

A Study of the Early Bronze Age Architecture at Tepe Zarnaq, a Kura-Araxes Settlement in Northwest Iran

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Abstract: Architecture is one of the most important and prominent cultural indicators of the Early Bronze Age or the Kura-Araxes Culture in Northwest Iran. The architecture of the Kura-Araxes culture is distinguished by the emergence of a circular plan, a departure from the rectangular plans of the preceding period. This architectural transformation is known as a fundamental change in the Early Bronze Age of the region. In 2012 excavations at Tepe Zarnaq in Heris County, evidence of several meters of cultural accumulation from the Kura-Araxes period, indicating a major and long-term settlement in the area. According to the architectural evidence obtained from four workshops in this excavation, the phasing, precedence and delay, relative chronology, and evolution of these buildings can be reconstructed. In the first period, a short-lived phase, no architectural evidence was found except for a few pits and primitive column bases. Based on pottery finds, this period of settlement appears to have been part of the Kura-Araxes II culture, associated with a nomadic society characterized by temporary settlements. The second architectural period has two phases with standardized adobe buildings and a circular plan. This period indicates the establishment of permanent settlements and the implementation of the common adobe architectural style of the Kura-Araxes II culture. The third period consists of 4 phases. In this period, the architecture with a circular plan evolves into a rectangular plan, which is a stylistic change in the Kura-Araxes III culture. This architectural evolution can be seen throughout the Kura-Araxes cultural area. In addition to adobe, during this period, pise and smooth stones were used in the foundations of buildings and walls.

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1. Introduction

Tepe Zarnaq is located in East Azerbaijan Province, in the county of Heris, on the northern edge of the town of Zarnaq. The excavation of this site was conducted in 2012 by the authors. The materials obtained from this site belong to the Late Chalcolithic period, the Early Bronze Age (Kura-Araxes), the Iron Age, the Late Historical period, and the Islamic Middle Ages. One of the most important objectives of the excavation of this site was to study the Bronze Age in eastern Azerbaijan and to compare it with the Lake Urmia basin and other regions within the sphere of the Kura-Araxes culture (Fig. 1) (Hejebri Nobari et al., 2016: 237-238).

In this excavation, 7 trenches designated B-C-D-E-F-G-V were opened in different parts of the mound. Trenches C and D contained several graves, Trench G included 2 5×5 m squares containing remains from the Historical and Islamic periods, Trenches B included 1 step trench (6 steps in 5×5 m units (B1 to B6) in the center of the mound), Trench V included 1 vertical trench in the south of the site for stratigraphy of the site, Trench E included 7 5×5 m squares (E1 to E7) on the northern side of the site, and Trench F included 2 southern squares measuring 6×5 m and 1 square measuring 5×5 m (F1 to F3) for the study of Early Bronze Age architecture on the southeastern side of the mound (Hejebri Nobari, 2012: 4).

One of the most important objectives of the excavation of this site was to study the Bronze Age (Kura-Araxes culture) in eastern Azerbaijan and to compare it with the Lake Urmia basin and other regions within the sphere of the Kura-Araxes culture. The Early Bronze Age culture of Tepe Zarnaq is part of a broader culture that, in addition to northwestern and western Iran, also includes vast parts of regions such as Anatolia, the Levant, southern Russia, and the Caucasus region (Fig. 1) (Sagona, 1984; Kushnareva, 1997: 44; Batiuk, 2013: 450).

During the Early Bronze Age period at Tepe Zarnaq, various valuable remains from this period were obtained, which require separate studies to elucidate this culture in the target area. In the meantime, different architectural phases have also been obtained that show close similarities with known Kura-Araxes sites in intra-regional and extra-regional areas. This article addresses the study of the architecture obtained from the Early Bronze Age of Tepe Zarnaq and its phasing.

