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ABSOLUTE CHRONOLOGY OF CULTURAL CONTINIUTY, CHANGE AND BREAK IN WESTERN ANATOLIA BETWEEN 6850-5460 CAL. BC: THE ULUCAK HÖYÜK CASE

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ABSTRACT

A total of sixty-five radiocarbon dates from Ulucak Höyük, including charcoal and short-lived species taken from Level VI–Level III, clearly prove a long history of occupation at the site, from 6850 cal. BC to 5460 cal. BC. Based on this radiocarbon seriation, this article explores the origins of sedentary life its gradual transformation, and abrupt changes at the site. A discussion of the sequence of events is also presented within a regional framework.

Ulucak Höyük is one of the earliest sites with evidence of farming and animal husbandry in the Aegean. Archaeological materials and radiocarbon dates confirm the existence of initial Neolithic layers, ca. 6850 cal. BC. Radiocarbon dates suggest that occupation between Ulucak VI and V continued without a gap. However, a gradual transformation has been observed starting from Level Vb onwards, which overlapped more or less with the 8.2 ka Climate Event. After a short gap between the Late Neolithic and Early Chalcolithic, an abrupt change in almost every aspect of material culture occurred around 5600 cal. BC.

KEYWORDS: Ulucak Höyük- western Anatolia-Radiocarbon dating-Neolithic- Chalcolithic-8.2 ka climate event, social transformation- abrupt cultural change

1. INTRODUCTION

Two decades ago, almost no information was known about the pre-Bronze age sequences in Western Anatolia. Since the late 1990s however, excavations carried out at several prehistoric mounds such as Ulucak, Çukuriçi, Ege Gübre, Yeşilova and Gökçeada-Uğurlu have started to reveal a longer history of occupation in the region than was previously assumed. Ulucak Höyük, 25 km east of İzmir in West Central Turkey (38° 28' 00" N 27° 21' 08" E), is poised to be a key site in the region (Fig. 1). With its well-preserved building sequences, covering a time period almost one and half thousand years (ca 6850-5300 cal. BC) the site provides an opportunity to reconstruct the chronology of this period. The material evidence from Ulucak Höyük, designated by Levels VI through III, suggests a dynamic process of social, ideological and economic transformations. It also highlights an episode of abrupt change in the Western Anatolian prehistoric communities.

A total of 65 radiocarbon dates were taken from well-defined contexts including charcoal, charred materials and other short-lived species (including animal bones and seeds) from Ulucak Höyük (Table 1). Bayesian chronological modelling of radiocarbon dates (Bayliss 2009), using OxCal and the General outlier model of Bronk Ramsey (2009), as well as the IntCal09 radiocarbon calibration dataset (Reimer et al.2009), were applied to the samples. Thus, this series of radiocarbon dates allows for a better understanding of the duration of the cultural processes at the site. By way of absolute chronology, this article aims to discuss material evidence from Ulucak Höyük in regards to subsistence, raw material, technology and symbolic media, together with its social implications, to suggest a new periodization for the region from the early 7th through the mid-6th millennium BC.

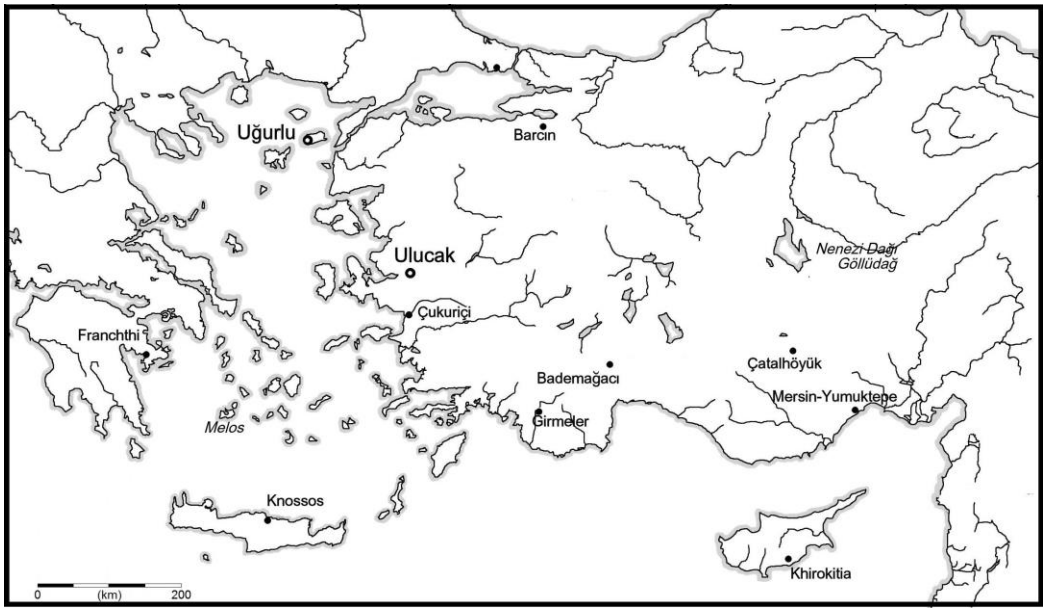

Fig.1. Map of Western Anatolia showing location of Ulucak Höyük.

2. INITIAL NEOLITHIC (6850/6830-6500 cal. BC): AN EMPHASIS ON COMMUNAL BUILDINGS

Sixteen AMS dates are available for Ulucak VI; five from seeds, five from charcoal, and six from bone collagen (Table 1 and Fig. 2). The "Start Boundary" around 6828 cal. BC (68.2%), and the "End Boundary" around 6519 cal. BC (68.2%) is based on a *Bayesian* calibration. The analysis of animal bones and seeds clearly shows that sedentary life at the site began with a fully-fledged economic system, including cereals, pulses and a four tiered herding system, with a limited role for wild animals and shell gathering (Çakırlar 2012; Megaloudi 2005).

This initial settlement has so far been represented by two rectangular buildings with mud slab walls (Building 42 and 43) flanked by open spaces with fire installations (Fig. 3). The floors and possibly the walls of these buildings were lime-plastered and red-painted. The long-standing use of Building 42, as well as fire installations in open spaces, is suggested by their rebuilding at least three times in the same position. The buildings appear to have been left clean, except for a few specific animal remains (scapula and mandible), grinding stones, and a bone implement, which seems to be related to their ritual abandonment. As has been discussed in detail elsewhere, (Çevik 2019a) the buildings appear to have been communal.

