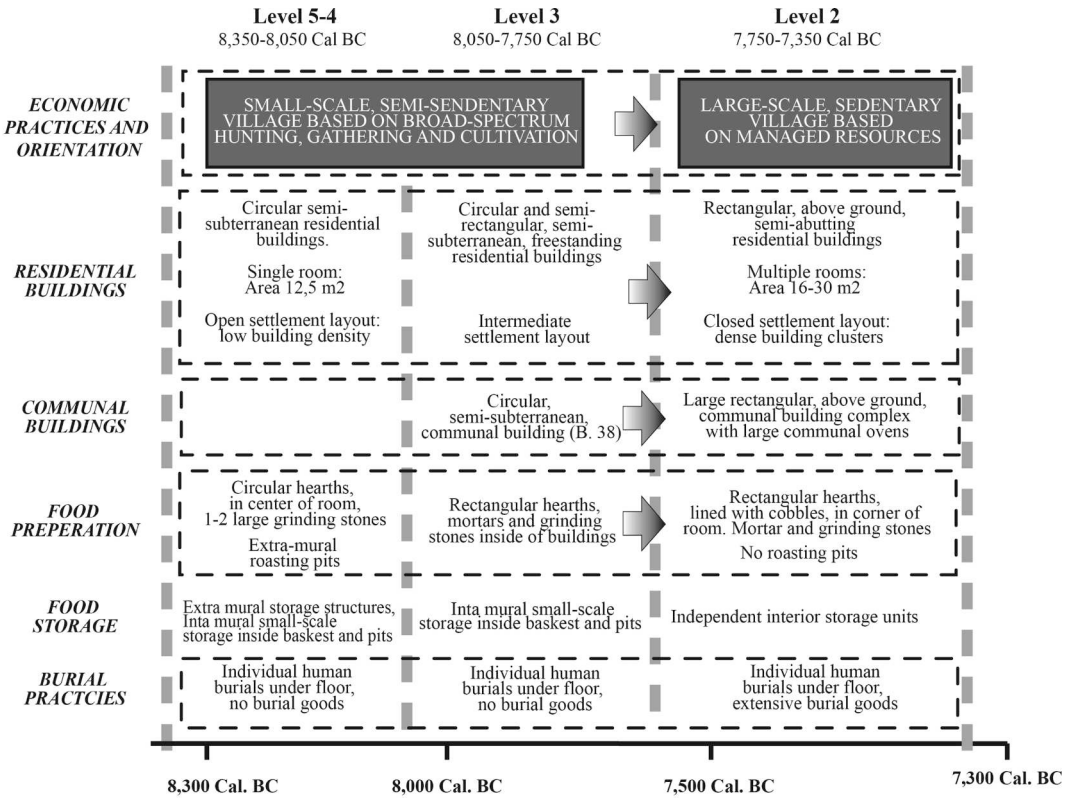

Fig. 3. Shifting cultural practices and material residues associated with the transition from circular, semi-subterranean to rectangular above ground residential buildings, Aşıklı Höyük.

Fig. 4. Air photograph of the northwest corner showing the deep trench 4GH, Aşıklı Höyük, 2018 (Aşıklı Höyük Project Photography Archive). Looking south, the settlement is positioned just to the east of the Melendiz River.

phase of Level 3, dating between 8,050 and 7,750 cal BCE demonstrate that Neolithic people constructed their buildings close together in a much denser pattern (Figs. 5 and 6). The circular buildings were better designed, more durable and permanent, and with thicker and more carefully prepared plaster floors. Although these buildings were still semi-subterranean, the above-ground part of the walls was higher (c. 40 cm) than in previous levels so that most of the building was above ground. The larger size and taller walls of these circular buildings (now 1.20 to 1.50 m in total height) required that walls be constantly renewed and repaired to prevent collapse. Sometimes the mudbricks are up to 1 m in length. The sub-rectangular buildings were single-roomed, with walls made of sun-dried mudbricks and plastered floors. One exceptional example had roughly constructed walls with apparently recycled, irregular mudbricks and lacked plastered floors (Esin and Harmankaya,

Fig. 5. Air photograph of the northwest of Aşıklı Höyük, 2018 (Aşıklı Höyük Project Photography Archive). Looking towards the north-east the viewer can see the circular-oval, semi-subterranean buildings of Levels 5, 4, and 3 and stratigraphically above this, the rectangular, above-ground rectangular buildings of Level 2.

2007: 258; Özbaşaran et al., 2018a: 84-89).

By 7,750 to 7,350 cal BCE, Neolithic people in Level 2, had totally altered their practices to constructing rectangular above ground, free-standing architecture (Fig. 5). The reorganization in the settlement that took place at the end of Level 3, coincided with the removal of the animal pens and structures out of the settlement (Stiner et al., 2018: 441). The removal of these outside of the settlement may have facilitated, if not encouraged, people to fundamental change the organization of their settlements. The new rectangular buildings with the start of Level 2 were built with mudbrick walls and flat roofs. The walls were around 30 cm thick. All of the rectangular buildings in Levels 2J-2E are single roomed and average 6–8 m^2.

In later periods, during the period of occupation with Level 2E and above, Aşıklı Höyük villagers constructed two - or three-roomed buildings, with greater compartmentalization, and by extension, privacy. The location, form and size of the buildings potentially supports the argument that the village organization reflects a pre-designed plan. Single, two -and in some cases three-roomed rectangular buildings appear to spread out in a radial layout, potentially forming building groups. These building groups are defined based on the presence of passages that connected buildings to each other. Clusters of building groups, passages, and middens formed "neighborhoods" during the last 200–300 years of occupation of the mound (Levels 2C to 2A). Further research on building biography is needed to assess the argument for Aşıklı Höyük village planning, and at other early Neolithic villages.

The repeated superposition of circular and rectangular buildings and interior features illustrates how Aşıklı Höyük villagers repeatedly rebuilt and renewed structures throughout the occupation sequence. Excavations in Area 4GH illustrate the nature of repetitive building practices with circular buildings at the earliest phase of occupation. This is seen with the rebuilding of Building 3 on top of Building 27, and the rebuilding of Building 6 above Building 34–35 (Özbaşaran et al., 2018a: 80-84). During the Level 2 occupation newer buildings were constructed on older buildings. Construction debris was normally used to fill up and level the inside of rectangular building prior to rebuilding. In some cases the orientation or the size of the new building was changed during rebuilding. This required new solutions such as integrating walls from earlier building into the new structure. Walls manufactured from mudbricks of different colors and textures indicate that mudbricks from older buildings were often recycled into new buildings. The dense and agglutinative layout of buildings would have made renewing single buildings difficult. It is possible, therefore, that the rooms in building groups would have been renewed together, requiring greater labor organization than construction of single buildings. This is potentially supported by the similar floor levels of buildings identified as part of a building group. The renewal of floor plasters was likely organized around seasonal and social events. Variation in the types of floors renewed at one time and the tempo of renewals in each building phase may also relate to cyclic events such as funerals (cf. Boivin, 2000).

