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Absolute and Relative Chronology of the Bronze Age at Tappeh Shireh-Paz-Khāneh (Shiretal), Qazvin Plain

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Abstract

This study investigates the absolute and relative chronology of the Bronze Age at Tappeh Shireh-Paz-Khāneh (Shiretal) in the Qazvin Plain, northern regions of Central Plateau of Iran, based on excavations conducted in 2015-2016. The site presents a multiperiod archaeological record, including Late Neolithic, Middle Bronze, and Late Bronze Age deposits. Despite the limited knowledge of the Bronze Age in the Central Plateau, particularly the notable gap from the mid-third to the mid-second millennium BCE, the findings at Tappeh Shireh-Paz-Khāneh provide valuable insights into the cultural and social dynamics of the period. This article aims to document and analyze the archaeological features and pottery assemblage to establish a relative and absolute chronology for the Bronze Age phases represented at the site. The study will also compare the cultural traditions observed at Tappeh Shireh-Paz-Khāneh with those of contemporary sites in the neighboring regions, to assess cultural continuity and regional interactions. Methodologically, systematic excavation and stratigraphic analysis have been conducted to categorize artifacts and architectural remains. The typological and chronological frameworks will facilitate dating the artifacts, especially pottery assemblage, and constructing a timeline of cultural sequences. By examining these findings, this research will contribute to a deeper understanding of the socio-political dynamics of the Bronze Age in the region, shedding light on the transitions leading to the Iron Age and the subsequent Median and Achaemenid empires. Based on relative and absolute chronological evidence for the Bronze Age, the site was occupied during both the Middle and Late Bronze Age settlement phases. The estimated date ranges for these phases at this site are 2400–2100 BCE for the Middle Bronze Age, and 1800–1700 BCE for the Late Bronze Age.

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1. Introduction

Tappeh Shireh-Paz-Khāneh, located in Alborz County, Qazvin Province, was excavated in Autumn-Winter 2015 and Spring of 2016 under the supervision of Mohammad Reza Asgari from Iranian Cultural Heritage, Handicrafts and Tourism Organization (ICHTO) of Qazvin Province, with permission number 943141/00/6123 dated 08/16/2015 from the Cultural Heritage and Tourism Research Institute (RICHT). The site exhibits multiperiod archaeological deposits, encompassing the Late Neolithic, Bronze Age (Middle and Late Bronze), and Iron Age. The site is thus particularly important for our knowledge of the Bronze Age on the Central Plateau of Iran which is otherwise is limited, with a notable gap from the mid-third millennium BCE to the mid-second millennium BCE (Pollard *et al.,* 2012; 2013).

Evidence for the Middle–Late Bronze Age is derived from excavated sites including Tepe Sagzabad in Qazvin (Azizi *et al.,* 2011; Pollard et al., 2012), Tepe Qoli-Darvish in Qom (Sarlak, 2011), Tepe Kopandeh in Isfahan (Saedi Anaraki, 2009), and Sites 013 and 051 in the Varzaneh Plain (Rafi'i-Alavi et al., 2020; Fazeli et al., 2022). In the Qazvin Plain, only Tepe Sagzabad and the present site have yielded excavated evidence dating to this period. Elsewhere in Iran, major centers and large settlements emerged during the Middle–Late Bronze Age, while the Elamite civilization flourished across the southern, southwestern, and western regions of the Iranian Plateau.

Due to the limited archaeological evidence available from the third millennium BCE, it has been proposed that societies in the Qazvin Plain did not attain state-level complexity and that large parts of the Central Plateau were only sparsely occupied during much of the Middle-Late Bronze Age (Schmidt et al., 2011; Vidale et al., 2018). The new evidence contributes to a better understanding of the social and cultural developments, that shaped the region during the second half of the third millennium and the first half of the second millennium BCE.

Based on the ceramic assemblage from Tepe Hasanlu, Danti (2013) proposed a chronological sequence for northwestern Iran spanning the second millennium BCE. This sequence comprises Middle Bronze Age I (2100–1900 BCE), Middle Bronze Age II (1900–1700 BCE), Terminal Middle Bronze Age II (1700–1600 BCE), Middle Bronze Age III (1600–1450 BCE), Late Bronze Age (1450–1250 BCE), Iron Age I (1250–1050 BCE), and Iron Age II (1050–800 BCE). This framework serves as an important reference for comparative chronological studies across the region.

Understanding the Bronze Age is crucial for interpreting the cultural and social dynamics leading to the Iron Age and the subsequent Median and Achaemenid empires. The rich evidence from several Iron Age settlement sites and cemeteries in the Central Plateau highlights the necessity of examining Bronze Age cultural traditions, to identify dates of transitions and assess cultural continuity and the extent of regional influences. The excavation of Bronze Age deposits at Tappeh Shireh-Paz-Khāneh offers preliminary insights into these issues, focusing on relative and absolute chronology.

This article addresses the following questions: what are the specific archaeological features and pottery assemblage identified at Tappeh Shireh-Paz-Khāneh that contribute to our understanding

of the Bronze Age; how do the cultural traditions observed at Tappeh Shireh-Paz-Khāneh compare to those at other contemporary sites in the Central Plateau of Iran; and what implications do the findings from Tappeh Shireh-Paz-Khāneh have for understanding the socio-political dynamics of the region during the Bronze Age?

The wider goals include: to document and analyze the archaeological deposits and pottery assemblage from the Bronze Age at Shireh-Paz-Khāneh; to establish a relative and absolute chronology for the cultural phases represented at the Bronze Age deposits of the site, contributing to a better understanding of the historical timeline of the region; and to assess the cultural continuity and interactions between different periods at Tappeh Shireh-Paz-Khāneh and their broader implications for the Central Plateau of Iran.

The methodology is as follows: systematic excavation and stratigraphic analysis of the site to uncover and categorize artifacts and architectural remains from the Bronze Age; typological analysis to date the pottery assemblage and establish a timeline for the cultural sequences at Tappeh Shireh-Paz-Khāneh; and comparative analysis of the findings with data from other archaeological sites in the region, employing both quantitative and qualitative methods to assess cultural influences and transitions across periods.

2. Tappeh Shireh-Paz-Khāneh

2-1. Location and Background

The archaeological site of Tappeh Shireh-Paz-Khāneh (also named by local as “Shiretal”), is located in Qazvin Province, within the Alvand Industrial Town, in Dizaj village. The site is precisely located at coordinates 36°13’05.24”N, 50°04’43.36”E, at an elevation of 1250 meters above sea level. Significantly, the Yāliyān River flows approximately 1 km to the west of Tappeh Shireh-Paz-Khāneh, contributing to the geological and ecological context of the area (Fig. 1).

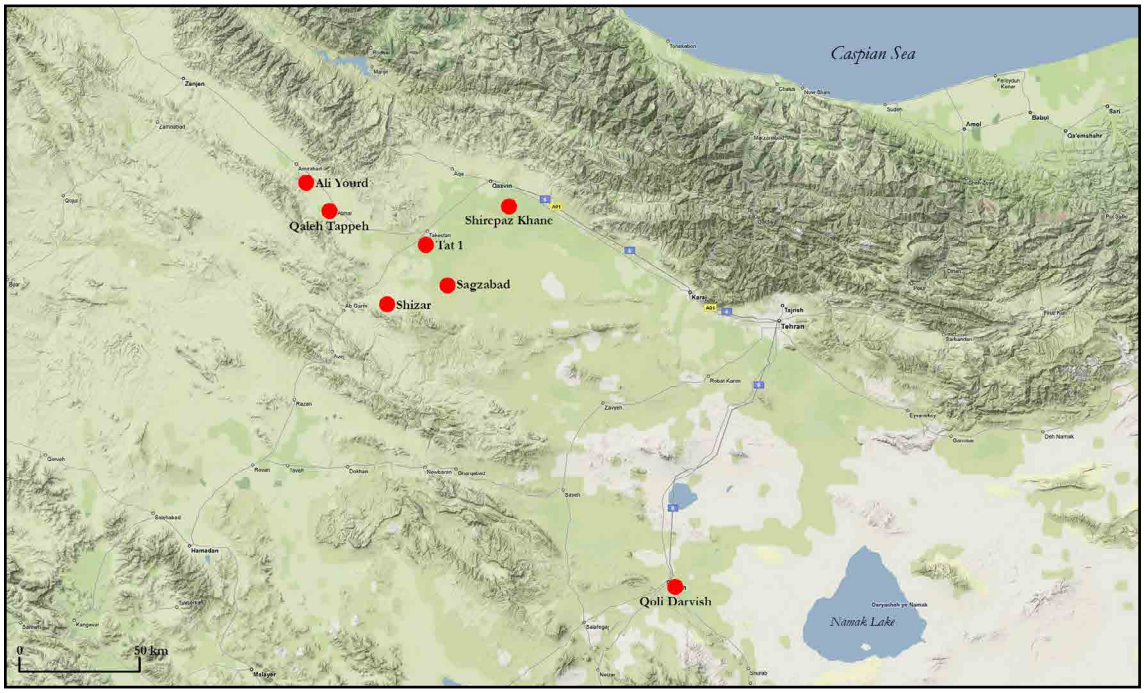


Fig. 1: Bronze Age sites in the Qazvin Plain, Central Plateau of Iran (Authors, 2025).