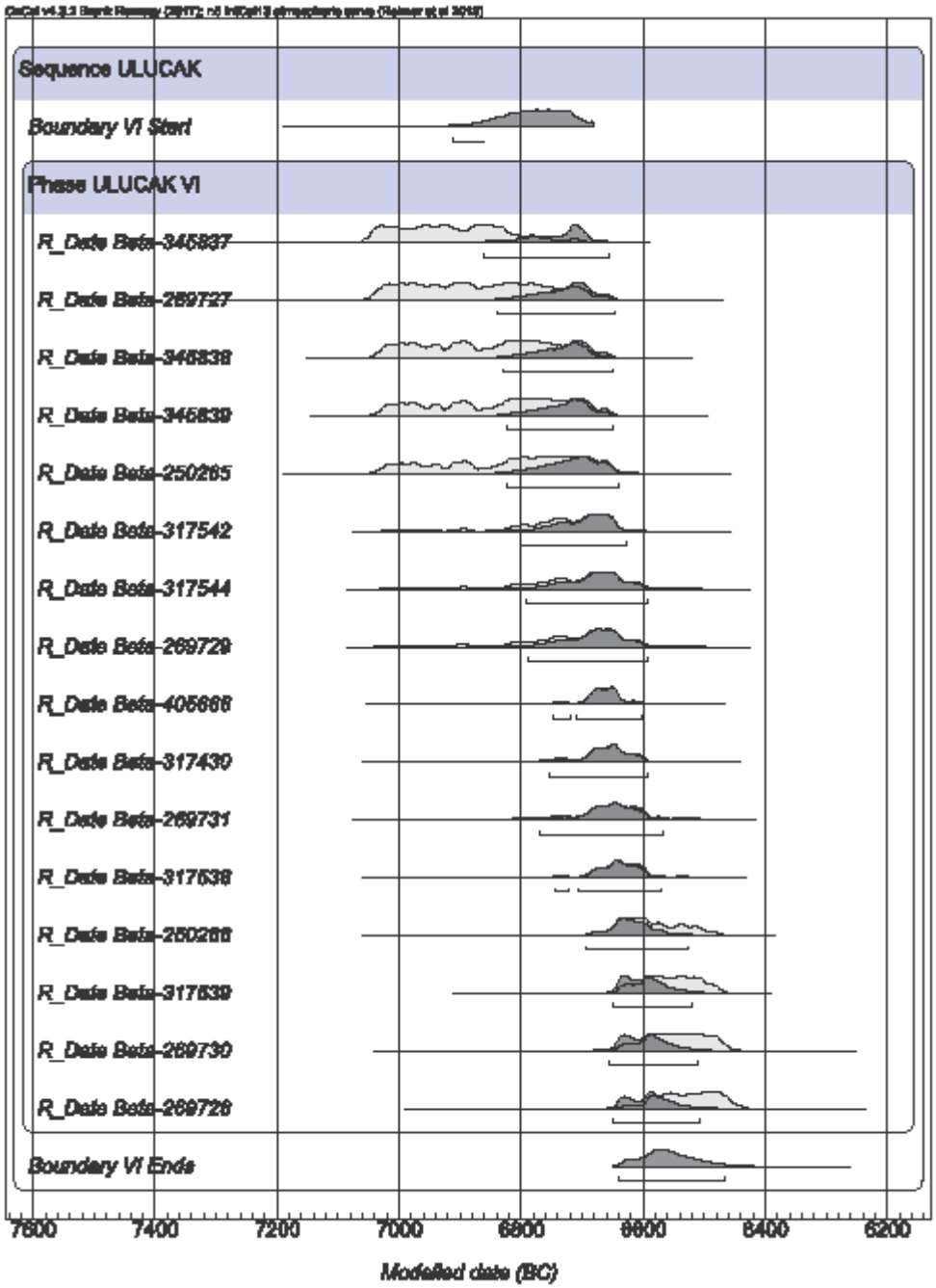

Fig.2. Radiocarbon samples from Ulucak VI presented according to Bayesian chronological

The earliest Neolithic occupation at Ulucak differs from the following levels by the complete absence of pottery or any other clay objects. Except for a few obsidian flakes and blades originated on Melos (Milic 2014) the chipped stone industry is mainly made of flints and cherts. The analysis of lithic technology indicates that both direct percussion and pressure techniques were applied (Guilbeau et. al 2019). The bone tool assemblage mainly consists of scrapers and pointed tools (Sivil 2017) . Additionally, some personal ornaments made of galena and *monodonta turbinate* (Çevik 2019b) from the basal layers of Ulucak have yet been peculiar to the site. Nonetheless, the common aspects in material evidence between Ulucak and other early 7th millennium sites in the region are increasingly recognized. These can be summarized as fallows;

- Developed agricultural economy with cereals and pulses and four-tiered herding system including sheep, goat, cattle and pig have been attested in Ulucak, Çukuriçi (Horejs *et. al.* 2015) and Uğurlu (Atıcı et. al. 2017).

- Technological similarities in lithic industries in terms of raw material procurement and production methods in all three sites.
- Absence of pottery and other clay finds, and polished axes as well.
- The common appearance of the buildings with lime plastered and painted floors in Ulucak and Çukuriçi, possibly for communal use. The deep rooted tradition of the buildings with lime plastered floors in this region and in the southwestern Anatolia is indicated by the sites of Bademağacı (Duru 2012), Hacılar (Mellaart 1970) and Girmeler (Takaoğlu et. al. 2014).

By taking their chronological proximity, and the above-mentioned shared features into consideration, the earliest Neolithic sites in western Anatolia should be considered to belong to the same process, called *Initial Neolithic*. This does not mean, however, that this process is completely homogeneous.

Fig. 3. Ulucak Höyük, Levels VI-IV.