5. Aşıklı Höyük space making and household life

As noted earlier, the shift from circular to rectangular buildings at Aşıklı Höyük is not just about building shape: it reflects a fundamental transition in home and space making, the development of privacy, and the organization of internal and external spaces (Figs. 2, 3, 9). In this section, we explore several interconnected aspects of this transition, considering the materiality of cooking, sleeping, food storage, and the overall shift from domestic activities taking place outside and between buildings, to that of activities taking place inside of buildings. As illustrated in Fig. 9, over about three to four hundred years, perhaps more, people living at Aşıklı Höyük increased the scale of household grain and plant storage at the same time that they shifted the location of food preparation and food storage from outside to inside of buildings. This reorganization of practice at Aşıklı Höyük, a form of space and home making if you will, is clearly defined through material culture and physical evidence. It is important to note that while this paper is focused on Aşıklı Höyük as an individual case study, it is clear that this transition is reflected in the archaeological record of many regional sites (see Bogaard et al., 2009; Kuijt, 2015) (Fig. 9). While the specific tempo of this general regional transition is unclear, and that it likely differed regionally, such as the relocation of fireplaces/hearths and storage features, our study suggests that the shift was incremental, directional, and occurred within 300 years according to radiocarbon dating. Additional research will be required to chart the specific timing of the reorganization, and modeling of this social and economic process.

5.1. *Creating new spaces inside of buildings: Hearths and cooking*

The location and organization of space within circular buildings

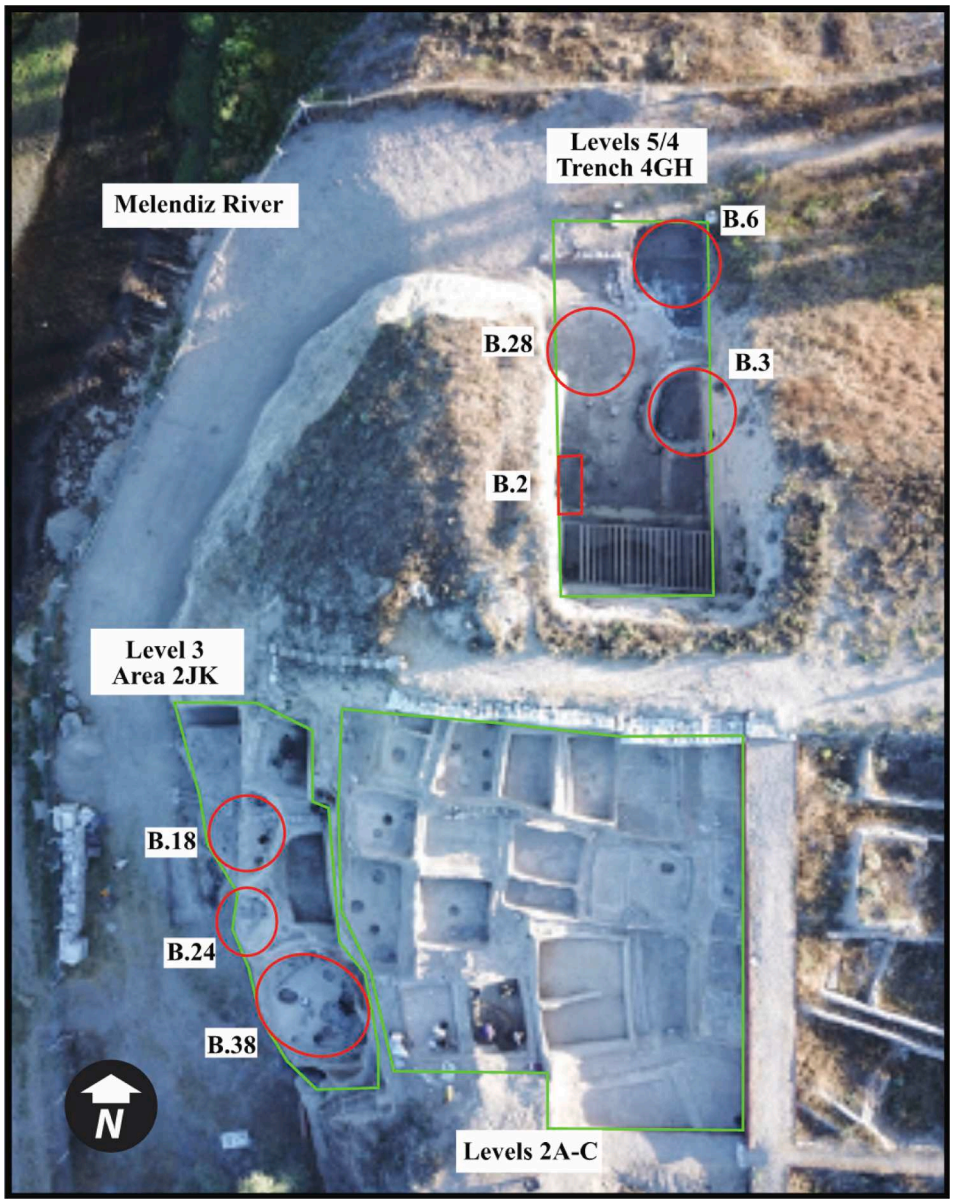

Fig. 6. Air photograph of the northwest corner of Aşıklı Höyük, Turkey, 2018 (Aşıklı Höyük Project Photography Archive). The circular-oval buildings are from Levels 5 and 4 (dating to 8350–8050 cal BC), Level 3 (dating between 8050 and 7750 cal BC), and the rectangular buildings are from Level 2 (lasting from 7750 to 7350 cal BC). The estimated extent of complete or partially preserved circular-oval buildings from Levels 5–3 are outlined in red. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

provides insight into how Neolithic people cooked their food and used intramural areas when they first founded Aşıklı Höyük (Figs. 3 and 9). In Levels 5 and 4, the round building hearths were consistently placed in the center of the room, but the location and shape of hearths began to change by Level 3. Each time a building was reconstructed in the same location the hearth was rebuilt in the same spot. The size of the hearth ranged between 0.65 and 1.00 m. The fire hearth was constructed by digging a hollow, oval pit into the floor, and then lining the base of the pit with rounded pebbles collected from the nearby Melendiz River. These stones were likely chosen for their heat-storing capacities (Özbaşaran, 1998; Uzdurum, 2018). In some cases, exhausted grinding stones were used in the hearths. Some hearths were bordered by a mud curb that projected above the floor level. Other common interior features include platforms, grinding stones, pits, post holes, ventilation shafts, and bins.