The site is located in the northern part of Qazvin Plain, c. 2 km south of the village of Dizaj, 2.5 km north of Alvand Industrial Town and 10 km southwest of Qazvin City. Morphologically, the site is a small mound about 4 meters high with an almost semicircular shape with its longer axis extending north south, likely originally circular; its eastern part was destroyed by the asphalt road built in the 1970s. More than half of the site had already destroyed due to unsupervised construction of Qazvin-Alvand road in the 1970s (1350 A.H.). While the very top of the site appears to have remained intact prior to excavation, more than 80 percent of core area has been used recently as a place for accumulating and burying huge amounts of industrial debris (Fig. 2).



Fig. 2: Top: Aerial photo of Tappeh Shireh-Paz-Khāneh (Google Earth); Bottom: Topography and location of trenches in Tappeh Shireh-Paz-Khāneh (Courtesy of MCTH of Qazvin Province).

2-2. Survey and excavation strategies

Tappeh Shireh-Paz-Khāneh was identified during archaeological reconnaissance in the 1990s by the ICHTO of Qazvin Province, as a severely damaged but important site. The site was chosen for rescue work in 2014 when tween road of Qazvin and the Alvand Industrial area was widened and threatened to fully destroy the remaining eastern part of the mound. The excavation of Shireh-Paz-Khāneh aimed to study the architectural context, cultural sequence, stratigraphy, and to define the core area and buffer zone of site, considering the damage and the need for urban infrastructure. After receiving permission from the RICHT, rescue excavations took place in the autumn-winter of 2015 and spring of 2016.

Work proceeded through a systematic site survey mapping the distribution of materials on the surface, that provided the basis for the choice of locations for soundings. 22 test trenches were dug to determine the core area and buffer zone of the site, establishing a surviving site of 2.2 ha, 150 m long and 150 m wide. Altogether eight different trenches were dug. The largest were two trenches with dimensions of 9×10 m and the smallest reached 3×3 meters. The combined results allowed to define fifteen phases of architectural occupation, six dating to the Late Bronze Age (LBA), five to the Middle Bronze Age (MBA) and four to the Late Neolithic (LN), this latter phase with its own subphases.

2-3. Description of Trenches and Architectural Phases

Trench I: Trench I was excavated on the highest, undisturbed point of the mound and had an extension of 10×9 meters. Trenches I and VI, are those included the upper levels of site. Eight different architectural phases were distinguished in trench I. One square mud-brick room of 170×170 cm was lined with red and white clay discovered in the first phase (Fig. 3a). The structure with which the walls stood on foundations made from large stone boulders belonged to the second phase (Fig. 3b). In the third phase, an open area floor, possibly with temporary roofing, was observed. This area slopes from NE to SW, and was therefore not suitable for a house floor, but possibly a courtyard or outdoor space. Two small pits may represent postholes for wooden column, as the space also contained organic residues and charcoal particles (Fig. 3c & 3d). The floor was littered with animal dung. The fourth phase is represented by a large pisé architectural element (Fig. 3e). The northern, eastern and southern walls of the room were within the trench limits and define a space (hall) of c. 18 m2 with an oven in the center. From this level onwards, the trench was reduced to half its size and excavation continued only in the western half of the trench in a 4x5 m area. The fifth phase of architecture was only observed in the Trench VI, which is opened in the northern part of Trench I. At a depth of -285 cm, the sixth phase of architecture was identified (Fig. 3f). It consisted of white-lined clay walls, which the small size of trench didn't allow us to more description. At a depth of -300 cm, the seventh phase of architecture represents the latest MBA phase, comprising a room with walls plastered in white (Fig. 4c). The last phase reached in this trench at -365 cm depth also belonged to the MBA. It consisted of remnants of a wall, an oven and a complete clay container inside the oven (Fig. 4d). Exploration continued through drilling to a depth of -420 cm.

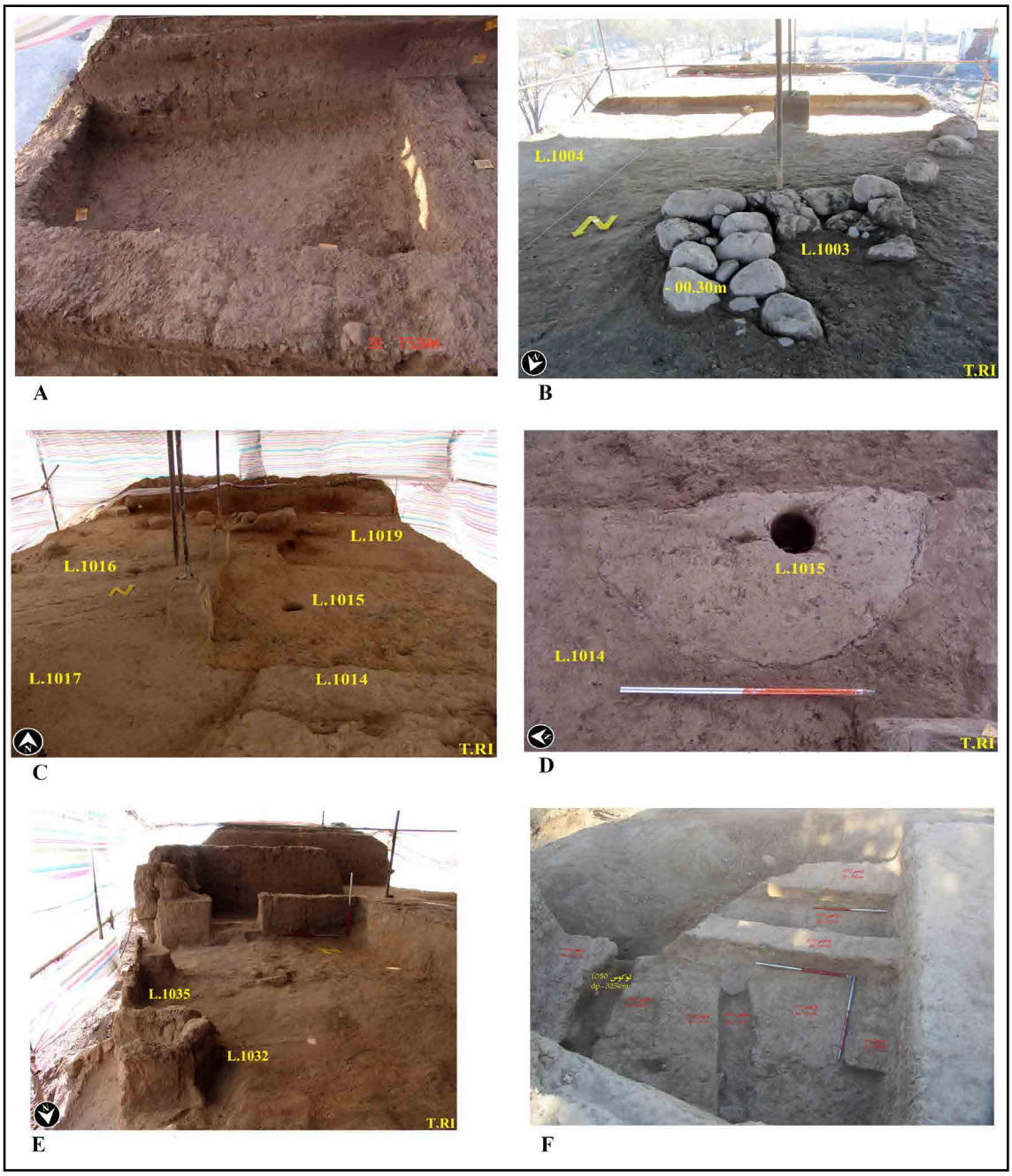


Fig. 3: Tappeh Shireh-Paz-Khāneh, Trench I: A. Architecture phase 1; B. Architecture phase 2; C. Architecture phase 3; D. Example of a posthole from architecture phase 3; E. Architecture phase 4; F. Architecture phase 6 (Pictures by excavation team members, Courtesy of MCTH of Qazvin Province).

Trench II: Trench II was located 11 m south of trench I and had an extension of 4×4 m. Here, the third, fourth and fifth phases of the MBA architecture were identified. Within the trench, the major feature were the pisé walls, which a large rubble packing in a rectangular space belonging to the fourth phase (Fig. 4e). The fifth phase was stratigraphically separated from the sixth phase by a pisé space with gypsum layer on the floor (Fig. 4f). The sixth phase includes white floor which had been painted by an irregular geometric shape and consisted of a mixture of ash and

dirt together with soft soil (Fig. 5a). This floor was the first Bronze Age occupation, and the underlying cultural layers from -585 cm onwards belonged to the Neolithic period (Fig. 6c & 6d).