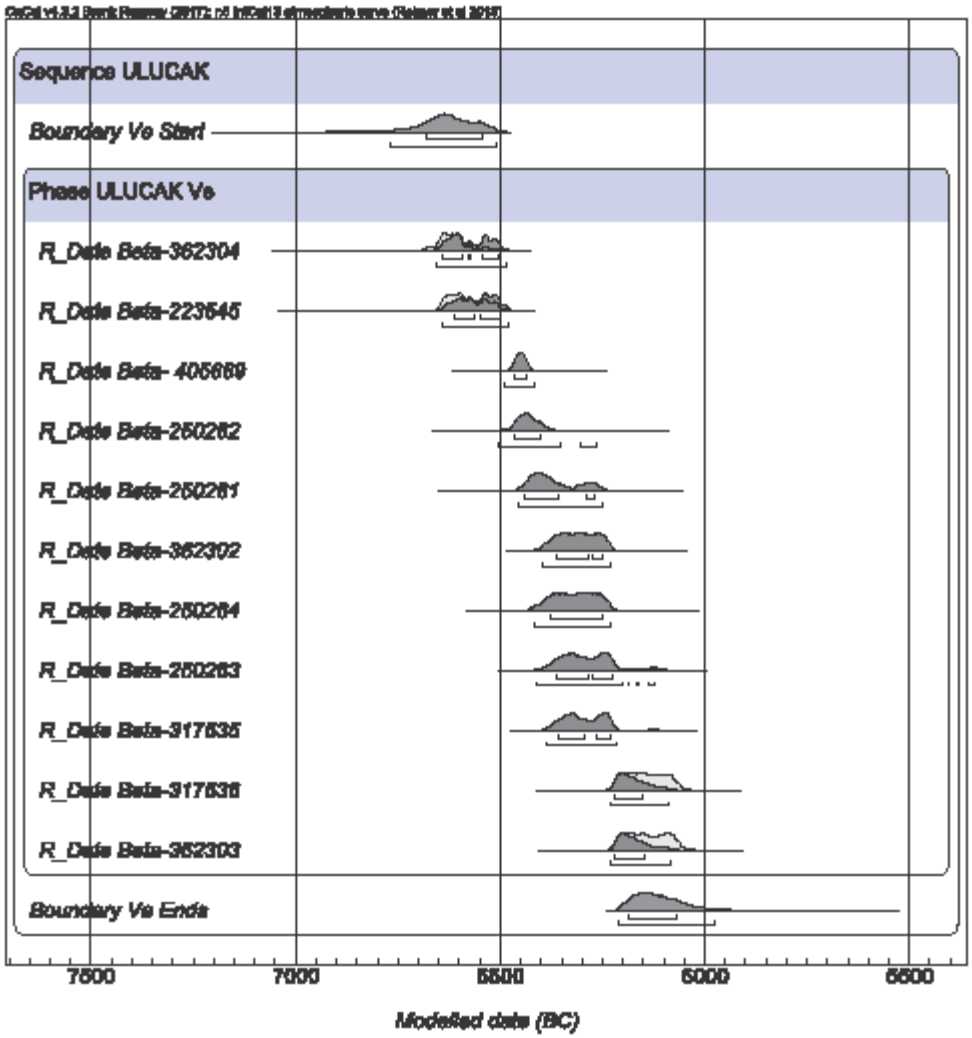

Fig.4. Radiocarbon samples from Ulucak Ve presented according to Bayesian chronological Analysis

3. EARLY NEOLITHIC I (6500-6200 cal. BC): POTTERY INTEGRATED INTO DAILY LIFE

33 radiocarbon determinations have been undertaken at Ulucak V (a-e) on animal bones, charred materials, and a shell (Table 1 and Fig. 4-5, 7). According to radiocarbon dates, there was no precise change between sub-phases in Ulucak V. Early Neolithic I at Ulucak is represented by Level V (c-e). Ulucak V (c-d) is dated with the "Start Boundary" around 6507 cal. BC (68.2%), and the "End Boundary" around 6151cal. BC (68.2%) based upon *Bayesian* calibration. The earlier two sub-phases (Vd-e) revealed rectangular buildings with post-framed or mud-slab walls, while Level Vc is only known from an open space with two ovens. The buildings of these earlier phases differed from the later periods by small shallow pits, possibly used for grain storage. The strict re-building continuity and their ritual closing, including items such as grinding stones and specific animal bones, continues. However, the most significant change that occurred in this period was the gradual integration of pottery and other clay objects into everyday life. Only a few pottery sherds can be dated prior to 6500 cal. BC. If this restricted number of pot sherds are not intrusive, then, they should be related to the latest phase of Level VI, after 6600 BC. The ceramics are in general mineral tempered, and have either dark brown or cream surface colours, with very few examples of reddish brown. Hole-mouth, and slightly S-profiled jars and bowls with tubular lugs, are typical. Among the other objects made of clay are spindle whorls, sling missiles and small horns. The Melian obsidian of this period represents 20% of the total lithic assemblage, indicating intensified contact with the Aegean region.