During the mid-9th millennium BCE, roasting pits, fireplaces, pits, post holes and grinding stones were also located in exterior areas, suggesting that daily activities were conducted in both intra- and extramural spaces. The fireplaces located in outdoor spaces differed in construction and function. Most of these were roasting pits, that were likely used for cooking. The indoor hearths were smaller and may have also been used for heating and lighting. The grinding stones and the plastered platforms indicate that activities, such as some processing of plant food, took place inside the houses as well.

Circular structure Building 1, dating to the earliest phases of Level 3, illustrates how people created, and recreated, interior features and spaces inside of circular buildings. Excavations of B.1 uncovered a cluster of finds near the west wall of this building, including a table-like feature made from unbaked clay, ground stone tools, a bone tool, and remains of a small basket containing cereal phytoliths (Özbaşaran et al., 2018a: 84; Tsartsidou, 2018: 161-162). Grinding stones, pestles and bone tools were also found on the floor. A sub-circular hearth located in the northeast part of the room was renewed twice. Concentrations of wood ash and charcoal above and around the hearth suggest intensive use. A stone ventilation shaft was located in the eastern side of the building. Another circular building (B.24) also had a ventilation shaft (Özbaşaran et al., 2018a: 93) and revealed how and where household members cooked and used spaces around the hearth. The ventilation shaft was blocked at some point and fell out of use, although the building remained in use as illustrated by replastering and repairs to the walls.

Fig. 7. Reconstructed semi-subterranean circular structures and above-ground rectangular buildings Aşıklı Höyük (Aşıklı Höyük Project Photography Archive).

Table 4
Reconstruction of the stages involved in the construction and use of a semi-subterranean circular building with mudbrick walls (stages 3, 4 and 5 may interchange).

Stage	Activities
1)	Digging a curvilinear hollow into the ground.
2a)	Building the wall: placing the mudbricks and mortar around the pit's circumference.
2b)	Rising the wall above the ground: for c. 40–60 cm, by placing mudbricks with a sloped angle towards the interior of the building.
3)	Digging holes into the floor level to place the vertical posts as loadbearing supports: one post would be placed in the center of the building and the others would be placed at the base of the wall.
4)	Plastering the floors and the interior faces of the wall.
5)	Constructing the roof: horizontally placed wooden beams were woven laterally with branches and reeds.
6)	Constructing internal features: hearths, pits, platforms.
7)	Reconstruction/renewal of the building.
8)	Abandonment: the hollow of the buildings was used as middens, or the buildings were filled with construction debris to create an even surface to be functioned as an outdoor activity area.

During the earliest phase of B.35/34/6, a fireplace was built. It was paved with pebble stones and lined with a mud curb. In the next rebuilding episode, the curb was renewed, but it was considerably reduced in size. An ashy area to the south of the hearth indicates that indoor activities were organized around this feature. This is further supported by concentrations of certain elements in geochemical analyses (Kalkan and Özbal, 2018). A ventilation shaft at floor level in the south wall (Özbaşaran et al., 2018a: 74) served as a functional means of air intake. The mud/clay floor was occasionally replastered at the time of hearth renewal. The walls were also repaired and renewed in the three major renewal events within the building sequence.

The location, size and organization of cooking facilities inside of rectangular buildings from Level 2 helps us understand how daily food preparation practices changed from when Aşıklı Höyük villagers were constructing circular-oval buildings. While documenting building biography and changing use of internal spaces is complex, the presence and absence of fire hearths, which provided illumination, hearth, and the ability to cook food, provides one of the few reliable means that archaeologists have to reconstruct how space was used within Neolithic buildings. Uzdurum (2018: 30) notes that at least 282 building at Aşıklı Höyük have been identified from later occupations of Level 2 (Levels 2D to 2A). Of these buildings 113 (40%) have fire hearths inside of them while the others do not (Fig. 10). All of the hearths inside of Level 2 buildings are rectangular in plan, defined by stone river cobbles, and at times kerb stones, clay retaining walls, and/or stone reflectors (see Uzdurum, 2018). No building had more than one hearth per room. The hearths are not built directly into the corners, instead being slightly offset from the wall, are placed so the long axis is parallel to the wall (Fig. 11). Compared to earlier periods, hearth placement and form became standardized, as did the placement of other interior features included platforms, pits, grinding stones, and storage units.

5.2. Dried plant storage and roasting pits: Shifting from extramural to intramural locations

As seen elsewhere (Flannery, 1972: 31; Kuijt, 2009; Kuijt and Finlayson, 2009), settlements of the PPNA period provide evidence for communal storage facilities, such as buildings and small-scale storage pits, often in open areas. People who lived in adjacent structures may have shared stored food. Sites such as Mureybet and Jerf el-Ahmar (Stordeur et al., 2000) show that more central and protected storage units emerged with the onset of year-round sedentism and the establishment of permanent villages in the PPNA. Through time, the dedicated storage facilities began to be centralized, and some daily practices were transferred inside the houses. In the PPNB, each building contained its own interior small-scale storage facilities suggesting that food was kept within the living space of each social unit. In either case, social changes such as in the division of labor for food procurement and preparation (Eshed et al., 2010; Molleson, 1994, 2007), and the dynamics of food distribution and sharing may have influenced the changes in storage location. This shift also coincides with a change in building form and size.

During the early phases at Aşıklı, food preparation and sharing was probably focused on community groups, and household members processed and/or kept a certain amount of food for future consumption/use in external areas. The amount of the stored goods was likely small and focused on immediate consumption, given the number and size of the baskets as the main storage facilities. The spatial distribution of the

Fig. 8. Reconstructed above-ground rectangular buildings characteristic of Level 2 (Aşıklı Höyük Project Photography Archive).