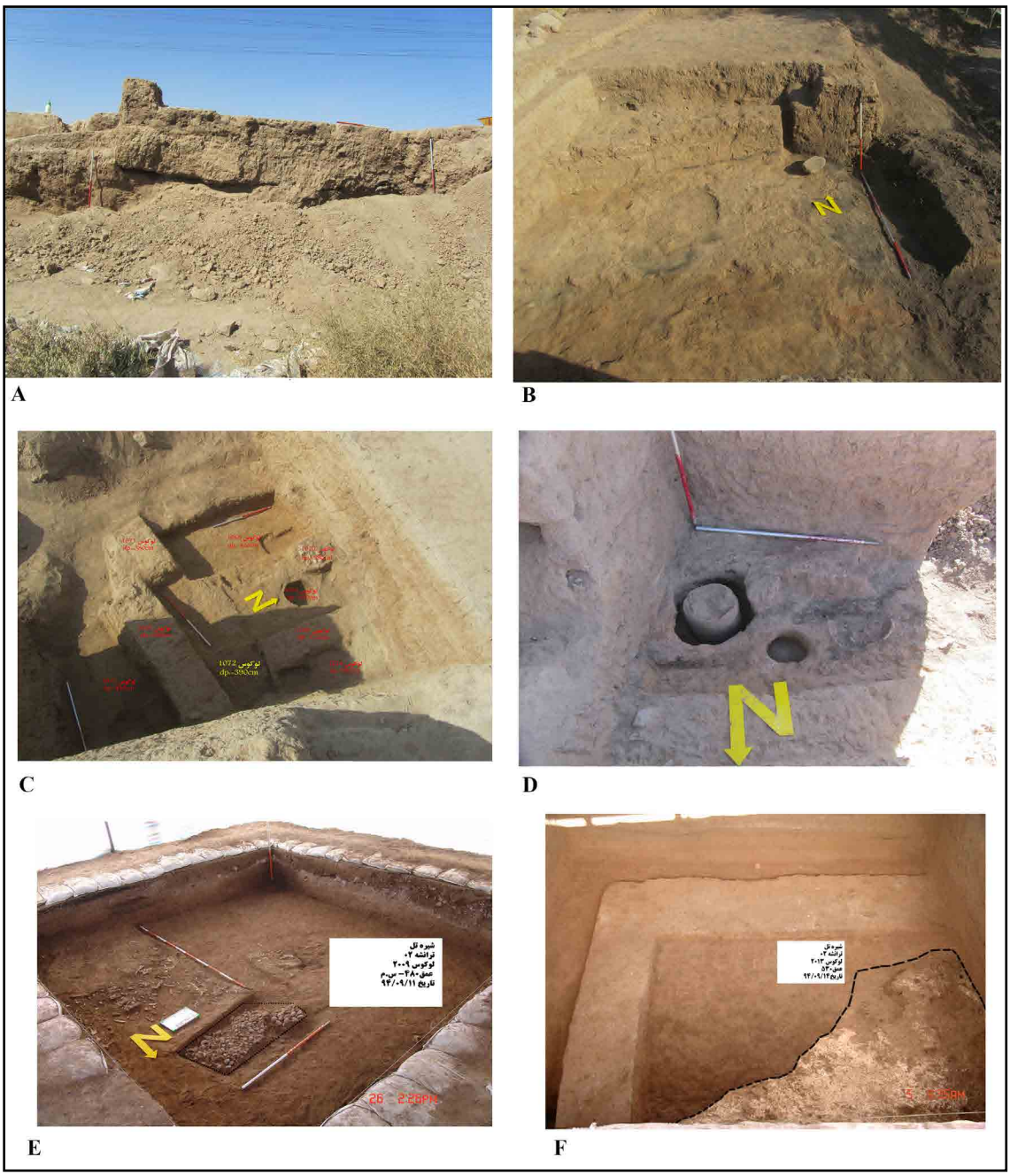


Fig. 4: Tappeh Shireh-Paz-Khāneh: A. Section of Trench VI, architecture phase 5; B. Trench VI, architecture phase 5; C. Trench I, architecture phase 7; D. Trench I, architecture phase 8; E. Trench II, architecture phase 1, floor layer of stone paving; F. Trench II, architecture phase 2, gypsum floor (Pictures by excavation team members, Courtesy of MCTH of Qazvin Province).

Trench III: Trench III was located 29 m northeast of the datum, about 7 m from trench I, and extended 4×4 m. Here, two phases of LBA architecture and one MBA phase were documented. The uppermost occupation consisted of a large mud-brick walls that separated two rooms (Fig. 5b). The architecture of the second phase with mud-brick and footed clay floor, was of larger

dimensions than in the preceding and following levels. Due to the limited dimensions of the trench, no complete room was comprised within the excavated space (Fig. 5c). The third phase of architecture belonged to the MBA and was represented with three clay walls that circumscribe three smaller rooms. Room 4 in the northwestern part of the trench had a clay floor and debris of an oven and of a platform as cooking installations (Fig. 5d, 6e & 6f).

Trench IV: Trench IV was created with a dimension of 4×7 meters at a distance of 30 meters northeast of the datum point. The purpose of exploring trench IV was a control study of the sequence of cultural layers and a horizontal exploration of the visible architectural phases for educational purposes. Two phases of architecture were identified, with the upper phase being purely a very small part of a pisé wall. The second phase of architecture belongs to the MBA and was a room in the southwest of the trench, possibly a storage area as a large sample of wheat seeds were retrieved here (Fig. 5e).

Trench V: Trench V was excavated in the southern part of Trench I to reveal the architectural plan of phase 1 and its stratigraphy. Excavation stopped at a depth of 110 cm after the plan was obtained due to the risk of collapse from the slope of the mound (Fig. 5f).

Trench VI: Measuring 9×10 meters, this trench was excavated in the northern part of Trench I to investigate the stone architectural space discovered previously and access the fifth phase of the architecture, which was not found in Trench I but was visible in the section of a destroyed wall. Four architectural phases from the Late Bronze Age were identified down to a depth of -295 cm. The first layer included an adobe wall with only the bottom course remaining, as the other two walls were destroyed. The second phase consisted of structural remains of stacked, unmortared stones with a floor, similar to those found in Trench I. Excavation continued in the eastern section to reveal the fifth phase. The third phase was identified by a wall with two rows and a central floor, while the fourth phase, found at a depth of -210 cm, measured approximately 50 cm high and 45 cm wide at its largest section, with a gap between the eastern part and the main wall. Notably, this wall had a white coating on its interior facade and was associated with a 10 cm layer of ash on the floor, indicating a fire. This phase corresponds to a large space measuring 5 meters in length and 3 meters in width (Fig. 4a & 4b).

Trench VII: This 3×3 meters trench, located in the southern part of Trench II, aimed to identify grooves in the Neolithic floor and to analyze the usage of the triple hearths found in Trench II. Two layers from the Middle Bronze Age were discovered: the first layer included part of a floor and hearth, while the second layer revealed two nearly perpendicular walls.

Trench VIII: Measuring 6×7 meters, this trench was located 20 m far from Trench VII, where the upper layers had been destroyed. Its purpose was to gather comprehensive information about the Middle Bronze Age, starting at a depth of -445 cm from the surface of the mound. The excavation reached -545 cm and revealed two architectural phases: the first phase featured an unmortared stone structure oriented east-west (Fig. 6a), and the second phase consisted of two adobe mud-brick walls in the southwestern part of the trench (Fig. 6b).