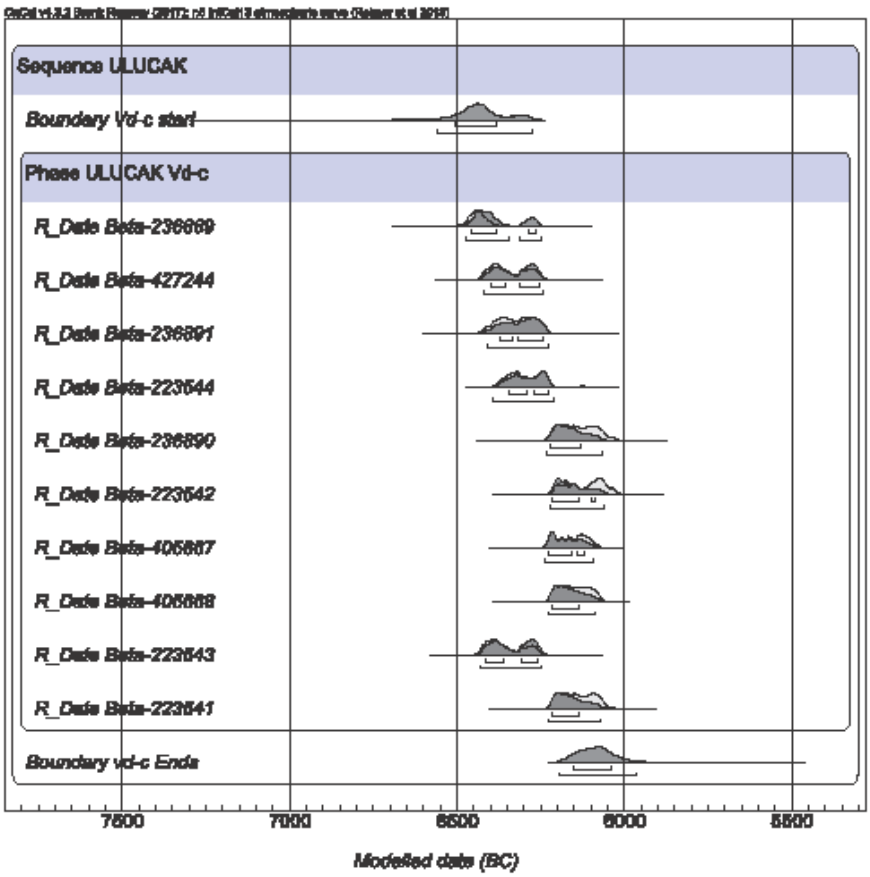

Fig.5. Radiocarbon samples from Ulucak Vd-c presented according to Bayesian chronological Analysis

4. EARLY NEOLITHIC II (6200-6000 cal. BC): INDEPENDENT HOUSEHOLDS AND INCREASE IN SYMBOLIC MEDIA

The Early Neolithic II is represented at Ulucak V, sub-phases a and b. Ulucak Va-b is dated by 12 determinations, with the "Start Boundary" around 6213 cal. BC (68.2%), and the "End Boundary" around 6010cal. BC (68.2%) based upon *Bayesian* calibration (Fig. 7). Despite strong continuity in building plans and construction techniques, the material evidence from the last two building layers of Ulucak V (a-b) displays close affinities to the subsequent period rather than the preceding occupational layers (Fig. 3). The capacity of the storage units in each building, including circular daubs and rectangular clay boxes, increased. Moreover, the recovery of ovens and hearths, and the great emphasis on storage activities in each building, suggests that they may have been inhabited by independent households. The strict rules for rebuilding and the ritual closing ceremony appear to have been abandoned during this phase.

Although domestic mammals were still dominant in faunal assemblage, the amounts of wild species increased (Çilingiroğu and Çakırlar 2013). Furthermore, the culling patterns of domestic animals indicate that dairy products may have become an integral part of subsistence, but only after Ulucak Vb. In fact, spindle whorls may also provide indirect evidence for further emphasis on secondary products, i.e. wool, as their quantity, diameter and weight increased from the late level V onwards (Sevindik 2015). Bone spoon-spatulae are first seen in Level Vb, while the number of bone needles also increased from the latter sub-phase onwards.

Ceramic vessels were more abundant and red-slipped wares became the dominant ware type in the pottery assemblage. Impressed (Va) and relief decoration (Vb) on ceramic sherds have been sporadically recovered from this period onwards. Clay objects including human and animal figurines, stamps (*pintedera*) and anthropomorphic spoons are also recorded for the first time (Fig. 6). Most of the material assemblage during this period is for the first time considered part of what is conventionally known as the "Neolithic package"" (Çilingiroğlu 2005).

Fig.6. Small Finds from Ulucak Va-b and IV

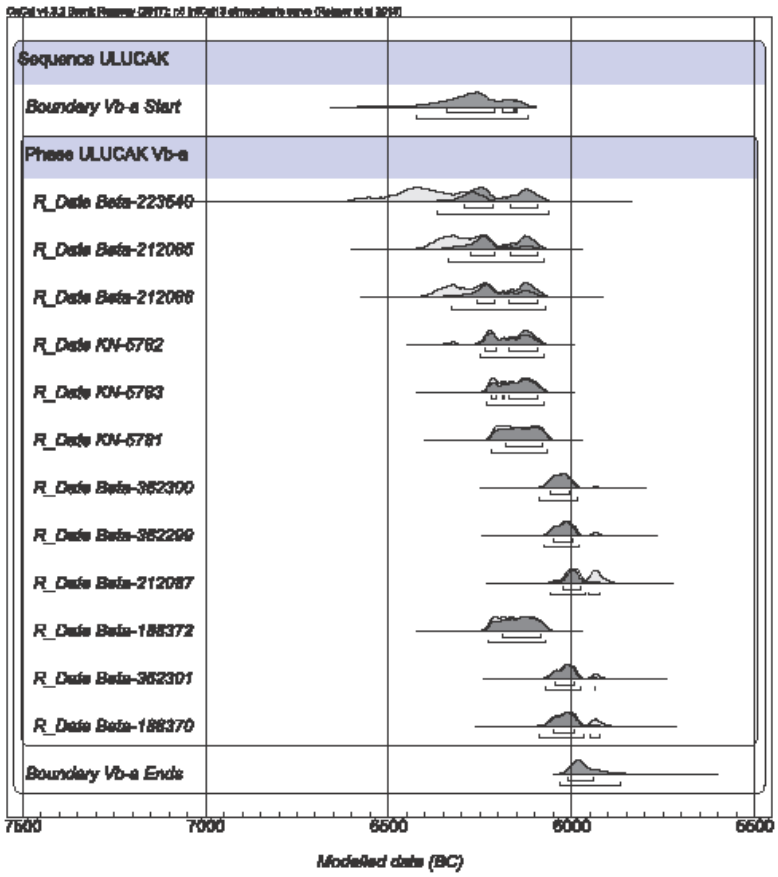

Fig.7. Radiocarbon samples from Ulucak Vb-a presented according to Bayesian chronological analysis

5. LATE NEOLITHIC (6000-5700 cal. BC): BEGINNING OF CRAFT SPECIALIZATION

Ulucak IV is represented by ten superimposed layers (VIa-k) (Çilingiroğlu et. al 2012; Çilingiroğlu and Abay 2005). However, this stratigraphy does not display homogeneity across the mound. Only the latest three sub-phases (a-c) were attested in the eastern slopes of the mound, while the whole sequence can be found in the west, close to the summit. The majority of radiocarbon dates come from these sub-phases. The "Start Boundary" for the Late Neolithic Ulucak is around 6066 cal. BC (68.2%), and the "End Boundary" around 5702 cal. BC (68.2%) based on *Bayesian* calibration. (Fig. 8). In this period no major changes have been observed in subsistence patterns or in the pottery assemblage, although storage jars and anthropomorphic vessels are introduced (Çilingiroğlu 2012). Other clay objects such as figurines, stamps, and spoons suggest strong continuity, despite their increased frequency and variety. Personal ornaments made of shell, various stones and clay are also more numerous. Decorated bone tools also first appeared in this period (Fig. 6).