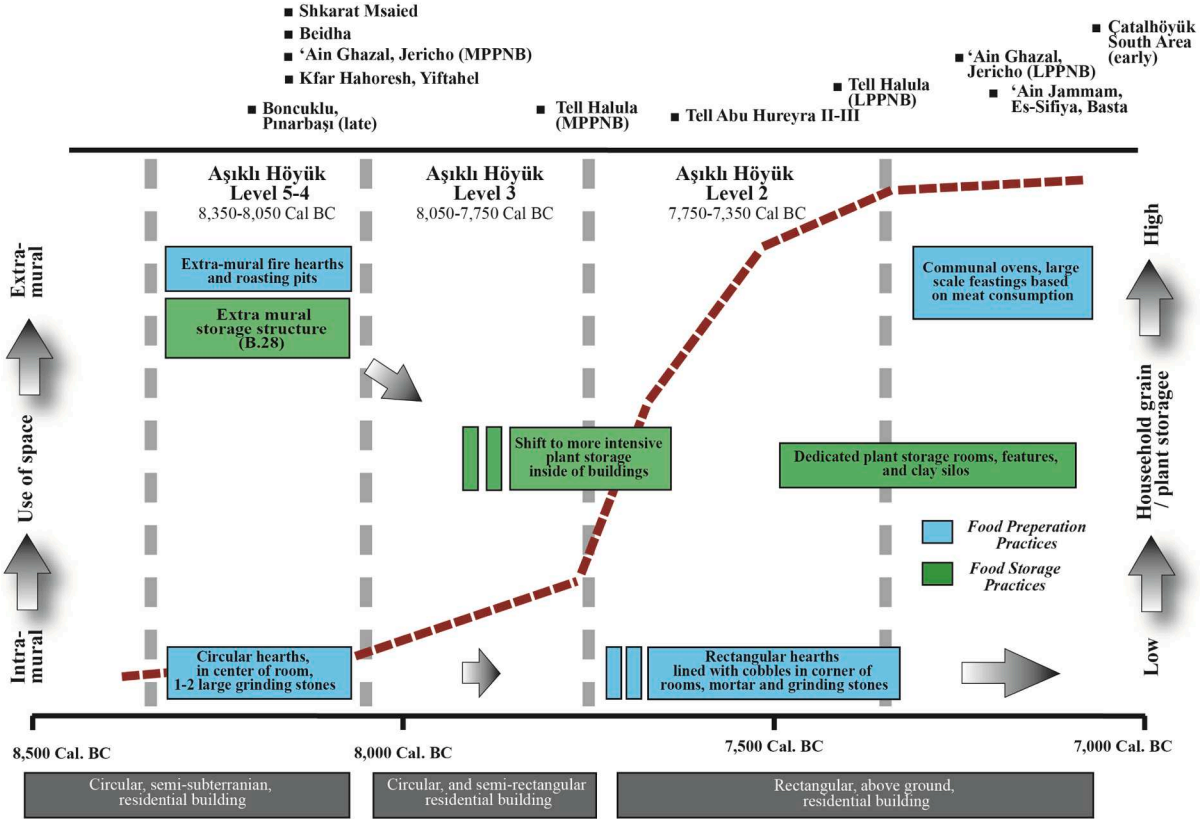

Fig. 9. Shifting use of space of food preparation and storage practices associated with the transition from circular, semi-subterranean to rectangular above ground residential buildings, 8,300 cal BC to 7,350 cal BC, Aşıklı Höyük. The red line reflects the shift from intra to extra-mural locations for food storage. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

archaeological material in one of the wattle and daub structures (St. 28) also implied the use of baskets or sack-like containers (Kalkan and Özbal, 2018: 137; Özbaşaran et al., 2018a: 69).

It is during Level 2 at Aşıklı Höyük that dedicated storage buildings appear (Figs. 3, 9, 12). This is evidenced by differentiation in the interior arrangements of rectangular buildings. As seen in Fig. 9, well-defined storage units do not appear inside the rectangular houses until the latest occupation levels. During the later occupations of Level 2 (2D to 2A) there is evidence for cereal processing and storage increases inside the buildings. Mudbrick foundations of storage bins were found in the corners/sides of the rooms. Phytolith analysis suggests the storage of cereals inside these features (Tsartsidou, personal communication, 2020).

Fig. 10. Plan view of village building layout and distribution of fire hearths, Level 2, Aşıklı Höyük (based on Uzdurum, 2018: Fig. 3).

Fig. 11. A rectangular hearth lying across the wall of the building, Level 2, Aşıklı Höyük (Aşıklı Höyük Project Photography Archive).

Fig. 12. Clay silos inside the eastern room of a rectangular building, Level 2, Aşıklı Höyük. The silos are located on the northeast, northwest, and southwest corners of the room. Each are bordered with a clay line and only the foundation levels of the silos are preserved (Aşıklı Höyük Project Photography Archive).

The Level 2 buildings with internal fire hearths do not have storage bins, whereas the buildings with storage bins do not have internal fire hearths. Around 50% of the rectangular buildings contained a single hearth, with other rooms likely used for general storage of farming equipment, tools, and clay silos for storying dried plants. The storage units became better defined during the later phases of Level 2 (Levels 2D to 2A, cf. below). Macro and microbotanical data attest to an increase in indoor cereal processing activities in Level 2 (Ergun, 2016, 2018;

Tsartsidou, 2018).

Examination of where food was prepared in roasting pits provides researchers with another example of the long-term processes by which Aşıklı Höyük people compartmentalized space. Through time the villagers of Aşıklı Höyük changed how and where they prepared and consumed their food. In the earliest phases of Aşıklı Höyük (Level 5 and 4) villagers constructed roasting pits in the areas between buildings. By Level 2 when household members were constructing rectangular buildings the roasting pits located in open areas fell out of use and daily activities were transferred to the roofs and interiors of buildings (Figs. 3 and 9).

Building 7, a 15 m^2 two-roomed rectangular building, provides important insights into the internal organization of space in these buildings. This building is exceptional with regards to the general behavior of building abandonment at Aşıklı Höyük. Unlike other buildings, Building 7 was not emptied of most portable items prior to destruction and rebuilding. The building's floor was renewed fourteen times (Mentzer, 2013). A plastered bench oriented from north to south was located in the southwest portion of the western room. Two grinding stones were placed on top of the bench. A hearth was located in the northeast corner of this room. Plant processing activities took place around the bench and the hearth (Ergun, 2016: 537, 2018: 21). After its initial use for food preparation, the hearth was filled and plastered with soil and transformed into a knapping area (Kayacan and Algül, 2019). Ground stone tools were scattered on the floor and collective evidence points to the intensive use of rooms for daily activities.

5.3. *The development of corporate/communal buildings at Aşıklı Höyük: Increased formalization through time*

One of the many interesting aspects of Aşıklı Höyük village organization is that of the changing use of non-residential space through time. As seen in Fig. 13, villagers developed and maintained larger structures with different physical layout in the earliest phases of the village. In some ways, however, the appearance of special purpose buildings in the earliest phases of occupation reflects variation within established building practices, rather than the appearance of new totally different practices. Building 38, a circular, potentially non-domestic structure representative of Level 5–3, provides an excellent example of this. Aşıklı Höyük Building 38 is slightly larger than other buildings, with slightly different internal organization and with benches (see Fig. 5, lower right). Contrary to other oval buildings no burials exist in Building 38. Other buildings, commonly identified as residential buildings, are also oval-circular, with a central fireplace, and with other features such as post holes for upright pillars. Building 38 shares many of these traits but is at the same time different and in many ways illustrate a variation expression, rather than a new development in constructing the built environment. Its form and construction techniques are similar to the contemporaneous, circular buildings. The large size (6.30 × 4.10 m) of the building and placement of internal features, however, suggest important differences in how people used spaces. The building had a long bench along its north walls and pits of various sizes were dug into the floor. A large fire installation was located in the southeast portion of the room. Only the two latest phases of the building have been excavated thus far. The hearth and the bench were renewed in each phase, while some of the pits were used continuously across phases (Özbaşaran et al., 2018a: 98-99). Macrobotanical remains suggest plant processing and food preparation activities took place around the hearth (Ergun, in press). Geochemical analysis indicates that the floor in northern part of the building was plastered more frequently and cleaned more often than in the southeastern part, while the area around the hearth was more intensively used (Kalkan, 2017: 458).