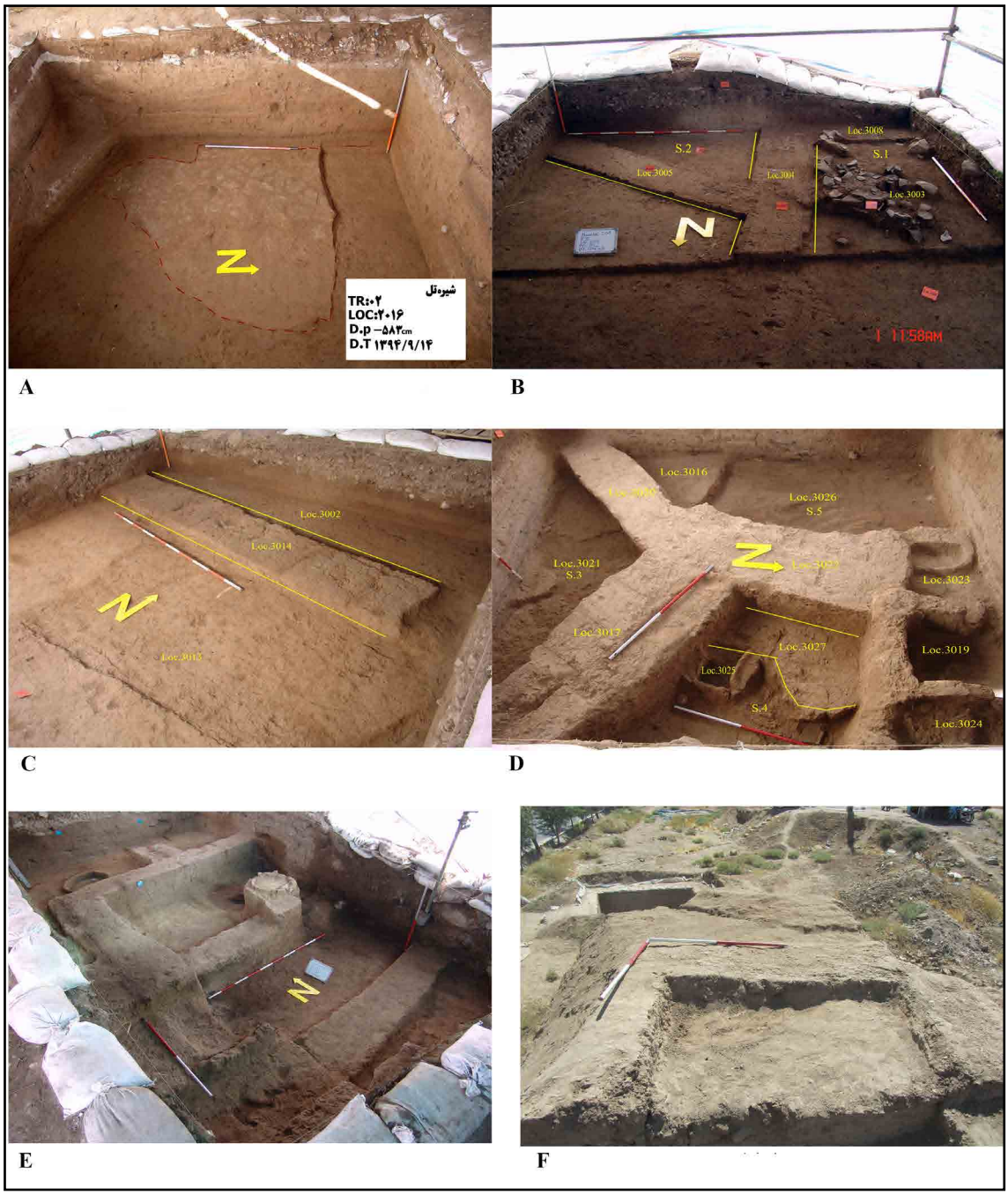


Fig. 5: Tappeh Shireh-Paz-Khāneh: A. Trench II, architecture phase 3, painted floor; B. Trench III, architecture phase 1; C. Trench III, architecture phase 2; D. Trench III, architecture phase 3; E. Trench IV, architecture phase 2; F. Trench V, architecture phase 1 (Pictures by excavation team members, Courtesy of MCTH of Qazvin Province).

3. Pottery Typology and Relative Chronology

The pottery from Tappeh Shireh-Paz-Khāneh belongs to two cultural periods: the Late Neolithic and the Bronze Age. The Late Neolithic pottery from the lowest layers of Trench II and VII is not discussed here. The Bronze Age pottery is attributed to the Middle and Late Bronze Ages.

Middle Bronze Age: The Middle Bronze Age pottery from this site was recovered from various trenches: Trench I (Phases 6, 7, and 8), Trench II (Phases 1, 2, and 3), Trench VII

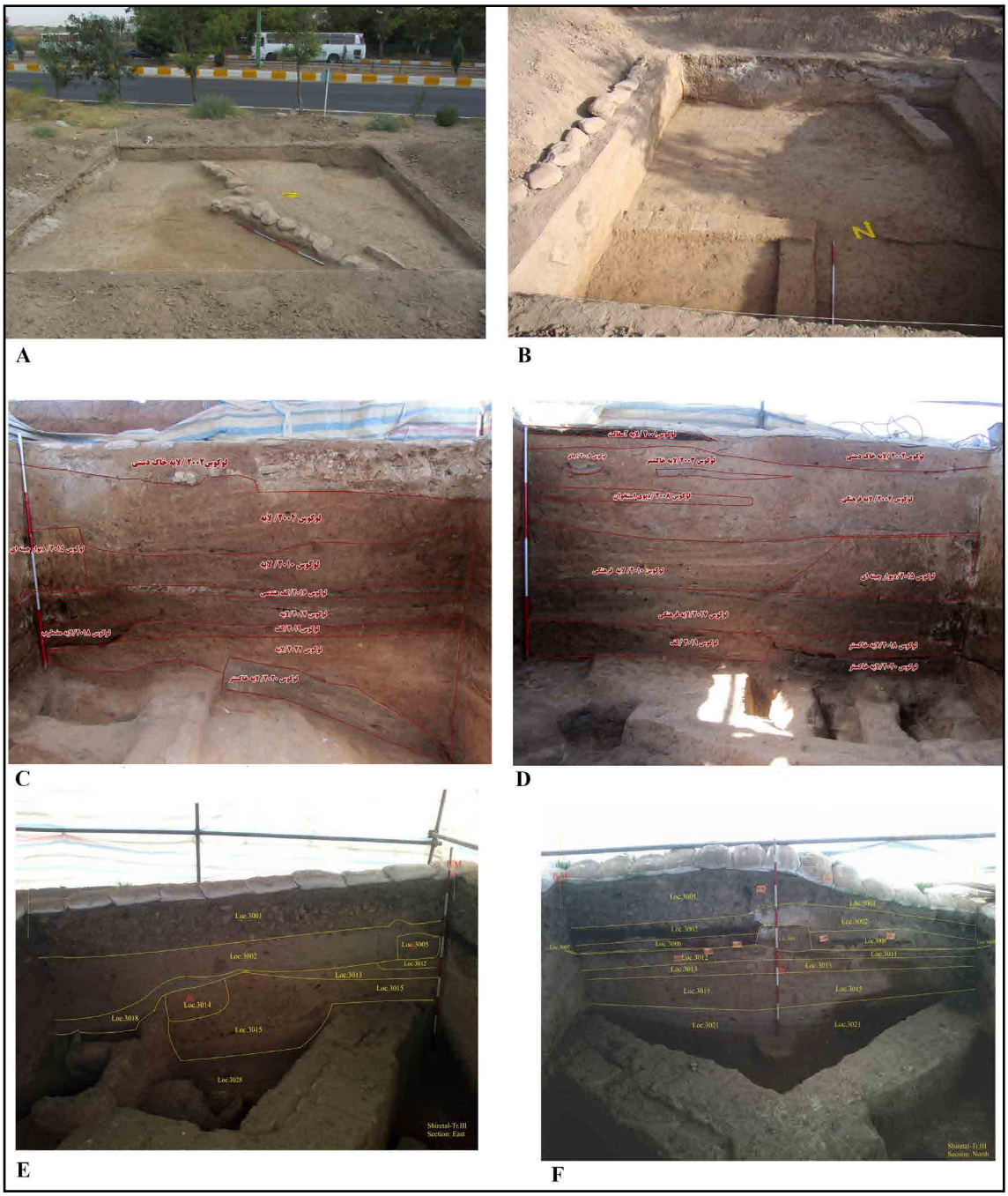


Fig. 6: Tappeh Shireh-Paz-Khāneh: A. Trench VIII, architecture phase 1; B: Trench VIII, architecture phase 2; C. Trench II, Western Profile; D. Trench II, Southern Profile; E. Trench III, Eastern Profile; F. Trench III, Northern Profile (Pictures by excavation team members, Courtesy of MCTH of Qazvin Province).

(Phases 1 and 2), Trench III (Phase 3), Trench VIII (Phases 1 and 2), and Trench IV (Phase 2) (Tab. 1).

Middle Bronze Age pottery can be distinguished into six main fabric groups (Tabs. 2 & 3):

1. Simple ware: buff to brown, often with traces of sooth or smoke (Fig. 7: 1-10); vessels are produced by hand molding over textile (Fig. 7: 1; Fig. 8: 12-15); sometimes with handles of type Nahkichevan (Fig. 7: 12-13) only from trenches I and VIII.

Table 1: Relative chronology of the trenches, Tappeh Shireh-Paz-Khāneh (Authors, 2025).

Trench	I	II	III	IV	V	VI	VII	VIII
LBA	1* 2* 3		1 2	1	1	1 2 3 4		
	4							
MBA	6 7 8	1* 2* 3	3*	2*		5	1 2	1 2

Star (*) shows the sampled contexts from architecture phases for 14C.

2. Wheel made grey ware: can be distinguished further into simple and decorated ware; all vessels are wheel-thrown and are fully fired; decoration is geometric, incised or plastic additions, zigzags (Fig. 9: 1, 6).

3. Wheel made buff ware: the fabric is similar to the grey wheel-made ware but is of buff to orange color (Fig. 9: 7).

4. Handmade grey/black ware: handmade from clay with mineral and organic temper and "burnished painting" (Fig. 9: 8-10).

5. Handmade black ware with carving: all handmade, with geometric decoration on the neck, framed by horizontal lines (Fig. 9: 11-14; Fig. 8: 1-5).

6. Brown ware with "carving" pattern: fabric is brown-colored to orange and decorated with point-shaped incisions. Lines form a zigzag patterns (Fig. 9: 15-17; Fig. 8: 6-7).

Potsherds 2 and 7 in Figure 7 can be attributed to the Early Bronze Age, whereas potsherd 6 in Figure 9 is likely associated with the Late Bronze Age. These parallels may indicate continuity in pottery-making traditions, suggesting the persistence and transmission of some ceramic traits across successive periods.

Late Bronze Age: The Late Bronze Age pottery from Tappeh Shireh-Paz-Khāneh was recovered from the first and fourth phases of Trench I, the fourth architecture phase of Trench VI, and the second architecture phase of Trench III (Tab. 1).

In addition to the Middle Bronze Age pottery types, the pottery collection categorized into four main fabric groups (Tabs. 4 & 5):

7. Plain ware (Fig. 10: 1-8).

8. Wheel-made grey ware (Fig. 10: 9-19).

9. Handmade grey ware (Fig. 11: 1-5).

10. Painted red ware (Fig. 11: 9; Fig. 8: 8-11) comparable to Haftavan VI (Edwards, 1981) and Sagzabad (Talai, 1983; Azizi et al., 2011: Plate 1), handmade and decorated with dark or yellowish painted motifs (Fig. 11: 6-8).

Notably, the Middle Bronze Age plain wares with textile impressions persisted across all layers of the Late Bronze Age. During this time, the same manufacturing technique was also applied to handmade gray ware, which had an uncoated inner surface (Fig. 11: 6-8).