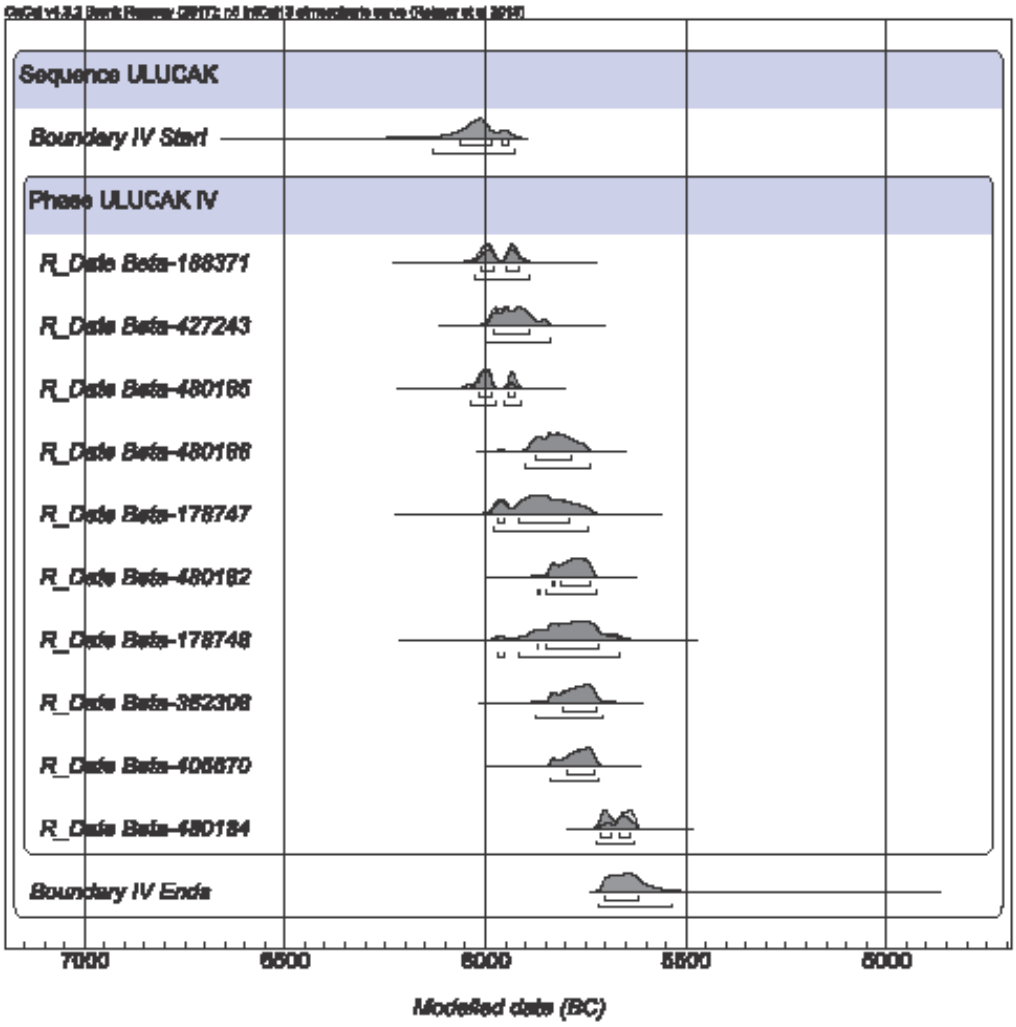

Fig.8. Radiocarbon samples from Ulucak IV presented according to Bayesian chronological Analysis

Substantial houses built of sun-dried mud brick walls on stone foundations characterize the main change in this period (Fig. 3). Nevertheless, the construction of post-framed buildings continue. Of the ten sub-phases of this Late Neolithic horizon, only IVb has been excavated widely, highlighting houses that were arranged along narrow streets. Internal division and enclosed courtyards became an integral part of some houses. Of particular interest here is the five roomed building complex (Buildings 55-56-60-61-62) in Level IVc where a great number of clay loaves, unfinished coil vessels, red hematite lumps remains of pigments, and grinding stones used for powdering hematite were found (Çevik 2016). This building complex clearly shows that specialized pot-

tery production begun at the site starting from the early sixth millennium BC.

As the detailed reports from Çukuriçi and Yeşilova have yet to be published, it is hard to assume whether the sequential changes that we observed in material culture from Ulucak Höyük matches other sites in the region, particularly for the period between 6600-6200 BC. However, it is still possible to define some regional characteristics by examining the evidence from both these sites and from the new sites – Ege Gübre and Dedecik/Heybelitepe – that were founded in the later stages of the period, around 6200 BC:

- Building techniques and settlement layout at all four sites display a great variety and thus cannot be compared.
- The very sporadic occurrence of pottery at around 6600 BC in Ulucak, Uğurlu and Çukuriçi (Horejs 2017), and its gradual increase after 6500 BC, appears to be a shared feature in the region. Additionally, red-slipped burnished wares also become a dominant ware type in all sites starting from the late seventh millennium BC.
- Apart from Çukuriçi, certain similarities in symbolic media such as anthropomorphic figurines and stamp seals can be suggested. Human figurines with almond eyes are typical for Ulucak, Ege Gübre (Sağlamtimur 2012) and Yeşilova (Derin 2012) while some motifs on clay stamps from three sites, and Dedecik-Heybelitepe (Herling et. al. 2008) are similar. The absence of such items in Çukuriçi may be explained by the fact that the site was abandoned around 6000 BC when these items become common.
- The great variety of personal ornaments made of various raw materials, and specialized pottery production, have yet uncovered at Ulucak Höyük.