By the start of Level 2, Aşıklı Höyük villagers started to develop dedicated non-residential spaces, most likely focused on the creation of communal spaces in which people were able to congregate. While it remains unclear who actually had access to these spaces, for example if these were spaces for members of sodalities or ritual specialists, the material record clearly illustrates that these were different spaces compared to contemporary residential/domestic buildings. As is seen in Fig. 10, in southwest corner of the Aşıklı Höyük mound in Level 2 people constructed a dedicated area with multiple non-residential buildings, all of which was separated from the residential area by a gravel street. This bounded area included multiple buildings and open areas that differed from the typical rectangular houses in terms of their size, construction

Fig. 13. Large, square, communal building, 6 by 6 m in size, with well-plastered lime floor, walls (Aşıklı Höyük Project Photography Archive).

materials and techniques, internal features and arrangements, and the distribution of archaeological and archaeozoological remains (Esin and Harmankaya, 1999; Özbaşaran, 2012). Building 21, a large (6 × 6 m) square structure had lime-plastered floors that were renewed and painted with red and yellow ochre on several occasions (Fig. 13). The walls were made from mudbrick on stone foundation, but their internal faces were also plastered and colored with ochre. The bench, hearth and post bases inside the building are also unique in regard to their forms and large size. Another building, Building 22, incorporated unique wall construction materials. The northern wall was made from stone, while the eastern and western walls were made from mudbrick. Micromorphological analysis of the building's floors identified hundreds of re-plastering layers, containing ash, lime and clay (Mentzer, 2018: 116; Mentzer and Quade, 2013: 94), suggesting numerous alternating plastering events.

Beyond the size, organization, and design of the special purpose Building 21, Level 2 people designed and used unique dome-shaped and tandori ovens unseen in other areas of Aşıklı Höyük (Uzdurum, 2018: 29). One of the tandori ovens was built inside of a building and the other was built in an open space. The dome-shaped oven was large, and the floor of the oven was covered in basalt blocks. It is possible that this oven, like the larger building, served as a communal facility, supporting collective food consumption, feasting and other public events.

Current evidence suggests that special communal events took place in these areas, potentially focused on maintaining community-level social cohesion during this time of profound technical, social and economic change including the transition to rectangular architecture, the management and domestication of animals, and creating new social ties at the household and supra-household scales. Dedicated areas for communal activities clearly differ than the residential area. Large, communal fireplaces are unique to this area (Uzdurum, 2018). Evidence for plant food processing activities is rare and likely did not occur in this area (Tsartsidou, 2018: 164). Interestingly, unlike all other areas of the site where caprines dominate, cattle are the most common taxon in this complex (Buitenhuis et al., 2018: 321), suggesting that cattle consumption figured prominently in this area. Similar evidence was found at the site of Musular, founded by the inhabitants of Aşıklı Höyük a few hundred meters west of the mound as a location to undertake similar activities (Duru and Özbaşaran, 2005).

5.4. *Aşıklı Höyük mortuary practices, material culture and identity*

One of the clear, yet very subtle, aspects to the transition of circular to rectangular buildings at Aşıklı Höyük is that with this shift we find evidence for changing attitudes towards the display of personal identities and possible social differentiation. As with the majority of Neolithic settlements, the villagers of Aşıklı Höyük organized the world of the living so that it was connected with the world of the dead. Starting in the earliest occupation of Aşıklı Höyük in the mid-9th millennium BCE, household members buried their dead beneath the floor of their semi-subterranean circular buildings. Excavations have revealed that the dead were buried beneath the floor as single inhumations in a tightly flexed (*hocker*) position, with no associated mortuary goods, and little evidence of special treatment. Evidence of coatings of phytoliths and dung remains on the bones, indicates that in some cases the dead were wrapped or covered with organic materials. The number of people buried beneath the floors of Level 5–3 residential structures varies from building to building. In Building 3 two individuals, a young-adult female and a young sub-adult girl, were buried beneath the floor. In some buildings, many household members were buried below the building. In Building 1, which dates slightly later compared to Building 3, a total of five individuals were buried beneath the floor. Recently, ancient DNA analyses have proven genetic ties between the old-adult female burial in Building 1 and the sub-adult girl burial in Building 3. Another adult female and another sub-adult girl buried inside Building 1 were siblings (Yaka et al., 2021). However, the young-adult female burial in Building 3 has proven to be genetically unrelated to these individuals, suggesting that household ties were not strictly based on biological kinship and were more fluid in nature.

Intra-mural and sub-floor human burials continued during Level 2. Given the size of the settlement during this period and the excavated area thus far (c. 0.4 ha), the small number of burials from all levels and phases (n = 98) may indicate that not all community members were buried within the settlement, and furthermore, not all buildings contained human remains. Some buildings yielded more graves than others, some containing up to seven individuals throughout their multiple phases. From Level 2F-2H to 2A, burial rituals became more varied and more individuals were buried with personal items, including ornaments (Yelözer, 2018). During Levels 2C-2A, burial practices became even more diverse as double burials, burials with ochre, and pre- and post-mortem body manipulation appear (Yelözer and Özbaşaran, in press). Such practices were, however, confined to certain individuals. For instance, only female and children burials had ochre. Ornament data reveal further patterns: the young adults were not buried with ornaments, while some adults above the age of 30 and some children were buried with beads of a variety of raw materials (Yelözer, 2018: 401). The changes in burial practices were accompanied by the import of exotic raw materials and technologies such as the 'butterfly' beads, showing the growing scale of networking and exchange with the middle Euphrates and the southern Levantine sites (cf. Alarashi, 2016; Groman-Yaroslavski and Bar-Yosef Mayer, 2015). Collectively, with the transition from round to rectangular architecture we see how at death the living were afforded variable treatment in burial, but that variability was within a set of shared, common practices. We see transition from community oriented to individualizing treatments, practices that appear to have recognized personal identities. It remains unclear, however, if the observed variation in the inclusion of burial goods really reflects some form of yet to be defined social differentiation or just the inclusion of more and different personal objects and adornment. As with the question of human health and food storage, researchers working on the Neolithic have yet to convincingly outline when we see sufficient variation in burial practice to argue for significant social differences. Instead, as pointed out by Ames (2007), as scholars we tend to assume the presence of material variation of one category, such as objects included in burials, reflects the crossing of some evolutionary cut off point. At its broadest, the evidence from Aşıklı Höyük demonstrates that with time we see greater variation in the frequency and types of objects left with the dead. While suggestive of different ways of individualizing the dead, the degree of variation at Aşıklı Höyük is not really consistent with broader arguments for social ranking and hereditary authority (e.g., Hayden, 2020).

