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Analysis of New Findings from Stratigraphic Excavations at Qaleh Yeri–Kuraim, Ardabil, Iran

Rahmat Abbasnejad Seresti[1], **Sheyda Ashrafi**[2], **Narjes Heydari**[3]

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Abstract

The archaeological sites of the Ardabil Plain provide essential evidence for understanding the cultural sequences of northwestern Iran and its interactions with the Iranian Plateau, the South Caucasus, and eastern Anatolia. Among these sites, the mound of Qaleh Yeri–Kuraim is of particular significance. This paper presents the results of the first season of stratigraphic excavations conducted in 2023, based on two test trenches. Test Trench I (TTI) was opened to establish a comprehensive cultural sequence at the site, while Test Trench II (TTII) targeted deposits associated with the Transcaucasian/Kura Araxes Early Bronze Age horizon. The excavations revealed substantial archaeological evidence, including dry stone and mudbrick architectural remains, industrial installations such as kilns, metallurgical evidence, and extensive ceramic assemblages. In TTI, a long and well defined stratigraphic sequence of approximately 14.6 meters was documented, containing successive and occasionally alternating layers with Islamic, historical, and Bronze Age pottery. This sequence represents one of the most continuous stratigraphic records in the eastern sector of northwestern Iran. TTII yielded significant evidence of metallurgical activities, including furnace remains, slag, copper ore fragments, ceramic molds, and crucibles, indicating metal smelting, refining, and production during the Early Bronze Age. Eco-factual evidence, including animal remains (primarily sheep and cattle) and plant remains (notably wheat and barley), reflects a subsistence economy based on mixed farming and animal husbandry. Special finds such as obsidian tools, spindle whorls, grinding stones, bone implements, and clay figurines demonstrate a range of domestic, economic, and symbolic activities from the Bronze Age through the historical and Islamic periods. In the absence of absolute dating, the site's chronology currently relies on relative dating and ceramic typology. The results indicate long term occupation interrupted by two major hiatuses, likely linked to tectonic, environmental, and historical changes.

Keywords: Ardabil Plain, Stratigraphic Excavation, Qaleh Yeri–Kuraim, Cultural Layer Sequence, Early Bronze Age, Ancient Metallurgy.

1. Department of Archaeology, Faculty of Arts and Architecture, University of Mazandaran, Babolsar, Iran (Corresponding Author). ***Email:*** r.abbasnejad@umz.ac.ir
2. Department of Archaeology, Faculty of Art and Architecture, University of Mazandaran Babolsar, Iran.
3. Department of Archaeology & Art, Nima University, Mahmoudabad, Iran.

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Introduction

The eastern sector of northwestern Iran, owing to its favorable environmental conditions, strategic geographical position, and location along important communication corridors, has provided a suitable context for the emergence, development, and continuity of diverse cultural traditions throughout different archaeological periods. Archaeological surveys conducted in the region indicate the presence of numerous and varied sites that, if further investigated, could help fill existing gaps in the chronological framework of northwestern Iran. Although the general outlines of certain cultural developments—particularly during the Iron Age—have been clarified through previous research, the precise identification of cultural transitions, stratigraphic sequences, and continuity between different layers and periods remains difficult. This difficulty largely stems from the absence of absolute dating methods and the limited number of stratigraphic excavations in the region. Moreover, a coherent chronological framework has not yet been established, and consequently the relationship between excavated cemeteries and their associated settlement sites remains insufficiently understood (Abbasnejad Seresti, 2024: 10–15). Due to its strategic geographical location, the Ardabil Plain has long functioned as a corridor for cultural interactions between the Iranian Plateau and neighboring regions. However, the eastern part of this area, particularly the Qarasu River basin, has received relatively little attention in terms of systematic excavation and scientific investigation. In response to this gap, the stratigraphic excavation program at Qaleh Yeri–Kuraim was designed and implemented with three main objectives: 1) Reconstructing the regional cultural sequence based on stratigraphic evidence; 2) Clarifying the site's position within the transregional Kura Araxes cultural network; and 3) Examining the impact of environmental and tectonic factors on the continuity or disruption of settlement patterns. In line with these objectives, the present article introduces, describes, and analyzes the findings of the 2023 stratigraphic excavations at this archaeological mound. The aim is to contribute to the development of a more coherent chronological model for the region—one that may also be applicable to other less studied areas in the archaeology of northwestern Iran.