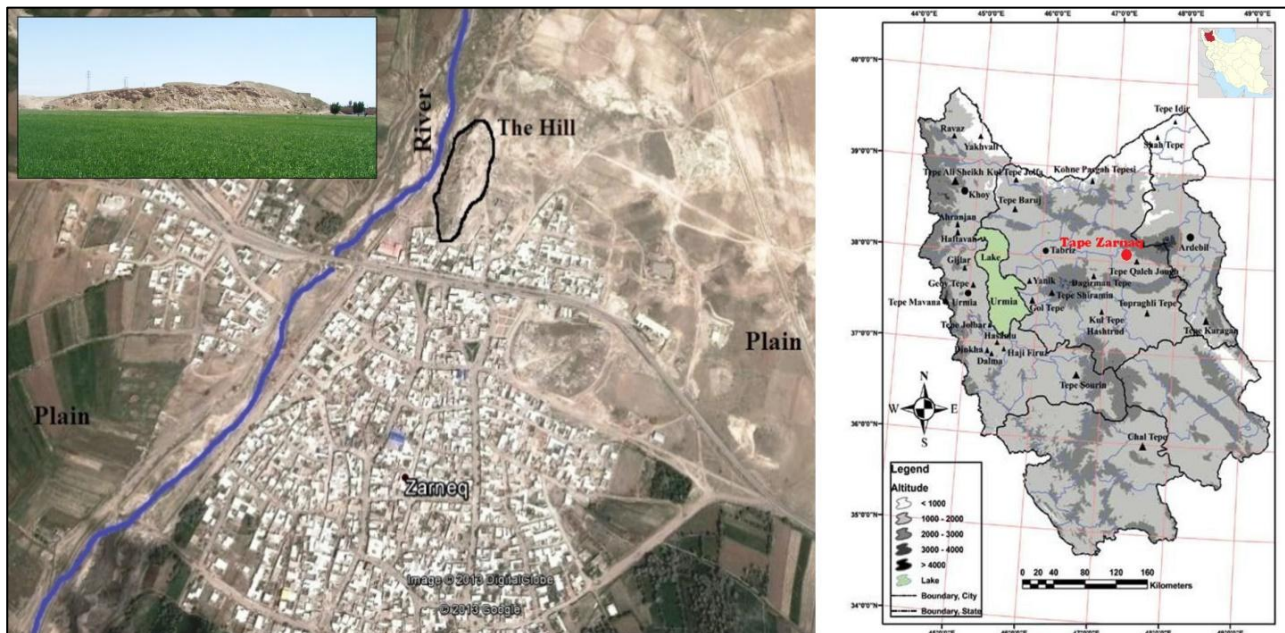


Figure 1. Right) Location of Tepe Zarnaq on the map of northwestern Iran, Left) Location of Tepe Zarnaq in the plain and image of Tepe Zarnaq, view from the west.

2. Characteristics of Art and Architecture in the Kura-Araxes Culture

The material culture of the Kura-Araxes period shows astonishing similarities across its cultural expanse. This culture was formerly known by various names such as Yanik in Iran (Burney, 1961), Shengavit in Armenia (Baiburtyan, 1938), Karaz in Anatolia (Koşay & Turfan, 1959), and Khirbet Kerak in the Levant (Amiran, 1965; Wilkinson, 2012: 21; Kuftin & Field, 1946: 360). Today, the designation Kura-Araxes is more emphasized. Regardless of regional and geographical differences, the integrity and homogeneity of the material culture of this period across such a vast area of the Near East is among the matters that astonished archaeologists; to the extent that some of them considered this integrity and congruity of material culture as evidence of a single ethnic movement (Kiguradze & Sagona, 2003: 39). Burney associated this movement with the arrival of Hurrian-speaking peoples (Burney, 1989: 45), while others consider the migration of Transcaucasian farmers to these regions as the main reason for the transfer of this culture to the southern and southwestern lands (Batiuk & Rothman, 2007: 8).

The Kura-Araxes cultural horizon has characteristics such as houses with circular and rectangular plans made of mudbrick, wattle-and-daub, and plaster, as well as fixed and portable hearths (sometimes in an abstract human form), bronze artifacts, bone tools, animal and human figurines, and chipped stone tool industries (Batiuk, 2013: 450). These economic indicators, especially circular architecture and the use of portable hearths, have led some researchers to refer to Kura-Araxes societies as pastoral nomadic and semi-nomadic communities (Connor & Sagona,

2007) and to consider their sites as tent-like nomadic encampments for a pastoral lifestyle (Batiuk, 2013: 453).

Charles Burney proposed three evolutionary periods for this culture: these three periods are Kura-Araxes I, II, and III. Accordingly, Kura-Araxes I is the formative stage of this culture. In this period, house plans are circular or quadrangular with rounded corners. The characteristics of Phase I pottery include the following: pottery is predominantly dark gray and black in color, handmade with fine sand temper, burnished, sometimes with spiral relief decoration (Burney & Lang, 1971: 58), rail-shaped rims (Burney, 1958: 167), vessels with vertical bodies, triangular and quadrangular rims. In general, incised decoration in the pottery of this period is limited, and incised motifs mostly appear on vessel lids (Brown, 1951: 67). Remains of this period in Iran have been obtained from Geoy Tepe K1 (Sagona, 1984), Kültepe Jolfa (Abedi et al., 2014), Tepe Baruj (Alizadeh & Azarnoush, 2003), and Kohne Pasgah Tepesi (Maziar, 2010). Periods II and III of Kura-Araxes coincide with the Early Bronze Age of northwestern Iran. In Kura-Araxes II, house plans are circular, and so-called Nakhchivan handles and incised decorations are observed on ceramic vessels. Among the characteristic sites of Phase II in Iran are Yanik Tepe XVI-XXVI, Godin IV, Haftavan VIII, and Geoy Tepe K2. In Kura-Araxes III, house plans become quadrangular, and incised decorations on ceramic vessels decrease (Sagona, 1984). Among the characteristic sites of Phase III in Iran are Yanik Tepe VII-XIII, Haftavan Tepe VII, and Geoy Tepe K3.

In the Kura-Araxes culture, a structural hierarchy in the type of settlements is formed. The first group consists of villages with an area of 1-1.5 hectares, the second group consists of settlements with an area of 3-5 hectares, and the third group consists of settlements with an area of 10 hectares and above (Shanshashvili & Narimanishvili, 2014: 256). In this period in the South Caucasus, 3 general types of architecture have been identified: 1) wooden houses with wattle (reed/stick) walls; 2) stone architecture; and 3) mudbrick architecture. Houses of the first and third types were usually used in lowland areas, while houses of the second type were used in foothills and highlands (Kikvidze, 1972: 46-47). Another important issue in Kura-Araxes architecture is the interior layout, which is referred to as standardization (Sagona, 2004: 252). In these houses, the presence of hearths, clay platforms, and postholes is common. The location of hearths was generally in the center of the main room/house. These hearths could be in various shapes and sizes. The next element in this layout, which was also widely used, is the clay platform, usually built on the wall opposite the entrance (Burney, 1961: 136).