Fig. 7: Tappeh Shireh-Paz-Khāneh, Middle Bronze Age pottery: simple handmade buff ware (Drawing by excavation team members, Courtesy of MCTH of Qazvin Province).

Table 2: Description of diagnostic potteries of Middle Bronze Age in Figure 7

Trench	Locus	Pottery No.	Description: 1. Vessel part, 2. Manufacture, 3. Temper, 4. Size (quality of production), 5. Firing, 6. Fabric Colour (ext. / int. / core), 7. Caly slip (ext. / int.), 8. Decoration, 9. Place of decoration	Parallel
VIII	8005	1	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark brown / dark brown / brown, 7. Thin / thin	Fazeli *et al.*, 2022: Fig. 10: 28
VII	7034	2	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Black (oxidized) / dark brown / brown, 7. Thin / thin	
VII	7035	3	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Buff / buff / orange, 7. Thin / thin	Fazeli *et al.*, 2022: Fig. 10: 1

I	1054	4	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin	
VII	7012	5	1. Bottom, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Black (oxidized) / dark brown / orange, 7. Thin / thin	
I	1063	6	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark brown / dark brown / brown, 7. Thin / thin	
VII	7030	7	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin	Fazeli *et al*., 2022: Fig. 10: 9
VII	7030	8	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin	
II	2014	9	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Pale brown / pale brown / brown, 7. Thin / thin, 8. Two knobbed in shoulder, 9. Exterior	
		10	1. Rim with vertical handle, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Black (oxidized) / dark brown / brown, 7. Thin / thin, 8. Two parallel knobs in shoulder, 9. Exterior	
I	1044	11	1. Body, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark brown / dark brown / dark brown, 7. Thick / thick, 8-9. Trace of textile in interior side	
VIII	8005	12	1. Body with horizontal handle, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin	
I	1054	13	1. Rim with horizontal handle on body, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin	

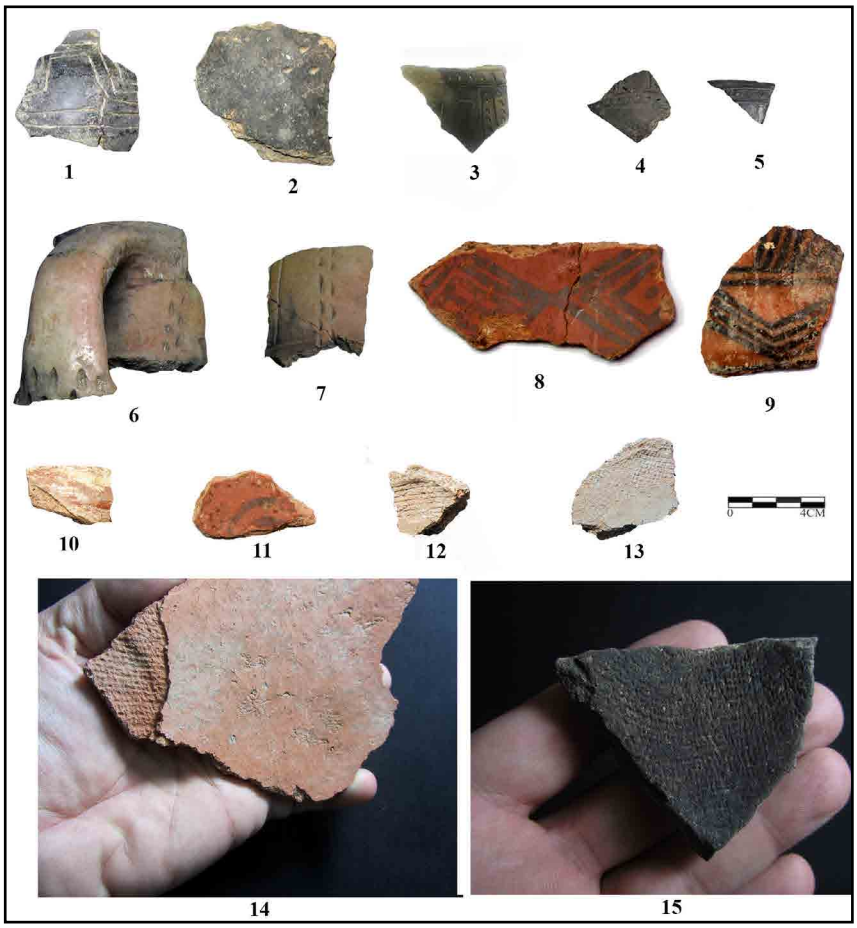


Fig. 8: Tappeh Shireh-Paz-Khāneh, decorated pottery examples and textile technique (Pictures by excavation team members, Courtesy of MCTH of Qazvin Province).

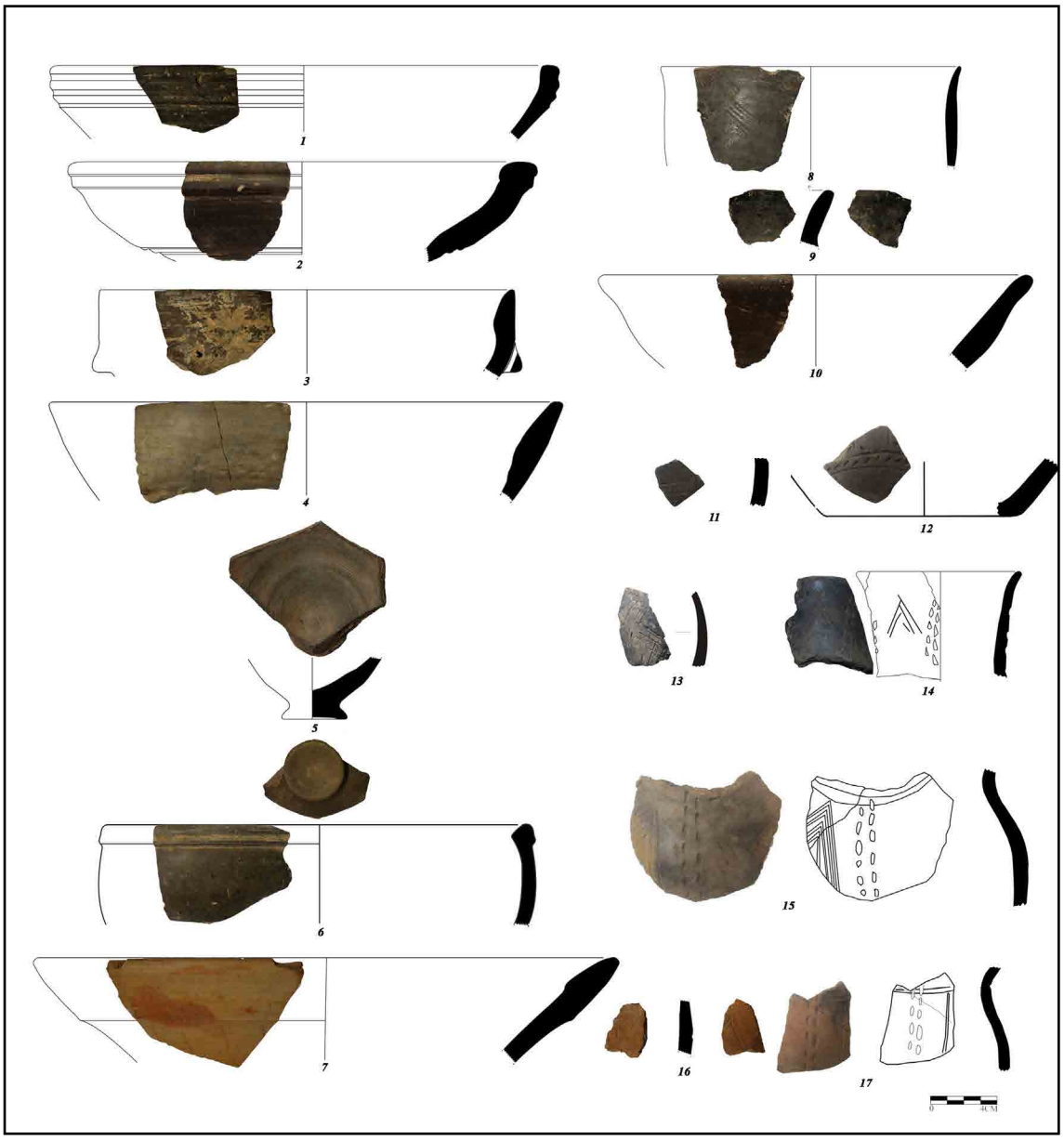


Fig. 9: Tappeh Shireh-Paz-Khāneh, Middle Bronze Age pottery: wheel-made grey and buff wares, handmade black ware, pastilles, plastic and incised decoration (Drawing by excavation team members, Courtesy of MCTH of Qazvin Province).

Table 3: Description of diagnostic potteries of Middle Bronze Age in Figure 9.