6. EARLY CHALCOLITHIC (5600/5640-5460 cal BC): THE CULTURAL BREAK

Apart from Ulucak and Uğurlu (Erdoğu 2018), none of the sites mentioned above survived after 5700 BC with re-occupied until the 5th or 4th millennium BC. A single date from a bone sample in the latest Neolithic IVa (Beta-480184: 6740±30 BP), calibrates respectively to 5713 to 5620 BC (Table 1 and Figs. 8-9).

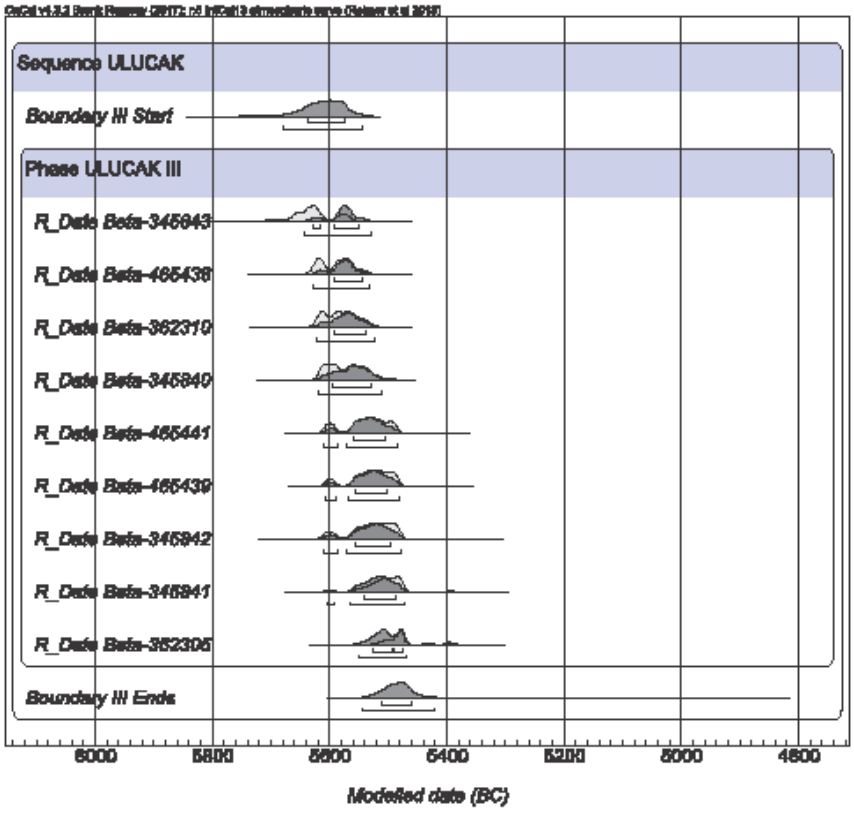

Fig.9. Radiocarbon samples from Ulucak III presented according to Bayesian chronological analysis

Ulucak III is dated by nine animal bone samples with the "Start Boundary" around 5638 cal. BC (68.2%), and the "End Boundary" around 5462 cal. BC (68.2%) based on *Bayesian* calibration It seems that after a short gap at Ulucak, an abrupt change in almost every aspect of material culture occurred around 5600 cal. BC (Çevik and Erdoğu 2019).

Substantial mud-brick buildings were replaced by hut-like pisè buildings in Ulucak III. The pottery assemblage marks a crucial change from surface treatment through shapes. The dominant ware type of red-slipped burnished wares of the previous period disappear, while dark surface colours including brown, grey, and greyish-black became dominant (Fig. 10). Besides ceramics, this latest horizon has thicker walls and a coarser appearance, with new decoration techniques including rippling, pattern burnishing, and incisions (Çevik 2018). Tubular lugs disappeared, while horned handles were introduced. The most striking change in pottery forms are the large splay bowls and dishes with internally thickened rims. Petrographic analysis of pottery from both Ulucak IV and III clearly shows that different clay sources were exploited in each period (Müller and Kriatzi 2018).

Fig.10. pottery from Ulucak IV (Late Neolithic) and Ulucak III (Early Chalcolithic)

A comparative study of chipped stone technologies suggests pressure technique was less applied, while retouch is not attested in Ulucak III (Kayacan and Altınbilek 2018). The stylistic features of the few clay anthropomorphic figurines sharply differ from the previous period and are reminiscent of those found in the Balkans. Newly emerged marble bracelets also indicate the changing understanding in personal ornaments. Despite these radical changes in material culture, however, there seems to be no major change in the faunal remains, as ovicaprids are the most dominant species in both periods (Pişkin 2018).

The question of why almost all the sites in western Anatolia were abandoned around 5700 BC, and what dynamics lie behind of this phenomenon, is so far unknown. This depopulation is not only recorded in western Anatolia, but also seen in the Lake's District region (Vandam 2015) and Central Anatolia (Marciniak and Czerniak 2007). What the material evidence from Ulucak after 5600 cal. BC suggests is a greater cultural affinity between western Anatolia and Thrace evidenced by internally thickened rimmed bowls/dishes with rippling decoration, horned handles, and figurines. The hut-like structures in Ulucak III, however, are rather reminiscent to those found in Aktopraklık B (Karul 2017) and Ilıpınar VB (Roodenberg et al. 2013) in North-Western Anatolia.

7. DISCUSSION

By the seriation of C14 dates we can define the beginning of sedentary life in Western Anatolia, the duration of the processes of cultural continuity, transformations, and abrupt changes at Ulucak Höyük, and the parallels with material culture in the

wider region. The distinct character of material evidence between Level VI and III are in accord with the C14 dates. However, the process of gradual transformation attested in material evidence since Level Vb, such as the growing interest in storage activities, integration of dairy products into the diet, and the rise of clay images can only be partially verified by the radiocarbon dates. This is due to the radiocarbon dates of sub-phases Level Vb through Ve being coherently grouped, while Level Va was separated from this grouping, as if the process started again during this period. Thus, the sequence of Level V needs to be tested with further C14 dates. The gradual transformation at the site after Vb overlaps more or less when the 8.2 ka Climate Event reached its peak. It has generally been suggested that western Anatolia was not been affected by this climatic change (Flohr et. al. 2015), as was the case further east (Göz 2019). This suggestion can be further supported by the newly founded settlements in Western Anatolia such as Ege Gübre and Dedecik-Heybelitepe during the late 7th millennium BC. Nonetheless, the indirect influence of the 8.2 ka Event in the region can still be seen. Accordingly, climate change may have acted as a catalyst for the intensification of storage activities, integration of secondary products (milk and wool), and the emergence of economically independent households, craft specialization, and the rise of symbolic media, all attested at Ulucak Höyük after ca 6200 cal. BC. Independent households and the increased need for renegotiation of these identities appear to have been supported by the greater variety of symbolic media and its continuous growth after Ulucak Vb. Some of these media, such as clay figurines and seals, and some decoration techniques, such as impressed vessels, at Ulucak Höyük may have been adopted from the new groups who were subsequently integrated to Western Anatolia from the East.