3. History of Kura-Araxes Architecture

Some researchers consider the origin of South Caucasian developments and cultural innovations, including the use of mudbrick in buildings, cist graves, burial of the dead under house floors, decoration of house walls with polychrome paintings, miniature architectural models, fire altars, as well as attempts to create ideographic script, anthropomorphic clay figurines, objects made of horn and bone, vessels, seals, and pottery, as resulting from influences from northern Mesopotamian styles. But others believe that circular plan architecture in the South Caucasus appeared earlier and with numerous examples from the Neolithic period and the so-called Shulaveri-Shomutepe culture, which was usually built without foundations or with irregular stone substructures and wattle-and-daub walls and plaster. The diameter of these buildings was about 2.5 to 3 meters and covered an area of 5-7 square meters (Sagona, 1993: 456; Kushnareva, 1997: 14-15; Shanshashvili & Narimanishvili, 2014: 246; Shanshashvili & Narimanishvili, 2009: 13; Japaridze, 2006: 265; Kiguradze & Sagona, 2003: 38; Kushnareva & Chubinashvili, 1970).

Examples of these sites with circular and oval architecture of various sizes have been obtained from various sites such as Shulaveri Gora, Amiris Gora, Kharamis Didi, Sioni, Terli, Didobe, and Berikldeebi in Georgia, Shomu Tepe in Azerbaijan, and Khatun Arkh in Armenia, which date to the Neolithic and Chalcolithic periods (approximately the mid-6th and 5th millennia BCE). These sites, in terms of settlement type, were mainly established in lowland, flat, and fertile areas (Sagona, 1993: 455; Işıklı, 2011: 79; Kiguradze, 2000: 321). Despite the fact that much evidence of agriculture

has been obtained from these sites, the recovery of circular plans, which are the architectural hallmark of these communities, strengthens the hypothesis that the culture of these communities was a mixed culture based on agriculture and nomadism (Sagona, 1993: 460).

The characteristics of the Shulaveri culture include: circular mudbrick houses with storage facilities, coarse handmade pottery in grayish-brown color and vessels with relief and incised decoration, skilled stone tool industry, and a very rich collection of animal horn and bone. Some buildings in Shulaveri were built with plano-convex mudbricks, and others with wattle-and-daub and without stone foundations. The houses were circular or oval, with diameters of 2.5 to 3 meters (Sagona, 1993: 456). The roofs of the houses were flat and had a height of at least 2.5 meters. The floors of most of these houses were lower than ground level, and entry was through a narrow doorway without steps, 60 cm wide. Among the interior facilities of the houses, only an oval hearth was seen, which was placed on the floor near the doorway (Sagona, 1993: 458).

The Shulaveri culture gradually merged into the Sioni culture, which was present from the late 5th millennium to the mid-4th millennium BCE. In recent decades, settlements related to the transitional period between the Shulaveri and Kura-Araxes cultures (the formative stage of the Kura-Araxes culture), known as the Sioni culture, have been discovered, and several sites related to it have been identified in the South Caucasus (including the countries of Azerbaijan, Armenia, and eastern Georgia) (Kiguradze, 2000: 321). These sites are generally single-period, small, with low elevation and an area of less than 1 hectare. In a small number of sites, Sioni deposits are also found over Shulaveri layers (at Alikemek Tepesi) or under Kura-Araxes layers (at Berikldeebi, Aranisi, Arapelus Gora in Georgia, Ojolar Tepe in Azerbaijan, and Geoy Tepe M in northwestern Iran).

The formative stage of the Kura-Araxes culture began around 4000/4100 BCE and continued until 3600 BCE. This stage has been identified at sites such as Kültepe I and II, Ojolar, and surveys of Khalaj, Damlama, and Sedek sites in the Nakhchivan region (Seyidov, 2000: 92), Aranisi, Arapelus Gora, Berikldeebi, and Sioni in Georgia, and Alikemek Tepesi in the Republic of Azerbaijan (Kiguradze, 2000: 322). Therefore, the Kura-Araxes period shows continuity of the Caucasian Chalcolithic in many aspects. This continuity is seen in architectural features such as circular-plan houses, irregular settlements, ceramic braziers, hearth equipment, a form of pottery, and several decorative techniques on pottery (Glumac & Anthony, 1992: 203; Burney & Lang, 1971: 58).