Trench	Locus	Pottery No.	Description: 1. Vessel part, 2. Manufacture, 3. Temper, 4. Size (quality of production), 5. Firing, 6. Fabric Colour (ext. / int. / core), 7. Caly slip (ext. / int.), 8. Decoration, 9. Place of decoration	Parallel
VIII	8003	1	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Dark gray / dark gray / gray, 7. Thin / thin	
VIII	8005	2	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Dark gray / dark gray / gray, 7. Thin / thin	
VIII	8003	3	1. Rim with knobbed handle, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
VIII	8003	4	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
VII	7012	5	1. Bottom with base, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	

VII	7030	6	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
VIII		7	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Pale orange / pale orange / orange, 7. Thin / thin	
I	1044	8	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin, 8. Polished geometric lines, 9. Exterior	
I	1044	9	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin	
VIII	8005	10	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin	
II	2014	11	1. Body, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin, 8. Incised lines and parallel ovals, 9. Exterior	
II	2014	12	1. Bottom, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin, 8. Incised lines and parallel ovals, 9. Exterior	
II	2004	13	1. Body, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin, 8. Incised lines, 9. Exterior	
II	2014	14	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin, 8. Incised lines and parallel tears, 9. Exterior	
II	2014	15	1. Body (shoulder), 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Pale brown / pale brown / pale brown, 7. Thin / thin, 8. Incised lines and parallel tears, 9. Exterior	
VII	7022	16	1. Body, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin, 8. Incised lines, 9. Exterior	
II	2014	17	1. Body (shoulder), 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Pale brown / pale brown / pale brown, 7. Thin / thin, 8. Incised lines and parallel tears, 9. Exterior	

Potsherd 10 in Figure 10 is attributable to the Early Iron Age. This may suggest that some ceramic traits characteristic of the Iron Age began to develop during the Late Bronze Age. Alternatively, the sherd may constitute intrusive material originating from disturbed upper Iron Age deposits.

4. Discussion: Absolute Chronology

Two charcoal samples and four bone samples from trenches I, II, III, and IV were dated absolutely at Tappeh Shireh-Paz-Khāneh. A description of the archaeological context of these samples is provided below (Tab. 6).

Sample No. 7_Shiretal, Locus 2014, RN. 2007: Locus 2014 (II-2) is the first batch of a package of ash layers with an average thickness of 15cm, at a depth of -515 to -535 cm below datum point. The feature extends in East-West direction over 232 cm length and 90 cm width. The cultural material from this layer belongs to the second architecture phase of MBA and comprises, besides animal bones and charcoal as well as charred seeds, simple buff kitchen pottery, handmade grey ware, some of it with incised geometric decoration, and wheel-made black ware as well as handmade brown ware. An animal bone specimen from this locus was dated to 2284-2061 cal BCE with 95% confidence, coinciding with the relative chronology based on pottery typology.

Sample No. 10_Shiretal, Locus 2008, RN. 2006: Locus 2008 (II-1) is a primary context located 2 meters from the eastern side wall of trench and extending 225 cm N-S and 200 cm



Fig. 10: Tappeh Shireh-Paz-Khāneh, Late Bronze Age pottery: simple ware, grey and black wheel-made ware, pastilles, plastic and incised decoration (Drawing by excavation team members, Courtesy of MCTH of Qazvin Province).

Table 4: Description of diagnostic potteries of Late Bronze Age in Figure 10.

Trench	Locus	Pottery No.	Description: 1. Vessel part, 2. Manufacture, 3. Temper, 4. Size (quality of production), 5. Firing, 6. Fabric Colour (ext. / int. / core), 7. Caly slip (ext. / int.), 8. Decoration, 9. Place of decoration	Parallel
V	5009	1	1. Rim, 2. Handmade, 3. Mineral, 4. Coarse, 5. Insufficient, 6. Orange / orange / pale brown, 7. Thin / thin	Edwards, 1981: Fig. 119: 3
V	5009	2	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin	
V	5001	3	1. Rim with vertical handle, 2. Handmade, 3. Mineral, 4. Coarse, 5. Insufficient, 6. Dark brown / brown / pale brown, 7. Thin / thin	Malek Shahmirzadi, 1977: Pl. 145: 1
V	5001	4	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
I	1036	5	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / Orange / Orange, 7. Thin / thin	

I	1036	6	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Orange / Orange / Orange, 7. Thin / thin	
I	1036	7	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / Orange / Orange, 7. Thin / thin	
I	1036	8	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Brown / Brown / Orange, 7. Thin / thin	
III	3003	9	1. Rim with knobbed handle, 2. Wheel-made, 3. Mineral, 4. Fine, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin, 8. Parallel knobs, incised and polished lines, 9. Exterior	Fazeli *et al*., 2011: Fig. 4
I	1039	10	1. Rim, 2. Wheel-made, 3. Mineral, 4. Fine, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
I	1039	11	1. Rim, 2. Wheel-made, 3. Mineral, 4. Fine, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin, 8. Incised parallel lines, 9. Exterior	
VI	6003	12	1. Rim, 2. Wheel-made, 3. Mineral, 4. Fine, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
VI	6003	13	1. Rim, 2. Wheel-made, 3. Mineral, 4. Fine, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin, 8. Parallel knobs and incised lines, 9. Exterior	Sarlak, 2011: Fig. 267
VI	6014	14	1. Rim, 2. Handmade, 3. Mineral, 4. Fine, 5. Sufficient, 6. Dark gray / dark gray / dark gray, 7. Thin / thin, 8. Polished geometric designs, 9. Exterior	
I	1039	15	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
I	1039	16	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
III	3003	17	1. Base of tripod vessel, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
V	5001	18	1. Bottom with base, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Insufficient, 6. Pale brown / pale brown / pale brown, 7. Thin / thin	Malek Shahmirzadi, 1977: Pl. 141: 13
V	5001	19	1. Semi-complete vessel with small vertical handle, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	

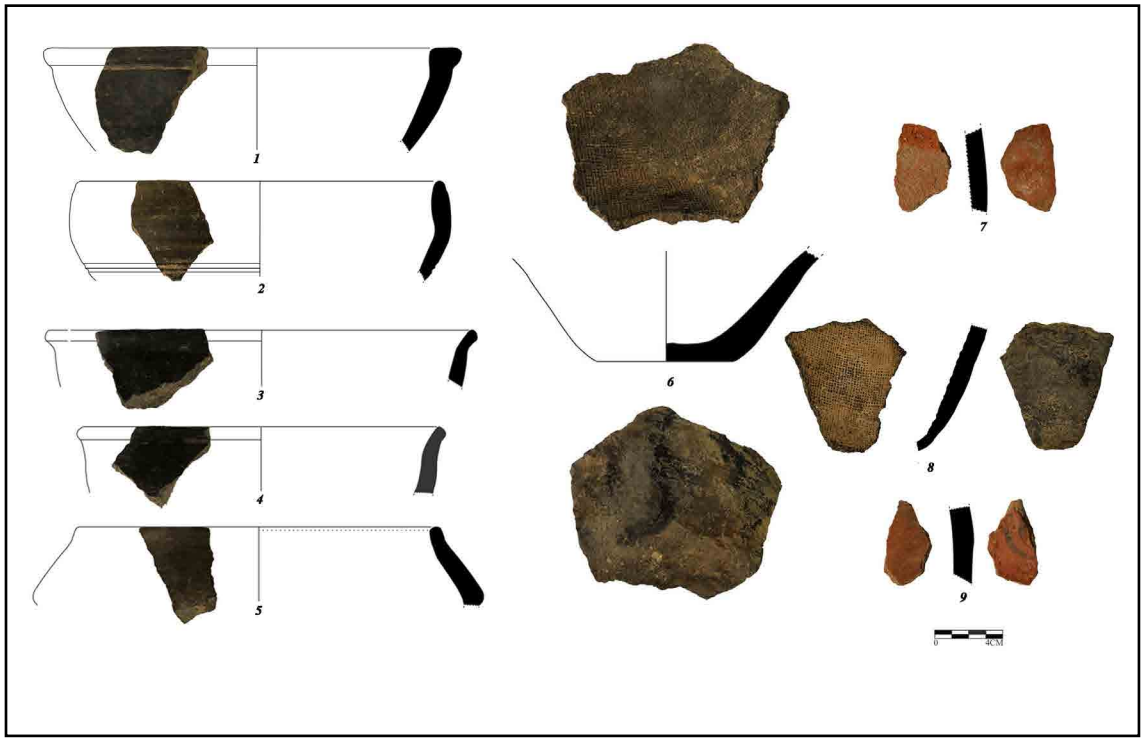


Fig. 11: Tappeh Shireh-Paz-Khāneh, Late Bronze Age pottery: black ware, decoration, textile technique and orange ware (Drawing by excavation team members, Courtesy of MCTH of Qazvin Province).

Table 5: Description of diagnostic potteries of Late Bronze Age in Figure 11.

Trench	Locus	Pottery No.	Description: 1. Vessel part, 2. Manufacture, 3. Temper, 4. Size (quality of production), 5. Firing, 6. Fabric Colour (ext. / int. / core), 7. Caly slip (ext. / int.), 8. Decoration, 9. Place of decoration	Parallel
I	1036	1	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Black (oxidized) / dark gray / gray, 7. Thin / thin	
I	1036	2	1. Rim, 2. Wheel-made, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / gray / gray, 7. Thin / thin	
V	5009	3	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Buff (oxidized) / dark gray / gray, 7. Thin / thin	
V	5009	4	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Gray / dark gray / gray, 7. Thin / thin	
V	5009	5	1. Rim, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / gray / gray, 7. Thin / -	
I	1092	6	1. Bottom, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Brown (oxidized) / gray / dark gray, 7. - / thin, 8-9. Trace of textile in interior side	
I	1036	7	1. Body, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. - / thin, 8-9. Trace of textile in interior side	
I	1036	8	1. Body, 2. Handmade, 3. Mineral, 4. Medium, 5. Insufficient, 6. Brownish gray / gray / dark gray, 7. - / thin, 8-9. Trace of textile in interior side	
I	1039	9	1. Body, 2. Handmade, 3. Mineral, 4. Medium, 5. Sufficient, 6. Orange / orange / orange, 7. Thin / thin, 8. Painted black design, 9. Exterior	

Table 6: Constrain table shows the provenience of individual samples, Tappeh Shireh-Paz-Khāneh (Authors, 2025).