6. Neolithic space making and the transition from circular to rectangular structures

In general Neolithic farmers living in Cappadocia and the Konya plain in the mid-9th millennium BCE were focused on broad-spectrum hunting, gathering and cultivation, with low-level food production and relying on a mixture of wild and managed resources. Collectively the archaeological evidence from Aşıklı Höyük provides important insights into how people organized their homes and socially created villages from the mid-9th millennium BCE up until the mid-8th millennium BCE.

6.1. *Aşıklı Höyük: The interplay of social change and the built environment*

Echoing practices at Pınarbaşı and Boncuklu, at Aşıklı Höyük by around 8,350 cal BCE (Level 5), if not earlier, people were constructing circular, semi-subterranean buildings with mudbrick or wattle and daub walls. The wattle and daub technique was abandoned quickly afterwards by around 8,050 cal BCE but villagers continued to construct their

buildings with mudbrick. Villagers also constructed other buildings that had subrounded corners, with an overall plan that was semi-rectangular. Some circular semi-subterranean buildings were still constructed between 8,050 and 7,750 cal BCE and these had more durable thicker walls. The settlement layout was now denser than the previous phases. During this phase, rectangular, single-roomed buildings also appeared. Some cooking and food preparation was undertaken inside of buildings, but in light of the frequency and placement of fire hearths it appears that cooking, food preparation and possibly storage of grain, was predominately focused on the outside areas between buildings.

Around 7,750 cal BCE (Levels 2J-2E) people constructed rectangular above-ground buildings and organized these in a different settlement pattern. The buildings were initially single roomed, had above-ground freestanding mudbrick walls and flat roofs, and eventually included two- and three-roomed rectangular buildings. There is no archaeological evidence for doors, suggesting that entry was from the roof. The tight clustering of freestanding buildings into building groups, with only a few open middens and limited open scale, highlights that some daily activities were conducted outdoors on the roofs. This argument is supported by the accumulation of trash including faunal remains, and obsidian and bone tool debitage, in the narrow spaces located between the buildings. The layout of the settlement, and the locations, forms and sizes of the buildings raises the possibility that people organized the space around some form of general plan, such as members of larger families or households constructing buildings within a specific area. The physical layout of the village, such as Levels 2C-2A, were such that buildings were constructed adjacent to one another, possibly renewed at the same time in each rebuilding phase, and possibly as part of a larger building groups. In contrast to earlier periods, with the shift to rectangular buildings household members started to spend more time cooking and preparing food inside of buildings. The placement of fire hearths inside of building, often to the side, highlights that cooking and food preparation became, at least in some ways, more formalized and practiced in private household areas. During Level 2 the hearths were built in the corners of the rooms appearing inside about 50% of the rooms. The physical movement of plant storage, now being focused on dedicated rooms and/or clay silos within rooms, to the internal areas of buildings also demonstrates aspects of the direct control of household resources, in locations that could be monitored and protected.

When people started to build rectangular shaped buildings they developed new, and in many ways improved, ways of constructing the walls, roofs and floors of buildings. As people started to build sub-rectangular and rectangular buildings, they incorporated new construction methods in building and silo design, and importantly, started to use better quality materials when building features. The primary building construction material was mudbrick, mortar with woods and reeds. With the shift to rectangular buildings people used higher quality mortar, and also mudbrick. While additional research is needed, it is possible that the new construction materials and construction of buildings above the ground reduced humidity levels within the buildings, and this would have contributed towards better preservation conditions for grain storage in rooms and silos. During the latest phase stone was preferred in the construction of particular buildings such as seen with Building 22, the special purpose structure. Villagers plastered the floors of residential buildings the same ways, and using the same material and techniques, from the earliest to latest phase of Aşıklı Höyük. When they constructed special purpose buildings in Level 2, however, they created pure ash plaster floors, colored red, applied in fine coats and with great care (Mentzer and Quade, 2013: 93). Fired lime (Hauptmann and Yalçın, 2000), and color treatment were unique to another building in the special purpose buildings area as well, and different types of fire hearths were constructed, potentially for large scale feasting and community events. As noted elsewhere (Birch-Chapman et al., 2017; Saidel, 1993; Steadman, 2006), in many ways the shift to rectangular buildings across Southwest Asia simplified construction for this allowed buildings to abut each other, to be supported by other buildings and offered new means of compartmentalizing space. The adoption of new and better-quality construction materials, such as mud brick and ash plaster floors would have reduced moisture levels by shedding water and served as a barrier for moisture and insects. Collectively, this would have had real implications for building longevity and food storage.

7. Discussion

Neolithic people started building rectangular buildings across Southwest Asia between 8,200 and 8,000 cal BCE. The adoption of these practices is later in some areas, and it remains unclear if this first appeared in a specific region. In some settlements, especially in areas of the southern Levant circular architecture persisted longer, and in other cases, such as at Halaf, circular buildings reappear in the Pottery Neolithic. Within Anatolian and northern Mesopotamian settlements such as Nemrik 9, Qermez Dere and Pınarbaşı and Boncuklu, we see regular use of circular semi-subterranean residential buildings before 8,200 cal BCE. Although less clearly dated, at Göbekli Tepe we also see the transition from circular to rectangular buildings in layers II, at some point between 8240 and 7780 cal BCE (Dietrich et al., 2019). By 8,000 cal BCE at Aşıklı Höyük villagers started building semi-rectangular buildings with rectangular buildings becoming more formalized by 7,750 cal BCE. The development of rectangular buildings at Aşıklı Höyük occurs at the same time as we see increased compartmentalization of interior spaces, the movement of grain storage from communal extramural locations to interior areas, the development of dedicated rooms for cooking and storage, and in some ways the physical segmentation of activity areas and the construction of new areas of privacy (Figs. 9 and 10). In terms of chronology, it coincides with the fundamental changes that came with the removal of the animals out of the settlement and a new organization in the layout was made. While more complicated and with limited resolution of chronology, excavations at Çayönü (Özdogan, and Özdogan, 1989) have documented a broadly similar pattern. Later, the use of rectangular buildings is seen at Tell Halula (Molist, 1996; Molist et al., 2020), Tell Abu Hureyra (Moore et al., 2000), and Musular (Duru and Özbaşaran, 2005). At Tell Halula and Tell Abu Hureyra, which are broadly contemporaneous with Level 2 at Aşıklı Höyük (within 200 years), we see the physical integration of cooking and food preparation features, and grain storage facilities, with people building specific rooms or storage features (Fig. 9). A comparison of rooms with hearths versus storage units inside rectangular houses at Aşıklı Höyük indicate that rooms with storage units did not have hearths, and conversely, rooms with hearths did not have storage units. In later periods, as seen at Çatalhöyük (Bogaard et al., 2009; Twiss, 2007) and Tell Sabi Abyad (Akkermans et al., 2006), we witness the extension and formalization of the overall pattern with people increasingly compartmentalizing internal space, using specific areas for specific activities such as food storage.