4. The Kura-Araxes Culture in Northwestern Iran

The oldest information about the status of this period in northwestern Iran was obtained from excavations at Geoy Tepe (Period K) (Brown, 1951). Other key sites of this period in northwestern Iran include Haftavan VIII-VII (Burney, 1970; 1972; 1973; 1975), Geijlar (Pecorella & Salvini, 1984), Dinkha IV (Gilbert & Steinfeld, 1977), Yanik VII-XXVI (Burney, 1962; 1964), Kordlar (Lippert, 1977), Kohne Pasgah II, III, IV, V (Maziar, 2010), Kültepe Hadishahr (Abedi et al., 2014), Kohne Shahar (Alizadeh et al., 2015), Nadir Tepesi (Alizadeh et al., 2018), Pissa (Mohammadifar et al., 2009), and Tepe Gourab (Khaksar et al., 2014). In Iran, this culture extends southward to near Kermanshah and eastward to Karaj (Piller, 2012) and Mazandaran (Mousavi et al., 2007). However, the beginning of the Early Bronze Age in northwestern Iran is a complex issue. In some sites, Early Bronze Age layers appear immediately above Late Chalcolithic layers, while in others, these layers appear after a hiatus. Based on his excavations at Yanik Tepe, Charles Burney stated that there is a chronological gap between the Chalcolithic and Early Bronze Age (Kura-Araxes culture) layers (Baxşəliyev, 2006: 74), and while considering the people of the Kura-Araxes culture as nomadic pastoralists familiar with agriculture, he interpreted the changes in the material culture and technology of the region's inhabitants, such as pottery and circular architecture, as cultural influence from beyond the Caucasus mountains that also encompassed northwestern Iran (Burney, 1994: 47-48). On the other hand, archaeological evidence from sites such as Kültepe I in Azerbaijan, which show the sedentary nature of these communities in circular-plan houses during the Late Chalcolithic, is considered evidence of the indigenous nature of this architectural style in the Caucasus (Əliyev,

2007: 87; Bakhshaliyev, 1997: 95). In the Urmia plain, data from some sites such as Tepe Geijlar also indicate continuity from the Late Chalcolithic to the Early Bronze Age (Khatib Shahidi & Omrani, 2006: 90). Recently, studies have also been conducted on the transition process from the Late Chalcolithic to the Early Bronze Age in northwestern Iran (Abedi, 2014), so it seems that the early sites of the Kura-Araxes culture are observed in places that have a transitional layer from the Late Chalcolithic to the Early Bronze Age (Kiguradze, 2000: 323) and in many aspects show continuity of the Chalcolithic in the core regions.

5. Kura-Araxes Architecture at Tepe Zarnaq

Among the trenches at Tepe Zarnaq, Trenches E (including 7 squares), F (including 3 squares), and Square V fully contain remains from the Bronze Age (Fig. 2). In Trench B, remains related to the Bronze Age were obtained from a depth of 160 cm from the bench mark and continued down to the virgin soil, where a thin Chalcolithic layer was obtained. In these trenches, remains of circular and quadrangular mudbrick and stone architecture, burials with ornamental items (such as bronze bracelets and a gold ring), clay artifacts (such as anthropomorphic and zoomorphic figurines) (Hejebri Nobari et al., 2016: 239), complete vessels and pottery sherds, stone tools (such as raw stones (unworked), semi-worked stones, cores, waste flakes, scrapers, blades, and microblades), stone implements (such as grindstones, mortars, and pestles), beads made of stone, bone, and shell, metal objects (such as pendants, arrowheads, and spearheads), and bone tools and remains related to the Kura-Araxes culture were obtained. In the central part of Square B6, ash remains and a kiln were obtained, and to its east, lithic debitage along with cores and stone tools were obtained. It is possible that this square was the workshop area of the site (ibid: 77). The architecture of the Kura-Araxes culture in these trenches was studied. Despite destruction and other limitations, it seems that, based on the evolutionary sequence of architectural layers and building plans, at least 3 architectural phases related to the Kura-Araxes culture can be considered at this site, which will be addressed in the following.

Phase 1

The architecture of this phase consists of several postholes and stone bases (Fig. 3). Two examples of these bases and postholes were identified in E1, one in Trench E2, one in E3, and one in E7. This architectural element was created in a very simple and primitive manner in this phase; in such a way that a flat stone was placed on the ground without any substructure, and in most cases, the area around the slab was reinforced in a circular manner with clay mortar. Probably a wooden column was mounted on it, which supported the roof of the building or a shelter, and the purpose was to prevent the post or column from sinking into the soft soil. In some of these stone bases, the base stone has been displaced from its position, leaving only an isolated pit. Alongside some of these pits or bases, minor architectural remains such as partition walls and occupation floors have survived, but the form of the buildings is not discernible. It seems that in this phase, seasonal yurts or shelters were used, the body covering of which consisted of wattle or reeds along with felt or animal skins, and inside, partition walls made of clay daub and roof-supporting columns were used. This architectural element was obtained only in the northern part of the site, in Trench E. No examples were obtained in Trenches B in the center, nor in V and F in the south of the site. The absence of this element in the center and south of the site could have been due to the limited extent of excavation in these trenches or may indicate a low population and lack of habitation in the south and center of the site during Phase 1.