Location and Geographical Setting of the Site

The site is located 21 km from the center of Nir and 34 km from the city of Ardabil (Fig. 1a). It was registered on Iran's National Heritage List in 2007 under registration number 19392. The site consists of a circular mound covering an area of approximately 155.21 square meters, situated in the southern part of Kuraim City, with the Qori Chai River flowing about 110 meters to its east (Fig. 1b). The mound stands at an elevation of approximately 1,575 meters above sea level and rises about 15 meters above the surrounding terrain. Geographically, it is located at 48°30′21″ east longitude and 37°57′41″ north latitude. Several human activities have contributed to the destruction of the site, including the construction and expansion of a road around the mound, the

building of toilet facilities for the local mosque, the extraction of soil for construction and agricultural purposes, and illicit excavations (Fig. 1c). In addition, weathering and climatic conditions are among the natural factors contributing to the deterioration of this important archaeological site (Abbasnejad Seresti, 2024: 71).

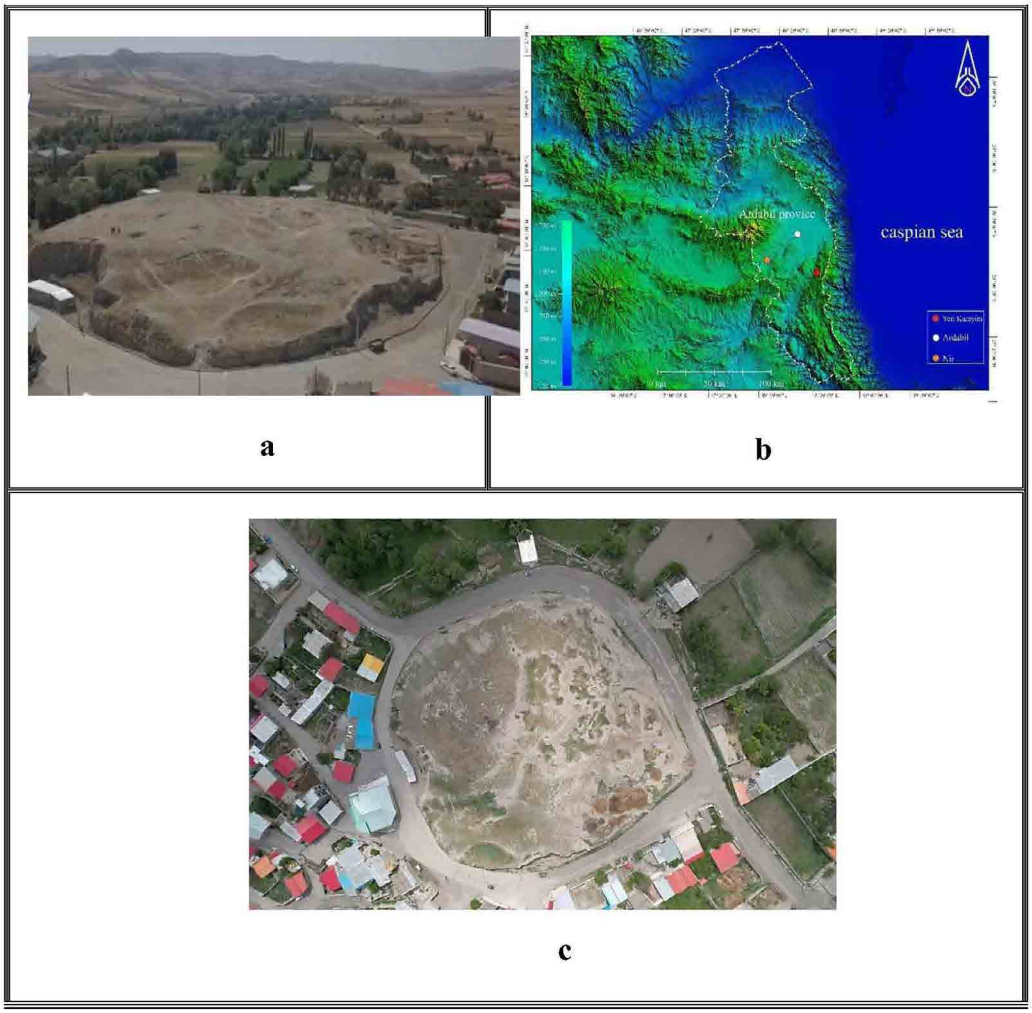

Fig. 1: a) Aerial image of the site, overhead view facing south; b) Location of the Qaleh Yeri site; c) View of the current state of the mound in 2023, vertical view from the northwest (Abbasnejad Seresti, 2024: 19).