In the southern Levant, the shift to rectangular buildings occurred at around 8,200 cal BCE at ‘Ain Ghazal, Yiftahel, Jericho, and Kfar HaHoresh. The adoption of rectangular buildings was not universal, for in other sites such as Beidha, people continued to use circular designs. As outlined in multiple studies (Banning, 1998, 2003, 2015; Banning and Byrd, 1987, 1989; Kuijt, 2000; Rollefson, 1997), the appearance of rectangular buildings resulted in increased compartmentalization of interior space, and the movement of grain storage from communal extramural locations to interior areas (Kuijt, 2015: 331). At the later settlements of ‘Ain Jammam, Basta, and Es-Sifiya all occupied about 7,200 cal BCE, this pattern became highly formalized, with dedicated storage rooms, and a formal organization of space. Assuming available archaeological data reflects real patterning, then food preparation, cooking and grain storage was increasingly focused on internal area through time. This observation is, of course, complicated by the fact that researchers have a surprisingly poor understanding of extramural activities within Neolithic villages.

With clear occupational continuity during the shift from round to

rectangular architecture, field research at Aşıklı Höyük adds to previous research, and advances our general and specific understanding of the forager-to-farmer transition, as well as the shift from round to rectangular architecture, in several important ways. First, the fine-grained resolution of Aşıklı Höyük chronology and material culture helps us understand that some of the material footprint of the transition were relatively rapid, perhaps occurring around 300 years (Figs. 3, 9), while some of the social dimensions appear to have taken longer to come into place. Through detailed analysis and integration of different data sets from Aşıklı Höyük our work illustrates that while the transition at Aşıklı Höyük occurred over 8–10 generations, as is seen in Level 3 the transition should be viewed a process, with the use of sub-rectangular buildings, incremental movement of storage areas and relocation of cooking features. Second, and related to our first point, the fine-grained resolution of Aşıklı Höyük provides researchers the opportunity to pull apart some of the interconnected elements within this process, the material correlates of these elements, and to identify subtle changes in daily life that brought about significant, yet unintentional changes over the longer-term. In contrast to Flannery's (1972) framing of what could be argued are temporal end points of the shift from round to rectangular architecture of settlements from thousands of years apart, the research presented here illustrates that while people at Aşıklı Höyük quickly changed how they constructed buildings and used spaces, it is unclear that household organization actually changed. The documentation of subtle small changes at Aşıklı Höyük, a form of slow change in how things were done with intermediate steps, should not surprise us.

Third, while the architectural shift in residential architecture over 300 years is highly visible, it is by no means clear that this immediately resulted in a corresponding shift from Neolithic nuclear to extended family-based households (e.g., Flannery, 1972). Genetic evidence from Aşıklı and other Pre-Pottery and Pottery Neolithic sites in Anatolia corroborates the fluid nature of households and biological versus social kinship ties before and after the transition to rectangular architecture (Yaka et al., 2021). Instead we argue that at Aşıklı Höyük evidence is consistent with gradual shifts in the location of food processing, cooking, storing food, and increased social packing of buildings and people, and greater compartmentalization of space within settlements (Fig. 3). It can be argued that, at least to an extent, the historical value of Flannery's (1972, 2002) treatment is that of his explicit connection of contemporary ethnographic data sets with prehistoric archaeology from different periods. Given that his archaeological case studies are separated by several thousand years in time and from different environmental settings, and that he modeled these through and ethnographic lens, it can be argued that in the end his research speaks to the Pottery Neolithic as a temporally removed byproduct of earlier human actions in the Pre-Pottery Neolithic. It provides limited, if any, insight into the interwoven pathways or small-scale tempos of change between these two end points, and in some ways the broader engines of change.

7.1. Pathways to Neolithic villages: Social inequality, population growth, and increased food security

Recent archaeological research at multiple Neolithic sites, as well as Aşıklı Höyük, has advanced our understanding of the remarkable diversity within village life, shed light on the tempo of change of the forager-farmer transition, and documented the shift from round to rectangular architecture. While not meant to represent any sort of overarching explanatory framework for domestication, the forager-farmer transition, or the shift from round to rectangular architecture, this discussion focuses attention on unresolved questions regarding the relative importance of emerging social inequality, population growth, and increased food security.

Some scholars (e.g., Hayden, 2020) have framed the driver of the forager-to-farmer transition as being linked to emerging social inequality. Social differentiation, rather than an explicit inequality, of course, exists in all human communities on some level, be it based on age, experience, or skills. At some level some degree of social differentiation was woven into the social fabric of Neolithic village life. The increased scale of food storage, the location where food was stored, increased scale of community are notable characteristics of Neolithic practices after 8,000 cal BCE. While the scale of food storage clearly increased through time, some archaeologists have quickly framed this as evidence for arguments for a food surplus, property, and differentially control of resources over others (see, for example, Hayden, 2020). We note here that archaeologists have correctly identified an overall trajectory in which the amounts of stored food increased from the PPNA to the Pottery Neolithic, as well as the movement of stored food from an extramural to intramural context (e.g, Bogaard et al., 2009; Kuijt, 2015). Researchers, however, have yet to demonstrate significant differences among buildings in storage volume, and just as importantly, have yet to convincingly determine who had access to stored foods, how food storage and family distribution pathways were organized, and if it was, or was not, linked to social units.

To put it another way, this raises a simple yet critical question: were all households in Neolithic villages able to store more food inside of buildings after 7,750 cal BCE, or were only select people/households able to consolidate and control resources? (see Fig. 3). To date no systematic research has addressed this key question, and no research we are aware of has convincingly demonstrated clear evidence for significant ranking or social inequality within or between Pre-Pottery Neolithic households. In fact, the overwhelming majority of archaeological research has outlined the shared nature of village life, similar access to resources, and the lack of ranking or authority based on social identities and differentiation. Central to this argument is the question of human health. In this regard bioarcheological research (Larsen et al., 2015: 48) demonstrates that growth in early childhood at Çatalhöyük was normal and that children were born into a relatively healthy environment, adequate resources and had access to quality nutrition. This research, combined with what is seen at Aşıklı Höyük, do not provide support for the argument that the social control of people and economies by select individuals (e.g., Hayden, 2020) was a mechanism for the domestication of plants and animals and the forager-farmer transition. Clearly there must have been some degree of social differentiation within the Pre-Pottery Neolithic to Pottery Neolithic in Southwest Asia, but the argument that increased social inequality brought about the social and economic transitions is very weak.