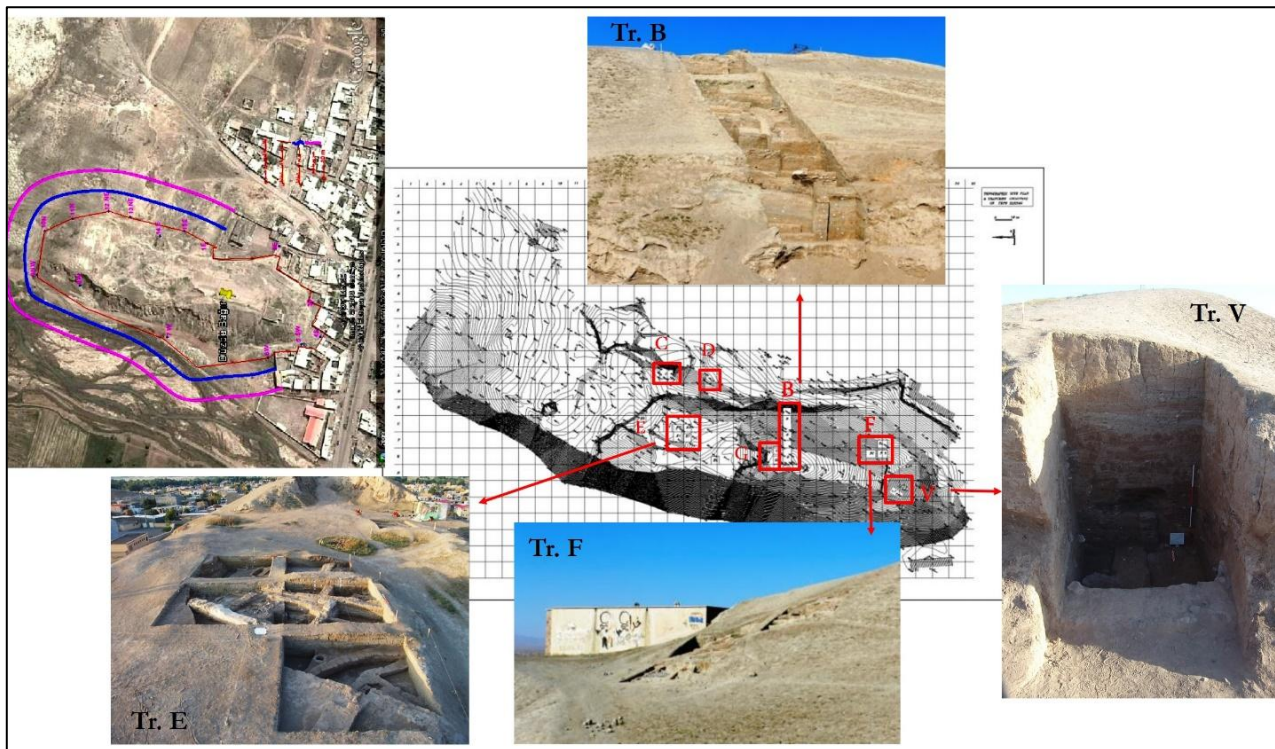


Figure 2. Topographic map of Zarnaq Tepe showing the locations of the excavation trenches discussed in the text.



Figure 3. Architecture belonging to Phase 1 of Tepe Zarnaq

Phase 2

This phase consists of buildings with circular plans (Fig. 4 & Fig. 5). The thickness of the cultural materials of this phase at the site is about 1.5 meters. In this phase, buildings were constructed using mudbrick with a transverse arrangement. The dimensions of these bricks are often standard, usually measuring 10×20×40, 10×25×40, and 10×30×40 cm, and they were placed together with clay mortar about 1 cm thick. In rare cases, non-standard bricks with unconventional dimensions were used to fill the walls. The arrangement of the bricks indicates that the thickness of the walls of the buildings was 40 cm. In the best-preserved state, only 3 courses of the wall height of these buildings remain. In total, 7 buildings with circular plans were obtained in the excavated trenches (2 in Trench E2, 2 in Trench E5, 2 in Trench F2, and 1 in F3). It seems that in this phase, we have 2 phases or sub-phases of architecture with circular buildings; meaning that since two circular buildings in Trenches E2 and E5 were placed on top of each other without any interruption, the inhabitants of this phase used buildings with circular plans in at least two different successive periods. Based on the available evidence, these buildings were internally divided into different spaces by partition walls made of clay daub. Also, inside some of these buildings, pits for the installation of columns were found, which could have supported a wooden or wattle roof. Based on the remaining radius of the circular buildings, their diameter is estimated at about 5 to 7 meters. In the upper phase of these buildings, there are two parallel walls attached to the exterior of the buildings, indicating that in some circular buildings of the upper phase, there were rectangular annexes. This space either served as a connection between two circular-plan buildings or was a rectangular entrance, but unfortunately, due to the limited dimensions of the trench, a definitive opinion cannot be given. Between the last circular buildings of Phase 2 and the first buildings of Phase 3, about 70 cm of deposits are visible, including about 40-50 cm of burning evidence, including burnt mudbrick and wood (in the form of a massive charcoal layer), and 20-30 cm of natural deposit. Therefore, it seems that the last phase of Phase 2 was destroyed by a widespread fire, and Phase 3 was formed with a short time interval on top of Phase 2.