Lab No. MAMS	Sample name	Archaeological context	Material	Calibrated dates (cal BCE), 1sigma: 68.3% probability	Calibrated dates (cal BCE), 2sigma: 95.4% probability	Period
29983	7_Shiretal	Tr.II, Loc.2014, RN.2007, D:523cm	Animal bone, *Ovis aries*, distal end of right humerus	2266-2141	2284-2061	MBA
29985	10_Shiretal	Tr.II, Loc.2008, RN.2006, D:483cm	Animal bone, *Equus* sp., distal end of right humerus, shaft	2451-2298	2463-2246	MBA
29981	4_Shiretal	Tr.IV, Loc.4015, RN.4009, D:455cm	Charcoal, *Juniperus* sp.	2462-2348	2468-2303	MBA
29980	2_Shiretal	Tr.III, Loc.3015, RN.3014, D:302cm	Charcoal, *Juniperus* sp.	2431-2216	2457-2209	MBA
29984	9_Shiretal	Tr.I, Loc.1025, RN.1021, D:230cm	Animal bone, *Ovis aries*, complete right radius & ulna	1874-1748	1881-1701	LBA
29982	6_Shiretal	Tr.I, Loc.1002, RN.1005, D:40cm	Animal bone, Caprini, distal end of right tibia	1741-1666	1750-1638	LBA

E-W. Its elevation is from -480 to -490 cm. The deposit contains a mass of animal bones, with horns, jaw bones, scapulae and ribs, some of them burnt. This bone accumulation is probably a garbage dump related to the rubble packing and associated floor layers (loc. 2004) of the first phase of MBA in trench II. Other cultural materials found here are simple buff kitchen ceramics, black handmade and wheel-made grey ware, some with geometric decoration, all

typical of MBA in the region. An animal bone specimen from this locus was dated to 2463-2246 cal BCE with 95% confidence, coinciding with the relative chronology based on pottery typology.

Sample No. 4_Shiretal, Locus 4015, RN. 4009: Locus 4015 (IV-2) represents an ash deposit in the SW of the trench that is wedged by the walls 4012 and 4007 and stratigraphically situated between layers 4013 and 4016. Its runs from a depth of -446 cm to -455 cm. The deposit contained mainly cereal seeds (wheat or barley) and some other charcoal. Buff kitchen ware, handmade grey and black pottery with incised geometric decoration are all typical for MBA in the region. A charcoal sample from this locus was dated to 2468-2303 cal BCE with 95% confidence, coinciding with the relative chronology based on pottery typology.

Sample number 2_Shiretal, Locus 3015, RN. 3014: Locus 3015 (III-3) is a primary deposit of soil and ash together with clay lumps and charcoal, sealed by locus 3013 and extending over the complete trench. This locus belongs to the third architecture phase of Trench III. Its elevation is from -293 to -368 cm. The layer slopes from S to E, and is in the northern part up to 75 cm thick. The deposit contained buff handmade kitchen ware, grey and black handmade wares and wheel-made tiles, all typical of the MBA. A charcoal sample from this locus was dated to 2457-2209 cal BCE with 95% confidence, coinciding with the relative chronology based on pottery typology.

Sample No. 9_Shiretal, Locus 1025, RN. 1021: Locus 1025 (I-2) consists of ash residues and siliciclastic accumulations formed inside the architectural space. The locus is located under the floor of the second phase of architecture (I2). Due to the slope of the floor, locus 1025 was visible in different elevations, from a depth of -125 cm in the north to -178 cm in the east and -152 cm to the west, all relative to the datum point. The thickness of the context was about 50 to 70 cm and reached a depth of -200 cm. Ceramics and animal bones, charcoal particles, ash residues and other organic residues like traces of mats and burnt wood had accumulated in this context. Ceramics were simple buff wares plus some wheel-made grey wares, typical for the LBA. An animal bone specimen from this locus was dated to 1881-1701 cal BCE with 95% confidence, coinciding with the relative chronology based on pottery typology.

Sample No. 6_Shiretal, Locus 1002, RN. 1005: Locus 1002 belongs to the first architecture of Trench I (I-1), is a soil layer under topsoil, extending over the complete trench at a depth between -20 and -40 cm. It has become thicker towards the south. The deposit must be characterized as a secondary context of debris which stratigraphically situated under locus 1001, and upon Locus 1003 and 1004. Pottery from this level comprises grey ware and polychrome painted Khabur ware or Haftavan type, related to the LBA (Fig. 8: 9). An animal bone specimen from this locus was dated to 1750-1638 cal BCE with 95% confidence, coinciding with the relative chronology based on pottery typology.

The model was constructed using the stratigraphic sequence of dated samples from phases 4 to 1 across all trenches. The MBA spans from 2468-2303 to 2284-2061 cal BCE with 95%

confidence, indicating a median date range of 2400 to 2100 cal BCE and a time span of at least 300 years. The LBA dates are poorly constrained, with only two dates (1881-1701 and 1750-1638 cal BCE), suggesting a median span of 1800 to 1700 cal BCE (Fig. 12).

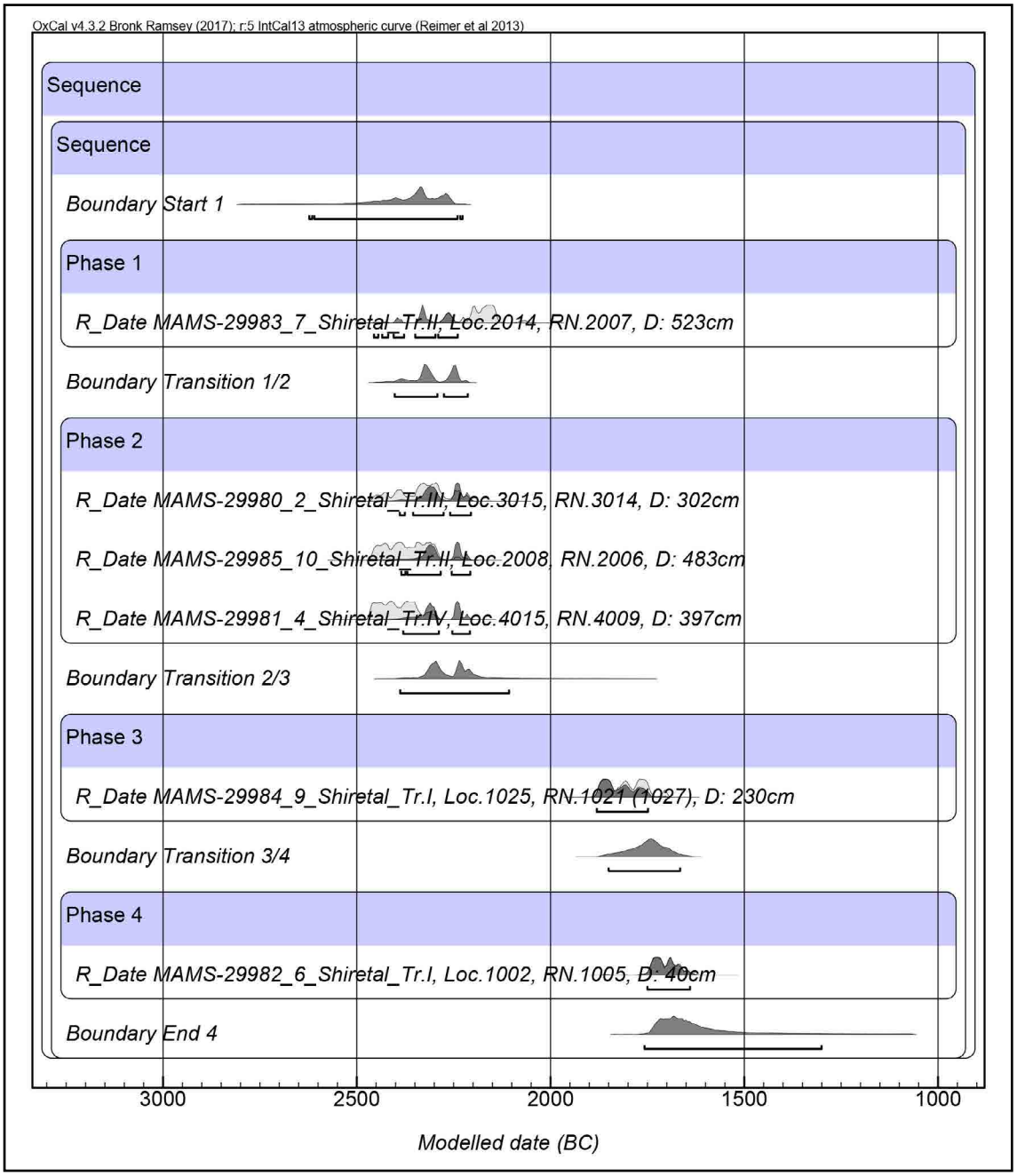


Fig. 12: Tappeh Shireh-Paz-Khāneh, calibrated and modeled ages (By B. Helwing and H. Fazeli).