Radiocarbon dates clearly suggest that western Anatolia was depopulated around 5670/5620 cal. BC and sparsely reoccupied by new groups with completely different cultural backgrounds from 5600 cal. BC. Although ancient human DNA research is in its infancy, early results have also shown a population change in Anatolia during this period, with population movement towards central Europe (Hofmanová et al. 2016; Lazaridis et al. 2016). These demographic shifts and abrupt changes seem to open a new avenue for understanding western Anatolian prehistory. The dynamics that lay behind of this phenomenon remain to be investigated.

8. CONCLUSION

Due to its long occupational history, Ulucak Höyük can be seen as one of the most important prehistoric sites in Western Anatolia. Stratigraphic excavations and a series of C14 dates have clarified the spatial extent of the settlement from the earliest Neolithic (6850/6830 cal. BC) onwards. It has also brought to light evidence of the cultural continuity from 6500 to 5700 cal. BC, as well as an abrupt change in the material culture around 5600/5640 cal. BC. The site therefore provides an exceptional reserve for future archaeological study.

ACKNOWLEDGEMENTS

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Table 1. Conventional and calibrated radiocarbon dates from Ulucak

Site Phase and The archaeological Context	Lab./Sample No	Material: Pretreatment	*δ13C*	Conventional Age BP	Calibrated BC (2 sigma)
Ulucak VI: Trench L13 (lime surface)	Beta-345837	Bone collagen: collagen extraction with alkali	-20.2	7990±40	7057-6756
Ulucak VI: Trench L13	Beta-269727	Charcoal: acid/alkali/acid	-25.5	7950±50	7041-6691
Ulucak VI: Trench L13 (lime surface)	Beta-345838	Bone collagen: collagen extraction with alkali	-19.4	7940±40	7032-6691
Ulucak VI: Trench L13 (fill)	Beta-345839	Bone collagen: collagen extraction with alkali	-20.3	7930±40	7032-6682
Ulucak VI: Trench L13 (Building 42)	Beta-250265	Charcoal: acid/alkali/acid	N.A	7910±50	6863-6649

Ulucak VI: Trench L13 (Lime surface)	Beta-317542	seed	-22.6	7870±40	6834-6604
Ulucak VI (Lime Surface)	Beta-317544	seed	-22.7	7850±50	6840-6590
Ulucak VI: Trench L13 (Fill)	Beta-269729	Charcoal: acid/alkali/acid	-25.4	7850±50	6840-6590
Ulucak VI: Trench K13 (around the hearth)	Beta-405666	Bone collagen: collagen extraction with alkali	-19.5	7840±30	6766-6598
Ulucak VI: Trench L13 (Lime Surface)	Beta-317430	seed	-22.1	7830±40	6812-6589
Ulucak VI: : Trench L13 (Fill)	Beta-269731	Bone collagen: collagen extraction with alkali	-20.4	7820±50	6816-6506
Ulucak VI: Trench L13 (Lime Surface)	Beta-317538	seed	-22.3	7810±40	6708-6560
Ulucak VI:Trench L13 (fill)	Beta-250266	Charcoal: acid/alkali/acid	N.A	7770±50	6682-6481
Ulucak VI: Trench L13 (Lime Surface)	Beta-317539	seed	-22.1	7730±40	6638-6478
Ulucak VI: Trench L13 (Building 42)	Beta-269730	Bone collagen: collagen extraction with alkali	-20.0	7710±50	6637-6465
Ulucak VI: Trench L13 (Building 42)	Beta-269728	Charcoal: acid/alkali/acid	-25.9	7680±50	6612-6441
Ulucak Ve: Trench L13 (Building 40)	Beta-362304	Bone collagen: collagen extraction with alkali	-20.6	7790±40	6688-6506
Ulucak Ve: Trench L13 (fill)	Beta-223545	Charred material: acid/alkali/acid	N.A	7760±40	6652-6486
Ulucak Ve: Trench K13 (ashy area)	Beta- 405669	Charred material: acid/alkali/acid	-22.5	7600±30	6491-6416
Ulucak Ve: Trench L13 (Building 40)	Beta-250262	Charred material: acid/alkali/acid	N.A	7570±50	6507-6263
Ulucak Ve: Trench L13 (Building 40)	Beta-250261	Charred material	N.A	7510±50	6455-6251
Ulucak Ve: Trench L13 (Fill)	Beta-362302	Bone collagen: collagen extraction with alkali	-20.4	7430±40	6396-6230
Ulucak Ve: Trench L13 (Building 40)	Beta-250264	Charred material: acid/alkali/acid	N.A	7440±50	6418-6228
Ulucak Ve: Trench L13 (fill)	Beta-250263	Charred material: acid/alkali/acid	N.A	7400±50	6406-6103
Ulucak Ve: Trench L13 (Fill)	Beta-317535	Bone collagen: collagen extraction with alkali	N.A	7400±40	6395-6121
Ulucak Ve: Trench L13 (Fill)	Beta-317536	Bone collagen: collagen extraction with alkali	N.A	7280±40	6226-6063
Ulucak Ve: Trench L13 (fill)	Beta-362303	Bone collagen: collagen extraction with alkali	-21.1	7270±40	6224-6058
Ulucak Vd: Trench L13 (Fill)	Beta-236889	Charred material: acid/alkali/acid	N.A	7580±50	6568-6272
Ulucak Vd: Trench L12 (Building 54)	Beta-427244	Charred material: acid/alkali/acid	-22.9	7480±40	6429-6250
Ulucak Vd: Trench L13 (Building 38)	Beta-236891	Charred material: acid/alkali/acid	N.A	7450±50	6422-6233
Ulucak Vd: Trench L13 (Fill)	Beta-223544	Charred material: acid/alkali/acid	N.A	7400±40	6395-6121