Figure 4. Examples of circular buildings of Phase 2 of Tepe Zarnaq in Trench E

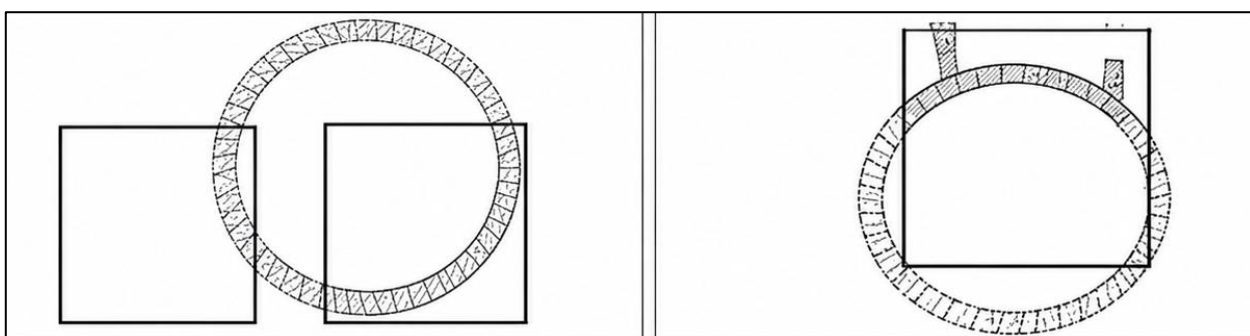


Figure 5. Reconstruction of the plan of circular buildings of Phase 2 of Tepe Zarnaq

Phase 3

This phase consists of buildings with square-rectangular plans, composed of stone and mudbrick. Buildings of this phase were obtained in all trenches of Trench E, Trenches B4, B5, and B6, as well as in the vertical Trench V. The thickness of the cultural materials of this phase in the vertical Trench V reaches 4 meters. In Trench E, these buildings were constructed on top of the circular buildings of Phase 2 with a slight time gap of about 50 to 70 cm of burning deposit. Since the buildings of Phase 2 were not obtained in Trenches B and V, the extent of deposits between Phases 2 and 3 in the center and south of the site is not clear. Based on the extent of the excavations, at least 4 architectural phases can be identified for Phase 3. These architectural phases are more clearly defined in terms of chronological sequence in Trench V, but the most complete architecture was obtained from the horizontal excavation in Trench E.

Phase 1 of Phase 3: This architectural phase, which is the oldest, was obtained only in Trench V (south of the site) (Fig. 6) and was not found in the north of the site. The building obtained in Trench V, due to the limited size of the trench, consisted only of a straight (non-circular) wall 211 cm long and 30 cm wide, which was obtained at a depth of 375 cm from the bench mark. Its interior is located on the northern baulk of the trench, and from it, mudbrick collapse, wall plaster collapse in white and red colors, circular industrial hearths, and an occupation floor made of beaten earth were obtained. Due to the black color of the collapse and the presence of small industrial hearths or kilns, it seems that this room had a workshop function or was related to fire and kilns. A notable feature of this phase is the wall plaster collapse, which has very interesting designs. These decorations were disrupted due to the collapse of the walls, and only one piece of plaster collapse could be stabilized. The dimensions of this piece are approximately 29×12 cm, and it has geometric incised designs, made using a mixture of clay and fine sand (Fig. 7).



Figure 6. Rectilinear mudbrick architecture in Trench V, Phase 1 of Phase 3 of Tepe Zarnaq

Figure 7. Wall decoration from Phase 1 of Phase 3 of Tepe Zarnaq

Phase 2 of Phase 3: This phase consists of buildings composed of mudbrick and stone, which were obtained in 3 trenches: V, B, and E. The buildings of this phase in the south of the site (Trench V) are located about 50 cm above Phase 1 of Phase 3, and in the north of the site, they are located about 20-30 cm of deposit above Phase 2 of the Early Bronze Age (the circular buildings). The boundary between these two architectural phases is marked by mudbrick collapse and (slight) natural deposits. These buildings were obtained in Trench V at a depth of 325 cm from the bench mark and have a height of about 30 cm. This building includes two perpendicular walls, with the east-west wall constructed of stone from the foundation level and the north-south wall

constructed of mudbrick. The brick dimensions are approximately 10×30×30 cm. A clay platform is located adjacent to the stone wall.

This phase is identified in Trench B6 by a north-south wall about 3 meters long and 90 cm wide. This wall belonged to a quadrangular building that extended south and north under the trench baulks and could not be traced further due to excavation limitations, so the nature of the building could not be determined. In the northern part of this wall, brick was used on top of stone, while in the southern part it was entirely mudbrick and no stone was used. The bricks here show great variety; their dimensions include 10×30×50, 10×20×50, 10×30×30, and 10×40×30 cm. In the space beside the wall, 2 horseshoe-shaped clay hearths were obtained on a beaten earth floor. The floor and hearth were made using clay and white plaster.

The buildings of this phase in Trench E, due to the large size of the trench and horizontal excavation, are considerably more complete and provide us with more information (Fig. 8 & Fig. 9). These buildings include quadrangular (rectilinear) rooms that were obtained adjacent to each other in Trenches (E1, E3, E4, E7). Some walls of the buildings are entirely mudbrick, while others are a combination of mudbrick and stone, especially in the foundation part. In some walls, a 20-30 cm layer of rubble fill was used for the foundations. The stones used were flat (unworked) in non-uniform dimensions (14×33×57, 27×39×108, 22×68×15, 20×20×15, 13×26×25 cm) and had become laminated due to weathering. The dimensions and shape of the foundation stones in the building in Trench E4 are considerably more regular. Here, three rows of stones were obtained in the foundation, with dimensions as follows: First row includes four stones measuring 14×30×77; 10×32×75; 9×33×77; 9×30×60. Second row: 10×30×60; 10×30×77. Third row: 10×30×50, 10×30×50; 10×20×35 cm. Between and under and on top of the stones, especially at the junction with the bricks, there is a thin layer of clay mortar.