Research Method

This study employs a descriptive–analytical approach and follows standard archaeological stratigraphic methods. Field investigations were conducted using a context based stratigraphic excavation strategy. Within this framework, each discrete stratigraphic unit—including deposits, walls, pits, and kilns—was recorded as an individual context and assigned a unique identification code. These contexts formed the basis for reconstructing the stratigraphic sequence and interpreting the occupational history of the site. All elevation measurements were calculated relative to a benchmark (BM) located in the southwestern part of each test trench. In addition, pottery typology constituted an important analytical method. Because absolute dating results (e.g., radiocarbon dating) are not currently available, pottery analysis was conducted based

on diagnostic assemblages. Technical characteristics such as firing technique, type of glaze, decoration, and vessel form were among the criteria used for selecting pottery samples for analysis. Architectural remains, faunal and botanical remains, evidence of metalworking, and selected special finds are briefly introduced in order to provide a general understanding of the stratigraphic conditions of the site and the results of the excavation.

Selection Criteria for Test Trench Locations

The locations of the test trenches were selected based on a morphological analysis of the mound and an assessment of visible surface damage. Accordingly, two test trenches were opened in the northern part of the site, where construction activities had created a relatively smooth and elevated exposed section. Test Trench I (TTI) was opened at the highest point of the mound, on its northern and eroded edge, at an elevation of approximately 1,554 meters above sea level. This location was selected to maximize the recovery of cultural deposits and to document relatively intact stratigraphic sequences that had experienced minimal disturbance from recent construction activities and unauthorized excavations. Test Trench II (TTII) was placed approximately 20 meters west of TTI in order to compare, correlate, and control the stratigraphic layers of the two trenches for the Bronze Age periods, as well as to access relatively undisturbed deposits. In this part of the mound, Bronze Age layers are visible in the exposed section created by earlier destruction and erosion (Fig. 2).

Regional Research Background

Although archaeological investigations in the Ardabil region began in the early twentieth century, research has largely relied on surveys and scattered excavations, while systematic studies focusing on stratigraphy and absolute dating have remained relatively limited. Moreover, much of the archaeological attention in northwestern Iran has traditionally been directed toward the Lake Urmia Basin. Jean Jacques de Morgan carried out excavations in the eastern foothills of the Ardabil Plain and at the Bronze Age cemeteries of Namin County between 1899 and 1901 (de Morgan, 1905). Claude F. A. Schaeffer later dated these remains to the fourteenth and fifteenth centuries BC (Schaeffer, 1948). In the 1960s, Mahmoud Kardovani and Ali Hakemi conducted archaeological research in the Moghan region (Hessari & Aliyari, 2012). Seifollah Kambakhsh Fard carried out investigations in Germi in 1965, and Charles McBurney conducted research in the Ardabil and Meshgin Shahr regions (Ingraham & Summers, 1979). German archaeologists were also among the first researchers to conduct archaeological surveys in northern Ardabil Province, excluding the Moghan region (Kleiss, 1969: 188–191). Germi County was later studied under the supervision of Houshang Sobuti during the 1980s and 1990s (Hessari & Aliyari, 2012), followed by additional research in Meshgin Shahr and Kohneh Qaleh. Between 2000 and 2004, a team