5. Conclusion

The Early Bronze Age in northwestern Iran is associated with the Yanik or Kura-Araxes culture. In addition to the Yanik Tepe, artifacts from this culture have been found at sites like Haftavan VII, Geoy Tepe K, and Hasanlu VII. The pottery from this period is

entirely handmade, typically featuring a black or gray burnished surface, often decorated with carved designs or simple wavy lines (Burney, 1961: 51). Architectural remains from the early phase include 14 building structures at Yanik Tepe (Summers, 2004), as well as from Phase K1 at Geoy Tepe (Summers, 1984) and Haftavan VIII (Burney, 1975), which reflect circular architectural spaces. The second and third phases of this culture, as reported, showed rectangular buildings identified at Yanik, Geoy Tepe K2 and K3, and Haftavan VII. The pottery tradition of the Yanik culture extends across the eastern slopes of the Alvand Mountains and the Hamedan Plain in western Iran, influencing areas as far as the western parts of the Central Plateau of Iran (Qazvin Plain). Sites such as Ebrahim Abad (Talai, 1995: 6), Piryousefian (Fazeli, 2006), Tepe Shizar (Valipour, 2006; Mostafapour, 2011; Fazeli et al., 2013), and Yas Tepe have been identified from this period in the Qazvin Plain through reconnaissance by the Institute of Archaeology of the University of Tehran and authors. Researchers date the second phase of the Kura-Araxes culture in the Caucasus and northwest Iran to between 3300 and 2700 BCE, with Kura-Araxes II having the widest geographical extend, likely entering the Qazvin Plain and Central Plateau around 3000 BCE. The archaeological evidence from this period is primarily from excavations at Tepe Shizar in the Qazvin Plain (Valipour, 2006; Fazeli et al., 2013) and Tepe Arasto in the Tehran Plain (Pourfaraj, 2012), dating between 3000 and 2600 BCE.

Recent excavations at Tappeh Shireh-Paz-Khāneh and Tappeh Tat 1 have challenged the notion of a cultural break and hiatus in the Central Plateau of Iran between the Early and Late Bronze Ages, previously thought to span approximately one millennium (2600–1700 BCE). Some researchers refer to this gap as the Lost Millennium, supported by paleo-seismological and paleo-climatological evidence (Fazeli et al., 2013). Climate change led to droughts, while severe earthquakes, due to the sites locations on alluvial fans near faults, contributed to the abandonment of habitats in the late 4th millennium BCE. Environmental conditions improved in the first half of the second millennium BCE, leading to the Late Bronze Age settlements like Qara Tepe/Sagzabad (Schmidt et al., 2011; Quigley et al., 2011). Excavations at Tappeh Shireh-Paz-Khāneh revealed habitation during the Middle and Late Bronze Ages from 2400 to 2100 and 1800 to 1700 cal BCE, partially bridging the earlier time gap by several settlement phases. Tappeh Tat 1 exhibited a similar situation, although its settlement duration was shorter. Despite this, information about the Lost Millennium remains limited (Fazeli et al., 2022), suggesting that various cultural and natural factors contributed to the decline of Bronze Age settlements, resulting in fewer identified sites from this period during archaeological surveys in the Qazvin Plain.

From the late third millennium BCE until the beginning of the Iron Age (around 1500 BCE), polychrome ware was widespread in western and northwestern Iran (Talai, 1995: 26).

This pottery type is referred to as Haftavan VIB or Urmia Ware in northwestern Iran, and sometimes as Dinkhah (Hamlin, 1974). Haftvan VI is chronologically dated between 1950-1350/1300 BCE, while Dinkhah IV dates from 1750-1450 BCE (Hamlin, 1974). In Ozlik Tepe, Azerbaijan, this period is dated to 1900-1700 BCE (Edwards, 1981 & 1983), and in Armenia, it ranges from 2400/2300 to 1600 BCE (Ozyforat, 2001). According to Talai, the tradition of polychrome pottery vessel production spread to the Central Plateau (Tepe Sagzabad) from northwestern Iran around 1600 BCE. He proposed that the Sagzabad culture is linked to the Dinkhah, Geoy Tepe, and possibly Giyan and Haftavan cultures (Talai, 1995: 26).

Based on absolute dating at Tappeh Shireh-Paz-Khāneh, pottery analysis, and architectural types, the Middle Bronze Age at this site aligns with the third period of Yanik, Geoy Tepe K3, Haftavan VII, and Hasanlu VI. The discovery of unique Nakhchivan-type handle sherds from Middle Bronze Age layers alongside handmade black pottery with carved designs suggests simultaneous formation during this period. Furthermore, the presence of wheel-made gray pottery alongside Kura-Araxes types indicates a connection to the eastern region of the Central Plateau of Iran, similar to the third period of Tappeh Hesar. Additionally, a new method of producing simple handmade gray pottery from this period is evident, including the technique of making pottery with textile, which is abundant across all layers of the Middle and Late Bronze Ages.

The Late Bronze Age at this site, characterized by large architectural spaces and occasional columns, spans from 1800 to 1700 BCE based on absolute chronology and pottery typology. Although the arrival of monochrome and polychrome Haftavan VI or Khabur-type painted pottery in the Qazvin Plain is dated to 1600 BCE according to excavations at Tappeh Sagzabad (Talai, 1995: 26), evidence from Tappeh Shireh-Paz-Khāneh suggests that painted Khabur-type pottery can be traced back to its early formation around 2000/1900 BCE in northwestern Iran. This pottery was found in Trench I during the third architectural phase, dated to 1880-1700 BCE, and is also present in its two older phases of Tappeh Shireh-Paz-Khāneh. Additionally, it appeared in the second architectural phase of Trench III, which transitions directly into the Middle Bronze Age, dated to 2400-2100 BCE. If we consider the end of the Late Bronze Age to be in the second layer of Trench III, the formation and arrival of Late Bronze Age pottery in the Qazvin Plain can be traced back to at least 1900/1800 BCE.

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Authors' Contribution

Authors contributed equally to the conceptualization and writing of the article. All of the authors approved the content of the manuscript and agreed on all aspects of the work

Conflict of Interest

Authors declared no conflict of interest.

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گاهنگاری مطلق و نسبی عصر مفرغ در تپهٔ شیره‌پزخانه (شیره‌تل)، دشت قزوین

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چکیده

این مطالعه، گاهنگاری مطلق و نسبی عصر مفرغ در تپهٔ شیره‌پزخانه (شیره‌تل) در دشت قزوین واقع‌در بخش شمالی فلات‌مرکزی ایران را براساس کاوش‌های انجام شده در سال‌های ۱۳۹۴ و ۱۳۹۵هـ.ش. بررسی می‌کند. این محوطه، توالی فرهنگی چند دوره‌ای، شامل نهشته‌های دورهٔ نوسنگی متأخر، مفرغ میانی و مفرغ متأخر را در خود جای‌داده است. باوجود دانش محدود از عصر مفرغ در فلات‌مرکزی ایران، به‌ویژه شکاف قابل‌توجه از اواسط هزارهٔ سوم تا اواسط هزارهٔ دوم پیش‌ازمیلاد، یافته‌های تپهٔ شیره‌پزخانه شواهد ارزشمندی درمورد پویایی فرهنگی و اجتماعی این دوره ارائه می‌دهد. هدف این پژوهش، مستندسازی و تجزیه و تحلیل ویژگی‌های باستان‌شناسی مواد فرهنگی مکشوفه، به‌خصوص گونه‌شناسی ظروف سفالی، برای بازشناسی گاهنگاری نسبی و مطلق برای مراحل عصر مفرغ در این محوطه است. این مطالعه همچنین سنت‌های فرهنگی مشاهده شده در تپهٔ شیره‌پزخانه را با سنت‌های محوطه‌های هم‌زمان در مناطق همجوار مقایسه خواهد کرد تا تداوم فرهنگی و تعاملات منطقه‌ای را ارزیابی کند. ازنظر روش‌شناسی، کاوش روشمند و تحلیل لایه‌نگاری برای طبقه‌بندی و گونه‌شناسی ظروف سفالی و بقایای معماری به‌کار گرفته شده است. با بررسی این یافته‌ها، این پژوهش به درک عمیق‌تر از پویایی فرهنگی، اجتماعی-سیاسی عصر مفرغ در منطقه کمک خواهد کرد و به درک بهتری از گذارهای منتهی به عصر آهن و امپراتوری‌های بعدیِ ماد و هخامنشی می‌انجامد. درنتیجه گاهنگاری نسبی و مطلق برای نهشته‌های عصر مفرغ، مشخص شد که این محوطه در بردارندهٔ چندین مرحلهٔ استقراری از دورهٔ مفرغ میانی و مفرغ متأخر است. بازهٔ زمانی پیشنهادی برای این دو دوره در این محوطه، ۲۴۰۰ تا ۲۱۰۰ پ.م. برای دورهٔ مفرغ میانی و ۱۸۰۰ تا ۱۷۰۰ پ.م. برای دورهٔ مفرغ متأخر است.

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