Ulucak Vd: Trench L13 (Fill)	Beta-236890	Charred material: acid/alkali/acid	N.A	7270±50	6231-6034
Ulucak Vd: Trench L13 (Fill)	Beta-223542	Charred material: acid/alkali/acid	N.A	7240±40	6214-6029
Ulucak Vc : Trench K13 (Fill with lime)	Beta-405667	Bone collagen: collagen extraction with alkali	-19.2	7320±30	6235-6084
Ulucak Vc Trench K13 (ashy area with mollusks)	Beta-405668	Bone collagen: collagen extraction with alkali	-20.7	7290±30	6222-6076
Ulucak Vc: Trench L13 (Fill)	Beta-223543	Charred material: acid/alkali/acid	N.A	7490±40	6436-6251
Ulucak Vc: Trench L13 (Fill)	Beta-223541	Marine Shell:High Probability Density Range Method (HPD): MARINE13. made a marine reservoir correction using a ΔR: 328 ± 41	N.A	7270±40	6224-6058
Ulucak Vb: Trench L13 (Building 30)	Beta-223540	Charred material: acid/alkali/acid	N.A	7540±110	6635-6119
Ulucak Vb: Trench L13 (Fill)	Beta-212085	Charred material: acid/alkali/acid	-25.6	7400±60	6414-6099
Ulucak Vb: Trench L13 (Fill)	Beta-212086	Charred material: acid/alkali/acid	-25.0	7380±60	6392-6094
Ulucak Vb: Trench L13 (Building 33)	KN-5782	Charcoal: acid/alkali/acid	N.A	7340±40	6350-6074
Ulucak Vb: Trench L13 (Building 33)	KN-5783	Charcoal: acid/alkali/acid	N.A	7315±35	6236-6077
Ulucak Vb Trench L13 (Building 33)	KN-5781	Charcoal: acid/alkali/acid	N.A	7280±35	6222-6068
Ulucak Va: Trench L12 (Building 46)	Beta-362300	Bone collagen: collagen extraction with alkali	-20.8	7160±40	6092-5927
Ulucak Vb: Trench L12 (Building 47)	Beta-362299	Bone collagen: collagen extraction with alkali	-20.8	7140±40	6075-5920
Ulucak Vb: Trench L13 (Fill)	Beta-212087	Charred material: acid/alkali/acid	+1.0	7090±40	6048-5891
Ulucak Va: Trench L13 (Building 23)	Beta-188372	Charred material: acid/alkali/acid	-24.9	7300±40	6231-6071
Ulucak Va: Trench L12 (Building 30)	Beta-362301	Bone collagen: collagen extraction with alkali	-20.9	7130±40	6071-5916
Ulucak Va: Trench L13 (Building 22)	Beta-188370	Charred material: acid/alkali/acid	-25.9	7130±50	6078-5899
Ulucak IVi: Trench N11	Beta-188371	Charred material: acid/alkali/acid	-24.5	7100±40	6050-5899
Ulucak IVc: Trench M13 (Building 56; Pottery workshop)	Beta-427243	Charred material: acid/alkali/acid	-21.4	7040±40	6006-5842
UlucakIVc: Trench 09 (yellow surface beneath Building 65)	Beta-480185	Bone collagen: collagen extraction with alkali	-20.1	7120±30	6057-5921
UlucakIVc Trench 09 (ashy area beneath Building 65)	Beta-480186	Bone collagen: collagen extraction with alkali	-17.5	6950±30	5900-5741
Ulucak IVb: Trench 011 (Building 8)	Beta-178747	Bone collagen: collagen extraction with alkali	N.A	6980±60	5985-5741
Ulucak IVb: Trench 09 (Fill)	Beta-480182	Bone collagen: collagen extraction with alkali	-20.01	6910±30	5872-5726

Ulucak IVb: Trench 011 (Building 8)	Beta-178748	Bone collagen: collagen extraction with alkali	N.A	6900±70	5975-5661
Ulucak IVb: Trench 013 (Building 48; storage jar)	Beta-362308	Charred material: acid/alkali/acid	-22.6	6890±40	5882-5707
Ulucak IVb: Trench 013 (Building 52)	Beta-405670	Charred material: acid/alkali/acid	-23.6	6890±30	5842-5718
Ulucak IVa: Trench 09 (around the owen)	Beta-480184	Bone collagen: collagen extraction with alkali	-18.7	6740±30	5713-5620
Ulucak III a: Trench 013 (Fill)	Beta-345843	Bone collagen: collagen extraction with alkali	-19.6	6710±40	5710-5558
Ulucak IIIb: Trench P13 (stone paved platform)	Beta-465438	Bone collagen:collagen extraction with alkali	N.A	6670±30	5640-5537
Ulucak IIId: Trench 013 (Building 49)	Beta-362310	Bone collagen: collagen extraction with alkali	-16.8	6650±30	5631-5526
Ulucak IIIa: Trench 013 (Fill)	Beta-345840	Bone collagen: collagen extraction with alkali	-17.8	6630±30	5625-5511
Ulucak IIId: Trench P13 (Fill)	Beta-465441	Bone collagen: collagen extraction with alkali	N.A	6590±30	5615-5482
Ulucak IIIb: Trench P13 (stone paved platform)	Bata-465439	Bone collagen: collagen extraction with alkali	N.A	6580±30	5611-5480
Ulucak IIIa: Trench 013 (Fill)	Beta-345842	Bone collagen: collagen extraction with alkali	-17.7	6570±40	5615-5482
Ulucak IIIa: Trench 013 (Fill)	Beta-345841	Bone collagen: collagen extraction with alkali	-18.3	6540±40	5613-5386
Ulucak IIIa: Trench 013 (Fill)	Beta-362305	Bone collagen: collagen extraction with alkali	-19.5	6510±30	5534-5380

N.A.: Not accessible

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