The width of the walls is on average 50 cm, and in some areas, traces of white clay plaster are observed. In the best-preserved point in Trench E3, 11 courses of brick remain in three rows, with the bricks used measuring 10×50×20 cm. In Trench E4, the brick dimensions are 10×40×38 cm, and in Trench E7, 10×25×40 cm. An interesting example in the building in Trench E7 is that in one of the walls, the bricks were laid on their sides. The dimensions of these bricks are also 10×20×50 cm.

On the floors of the houses, beaten earth was used, sometimes up to 10 cm thick, which was renovated in several stages. Under the floor of the building in Trench E1, 3 burials were obtained, which appear to belong to this phase. These burials were damaged and, in some parts, shattered due to earthmoving and pressure from heavy machinery. The burials were in a crouched position in an east-west orientation with faces facing south. Next to these bodies, various grave goods were obtained, including ceramic vessels, pendants, bronze pins and bracelets, a gold ring, a bone spindle whorl, and a cylindrical clay object resembling a hearth or fire altar.

Among other components of the buildings of this phase are fixed hearths, which are horseshoe-shaped. Such hearths were also obtained in previous phases and periods of the Kura-Araxes culture at this site. In this phase, at least two examples of these hearths were obtained in Trench E. These hearths are mainly made of clay and sand or clay and lime, and their dimensions are approximately 60×80 cm, with a height and thickness between 15-20 cm. Another element present in the architectural spaces of this phase is a mudbrick platform with white clay plaster, obtained in the building in Trench E7. The surface of this platform was blackened and sooty for an unknown reason (fire or industrial activities). This platform was attached to the western and northern walls of the building and measures 25×230 cm in the north-south direction and 25×110 cm in the east-west direction. In addition to this, from this phase and Phase 3, horn, jaw, and a large quantity of bones of large herbivorous animals (probably cattle) were obtained.



Figure 8. Rows of flat stones in rectilinear architecture in Trench E, Phase 2 of Phase 3 of Tepe Zarnaq (left)

Figure 9. Rectilinear mudbrick-stone architecture in Trench E, Phase 2 of Phase 3 of Tepe Zarnaq (right)

Phase 3 of Phase 3: This phase consists of buildings with rectilinear plans, constructed entirely of mudbrick. These buildings were formed in Trench V with a height difference of about 120 cm above Phase 2 and a height difference of 35 cm below Phase 4 of Phase 3. The boundaries between these architectural phases are marked by mudbrick collapse and natural deposits. This architectural phase was obtained in Trench V, Trench B5, and the uppermost parts of the Trenches in Trench E. Due to the disturbances on the surface of Trench E, the connections between the walls were disrupted and cannot be reconstructed. In Trench B5, the layers were also somewhat disturbed, and no definitive conclusion can be drawn. The architecture of this phase in Trench V consists of two perpendicular walls in the north-south and east-west directions (Fig. 10). The walls were constructed without foundations, and the bricks were laid directly on the ground. The continuation of the wall to the south was destroyed due to the construction of a village water reservoir. Only three courses of brick remain from the wall height, measuring approximately 10×40×35 cm. The interior space of the walls, or in other words, the floor of the rooms, was made of beaten earth, and according to the cut of the floor layer, it seems this was done at least three times. On the walls, very limited traces of clay plaster with fine straw and sand temper were also obtained, which were severely damaged. On the floor, a piece of collapsed wall plaster was obtained, decorated with geometric-vegetal motifs resembling wheat ears within square frames. These decorations were executed using the incised technique and filled with a white substance (Fig. 11).



Figure 10. Rectilinear mudbrick architecture in Trench V, Phase 3 of Phase 3 of Tepe Zarnaq

Figure 11. Wall decoration from Phase 3 of Phase 3 of Tepe Zarnaq

Phase 4 of Phase 3: This phase also consists of buildings with square-rectangular plans, constructed entirely of mudbrick. The architecture of this phase was obtained in the uppermost layers of Trench V and Trench B4. In Trench B4, a north-south wall, belonging to a quadrangular

building, was obtained with dimensions of about 2.7 m in length and 1 m in height, which extends to the south into the trench baulk and was destroyed to the north for an unknown reason, so the nature of the building could not be determined. The bricks used in this wall measured 10×40×30, 10×40×20, and 10×50×30 cm, with 1 cm thick mortar between them. To the east of this wall, a horseshoe-shaped hearth was obtained on a beaten earth floor. The western part of the wall lay under Trench B3 and was not excavated, and the eastern parts were highly disturbed and destroyed due to being on the slope of the mound.

In Trench V, a building consisting of 4 interconnected walls was obtained, creating a 4-sided room measuring approximately 130×170 cm, with about 64 cm of its height remaining (Fig. 12). The walls of the building extended beyond the trench baulk along the trench wall, and it is clear that rooms were attached to it on either side. The bricks were approximately 10×30×40, 10×35×45, and 10×50×30 cm in size, laid in a bond (header and stretcher) arrangement, with 1 cm thick mortar between them. The mortar and bricks were made from a mixture of soft soil, sand, and straw. The interior space of the room was filled with mudbrick collapse, and after the removal of the collapse, a beaten earth floor was obtained. The floor was rebuilt and reused several times, and the walls were built without foundations. Among the collapse and on the walls (rarely and limitedly), traces of wall plaster were obtained, which were about 1 cm thick, and on them, traces of the use of white, black, and red colors are visible.