Although rarely explored by researchers, Neolithic population aggregation/growth/pressure, has also been proposed as a contributing factor in the forager-farmer transition (Bocquet-Appel, 2002; Chamberlain, 2006; Cohen, 1975), and to an extent, the shift to rectangular buildings. From a housing standpoint the question here is simple: did rectangular buildings facilitate putting people into spaces in more efficient ways? (cf. Birch-Chapman et al., 2017; Saidel, 1993; Steadman, 2006). On some level rectangular buildings provide a more efficient packing space, and by placing these buildings next to each other they can provide mutual support. While in some ways an attractive model, demographic modeling has yet to provide supportive evidence for significant population growth just before 8,200 to 8,000 cal BCE. Settlements from this period are noticeably larger than in the Epipaleolithic, but it is unclear if that was translated into a form of population pressure. Looking at Aşıklı Höyük, there is no question that by Level 2 with the broadscale adoption of rectangular construction residential buildings were more closely packed and potentially more numerous. In some ways, however, this pattern has the appearance of occurring with the shift to rectangular architecture rather than serving as the cause of the development of rectangular architecture. Even among the co-authors of this paper, there is no clear consensus as to the relationship between population growth and architectural change at Aşıklı Höyük. It can be argued that through time the density of architecture, the scale of food storage, and presumably the number of people living at Aşıklı Höyük increased, and these changes occurred in synch with the shift to rectangular buildings. It is not at all clear, however, that increased

population levels and population pressure was the proximal cause of the widespread adoption of rectangular buildings at this site and through the broader region of Southwest Asia, so much as one of multiple factors that increased the need for greater food security.

While the importance of demography in the transition to rectangular architecture and the foraging-to-farming transition remains unclear, there is no question that between 8,200 to 8,000 cal BCE Neolithic villagers focused on increasing their food security. There is variation in how storage was organized inside of residential walls (clay bins vs. pits, vs. dedicated rooms) but within this variation there is the shared commonalities in the general trend of developing better food storage technology in relatively cool and dark areas of buildings with restricted access and greater control. Behind these material footprints are likely to be significant shifts in daily practices, such as the allocation and organization of cooperative and consensual labor by individuals, within households and communities. Sharing in food harvesting, processing, and storage, with cooperative pooling of labor, would have fundamentally altered social relationships, increased food security for people, and in some ways, formalized access to and sharing of the resulting rewards and byproducts of this labor (see also Bogaard, 2017). The development of practices that occurred off site in field areas, such as the use of basic forms of rock walls for soil retention, simple forms of water management, also would have contributed to greater resource stability and predictability and risk minimization.

Viewed collectively there is a growing body of research (Benz et al., 2017; Bogaard et al., 2009; Finlayson et al., 2011; Twiss, 2007) that highlights the importance of food security and the communal among early Pre-Pottery Neolithic villages. Evidence from the period just before and around 8,200 to 8,000 cal BCE illustrates how Neolithic villagers left traces, some subtle and some less subtle, for communal action and spaces within settlements. This includes evidence for feasting, the existence of communal places and cooking areas as seen at Aşıklı Höyük. To some extent, then, feasting, and shared facilities, may not have advanced the authority and power of individuals but served to further a sense of community and engagement within the village. Thus, the critical focus of this may not have been household autonomy, so much as how friends and families shared labor within villages, and what were the social byproducts of communal labor within Neolithic villages.

8. Conclusion

On some levels the Neolithic architectural shift from circular to rectangular buildings has become embedded in broader and highly productive conversations about the nature and development of the archeological and ethnographic household. One major theme in these discussions is that of the assumed shift from cooperating nuclear to more autonomous extended family households (see Byrd, 1994; Flannery, 1972, 2002; Kuijt et al., 2011), as materially realized by the architectural shift from circular to rectangular buildings. Along with conversations about plant and animal domestication, and changing human health, we would argue that discussion of the Neolithic household has made a significant contribution of the archaeological understanding of the global development of larger scale village communities.

First published nearly 50 years ago, Flannery's (1972) original publication was focused on defining and discussing contrastive element of two idealized household forms, defined initially by ethnographic research, and applied to archaeological case studies separated by several thousand years of time. While recognizing the historical contribution of this framing, we submit that academic discussion now needs to expand beyond this evolutionary narrative to consider the developmental pathway of the architectural transition from circular to rectangular buildings, to document the material and organizational variation within these practices, to develop grass root reconstructions of the operation of the household(s), and to engage in a global comparative perspective to better understand the commonalities and differences within social units. We note here, for example, that one of, if not the, major tensions in current modeling is how researchers should reconcile elements of community cooperation versus household competition at different points of the Neolithic, and arguments for the development of property, privacy, and social differentiation. Differences in how communal versus residential space was organized in earlier Neolithic villages, such as at Aşıklı Höyük and other settlements, points towards the existence of supra-households. The substantial evidence for communal use of space contrasts with competing, and at the same time perhaps complementary, narratives of households "owning" storage facilities, and controlling property and resources (see Bowles and Choi, 2013; Flannery, 1972; Hayden, 2020). To be direct, archaeologists still struggle in our attempts to model household organization from the ground up, to consider the intermediate steps in a longer evolutionary pathway, and to consider how Neolithic social organization may have been linked to the circular to rectangular transition. Beyond our desire to label households of the past, we need to consider broader issues, such as how multiple nuclear families may have become connected through blood and labor, may have cooperatively organized food harvesting, preparation, and storage, and how with time these food distribution networks may have become intergenerational. Critical to all of this, and yet largely beyond the scope of this paper, is moving the conversation from descriptive presentation of archaeological high-resolution data, such as supplied in this paper, to broader explanatory modeling of the interconnectivity of multiple processes and actions in daily life. The case study of Aşıklı Höyük advances these conversations, with the relatively rapid shift to rectangular architecture helping us understand the beginnings of the pathway towards, but not yet fully established manifestations of, new household forms and social units. It is clear that much more work is needed to understand and theorize the nature of this evolutionary important transition.

CRediT authorship contribution statement

Güneş Duru: Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Project administration, Visualization. **Mihriban Özbaşaran:** Conceptualization, Investigation, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Sera Yelözer:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Melis Uzdurum:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Ian Kuijt:** Conceptualization, Writing – review & editing, Visualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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