Figure 12. Rectilinear mudbrick architecture in Trench V, Phase 4 of Phase 3 of Tepe Zarnaq

6. Discussion

The evidence obtained from the stratified cultural deposits at Zarnaq Tepe indicates that the thickest occupational deposits belong to the Early Bronze Age and the Kura–Araxes cultural tradition. However, based on the architectural and ceramic evidence, no remains attributable to the Kura–Araxes I phase were identified at the site. This absence suggests that occupation began during the middle stages of the Kura–Araxes cultural sequence.

The most significant finding for establishing the site's chronology is the complete absence of incised-and-white-filled painted pottery within the ceramic assemblage. Despite excavations conducted in several excavation areas and trenches, revealing several meters of cultural deposits and multiple architectural phases, none of the complete or fragmentary ceramic specimens exhibit incised decoration filled with white paste. This decorative technique constitutes one of the most diagnostic features of Kura–Araxes II pottery at other major contemporary sites. Its complete absence is consistent with the comparative chronology established at Yanik Tepe, where the abandonment of the incised decorative technique has been attributed to the late Kura–Araxes II

period (Burney, 1962). Consequently, the occupation at Zarnaq Tepe cannot be assigned to either the initial or the peak stages of Kura–Araxes II; rather, its beginning should be placed toward the end of this phase.

Architecturally, the excavation data indicate the presence of only two architectural phases consisting of circular buildings. Compared with Yanik Tepe, which contains approximately fourteen successive circular architectural levels (Summers, 2004), this limited number suggests a considerably shorter duration of circular architectural traditions at Zarnaq. In light of the ceramic evidence discussed above, both circular phases may likewise be assigned to the late Kura–Araxes II period. Nevertheless, the available evidence indicates that the first phase reflects a mobile or semi-nomadic occupation, whereas the second phase represents a transition to permanent settlement through the construction of circular mudbrick houses. The termination of this circular architectural phase is marked by extensive burned deposits identified in the excavation trenches, indicating a major fire event. However, the archaeological evidence is insufficient to determine whether this destruction resulted from natural causes or human activity.

Subsequently, the architectural evidence from the third occupational period demonstrates a complete transformation from circular to rectilinear building plans. In Trench E, this transition occurred immediately above the destruction layer, with only a short occupational hiatus separating the two architectural traditions. This pattern closely parallels that documented at contemporary sites, including Period II at Yanik Tepe and Haftavan VII (Burney, 1972: 129). In Vertical Trench V, the cultural deposits of this period reach a thickness of approximately 4 m and comprise four architectural sub-phases, making the stratigraphic sequence comparable to that of Yanik Tepe. Although no fundamental changes occurred in ceramic manufacturing techniques or general vessel forms during this period, the ceramic assemblage demonstrates the increasing prevalence of pointed-base vessels and the decline of Nakhchivan-type handles, both of which are characteristic features of the Kura–Araxes III phase. One particularly noteworthy discovery in Trench V is the presence of fragments of painted plaster wall coatings. This evidence indicates that although the incised decorative technique had completely disappeared from the pottery assemblage, geometric decorative motifs were not abandoned altogether but instead continued to be employed in architectural decoration. These motifs are comparable to the incised geometric designs found on Kura–Araxes II pottery from other sites across the cultural distribution zone (Summers, 1982). On the basis of the combined evidence—including rectilinear house plans, pointed-base ceramic forms, and the complete absence of incised pottery—the third occupational period at Zarnaq Tepe can be confidently assigned to the Kura–Araxes III phase.

7. Conclusion

The integration of the architectural and ceramic evidence demonstrates that Zarnaq Tepe, one of the key archaeological sites in eastern Azerbaijan, preserves a continuous sequence of Late Early Bronze Age occupation extending from the late Kura–Araxes II phase throughout the entirety of Kura–Araxes III. The circular architectural tradition, represented by only two occupational phases, reflects a relatively brief and transitional settlement episode at the end of Kura–Araxes II. This occupation terminated in a major fire, after which a fundamental shift occurred, with rectilinear architecture replacing the earlier circular buildings and developing through four substantial architectural sub-phases. The complete absence of incised-and-white-filled pottery throughout the site constitutes the strongest evidence for assigning the beginning of occupation to the final stages of Kura–Araxes II. This finding further suggests that the arrival of Kura–Araxes communities in the Zarnaq region coincided with the decline of earlier ceramic decorative traditions. Nevertheless, decorative practices did not disappear entirely. Instead, they continued in a new medium through geometric motifs applied to plastered architectural walls during the third occupational period, reflecting both cultural adaptability and the persistence of symbolic traditions within a different material context. Overall, the evidence from Zarnaq Tepe not only establishes a reliable chronological framework for eastern Azerbaijan but also closely corresponds

with the stratigraphic sequences documented at major sites in the Lake Urmia Basin and the South Caucasus. As such, the site fills an important gap in reconstructing the cultural development and regional expansion of the Kura–Araxes tradition across northwestern Iran.

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Author Contributions

The first author was responsible for all stages of the study, including data collection, analysis, and preparation of the manuscript.

Conflict of Interest

The author declares no conflict of interest.

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The data supporting the findings of this study were derived from published sources cited in the reference list.

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