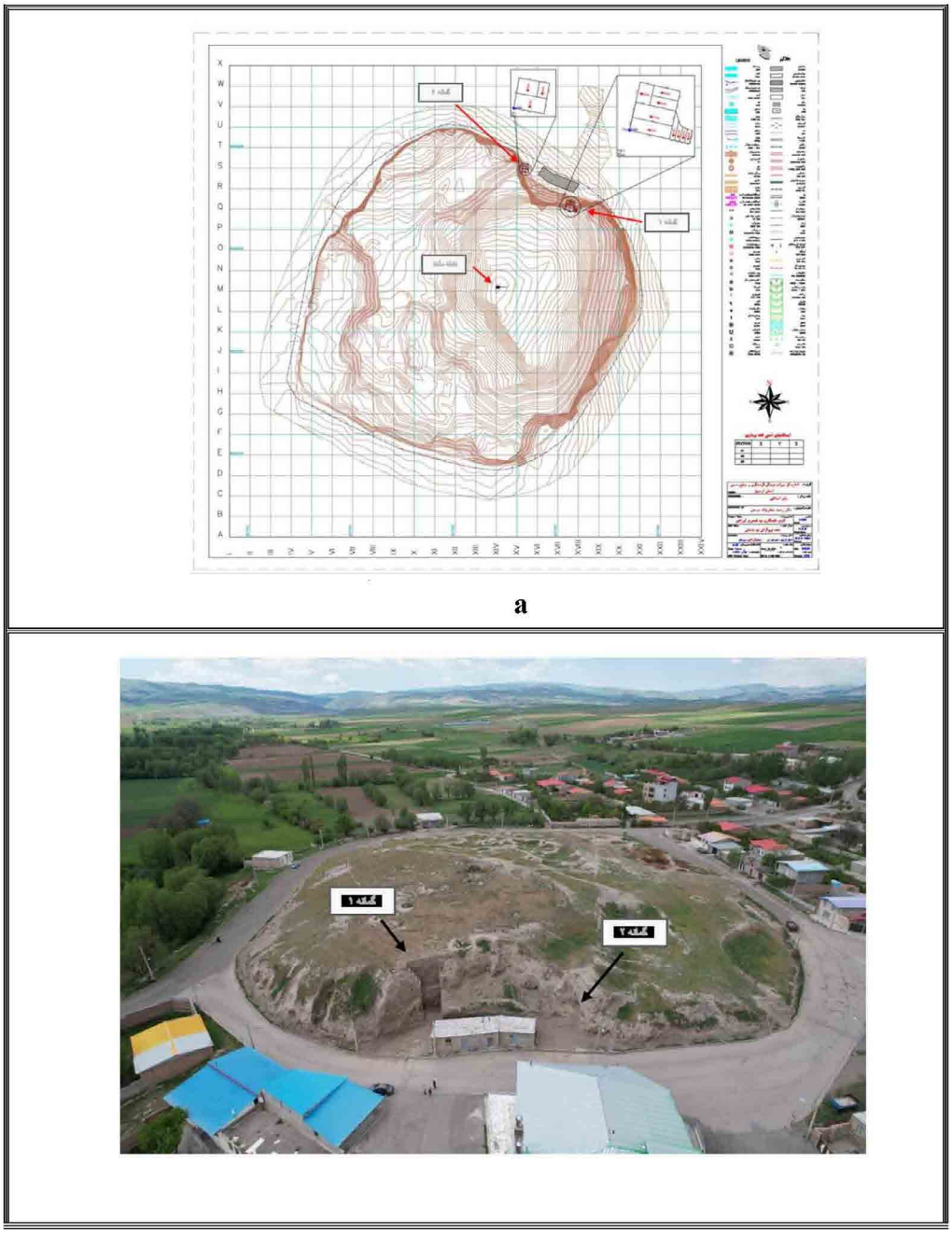

Fig. 2: Qaleh Yeri Kuraim Mound: a) Topographic map showing the locations of Trenches I and II and the datum point; b) Location of Trenches I and II, view from the north (Abbasnejad Seresti, 2024).

from the Archaeological Research Institute and the Central Office of Cultural Heritage surveyed the eastern areas of the Aras River, leading to the excavation of Idir Mound in 2004 (Hessari & Akbari, 2005). Further excavations in the Araxes Basin have continued to yield significant stratigraphic evidence for the Kura Araxes cultural horizon in northwestern Iran. One of the most notable examples is Kohne Tepesi, where systematic stratigraphic excavations documented multi period occupation spanning from the Early Bronze Age through the Parthian period (Zalaghi et al., 2021). In Meshgin Shahr, the Ieri site was excavated between 2003 and 2005, where archaeological remains dating from

the Neolithic period to the second millennium BC were identified (Hozhbari Nobari, 2005). The Moghan Plain Project was also implemented between 2003 and 2006 as the largest archaeological project in the region, including the excavations of Oltan Qalehsi (2003–2005) and Nader Tepehsi, Aslanduz (2006) (Alizadeh & Ur, 2007; Alizadeh et al., 2018; Alizadeh, 2022). In recent years, additional research has been conducted at several sites, including Qaleh Khosrow (Rezaloo, 2007), the Iron Age cemeteries of Khorramabad and Qizil Qiyeh Ahmadbeigloo (Rezaloo, 2012; Hajizadeh & Rezaloo, 2014), Qaleh Buini Mound (Tahmasbi, 2016), and the Oraq Artavil Tayr site in Ardabil (Sattaranejad, 2022).

Theoretical Foundations and Methodology

Relative chronology is an archaeological approach that reconstructs temporal sequences through the analysis of material culture and patterns of cultural change. Stratigraphic relationships constitute the primary basis for establishing relative chronology in archaeological research. In general, chronological frameworks are developed through two complementary approaches: relative dating and absolute dating. Among the methods used to establish relative chronology, ceramic typology and seriation are particularly valuable for identifying cultural sequences and temporal relationships. Since the results of absolute dating analyses are not yet available, the chronological framework of the present study is based on relative dating methods. These methods rely primarily on associated cultural materials—especially pottery—as well as on the reconstruction of stratigraphic relationships through the Harris Matrix. This approach provides the basis for establishing a relative chronology of the excavated sequence and for interpreting the occupational history of the site. The excavation strategy at the site was based on the context recording method. Each cultural find was first assigned an accession number and then fully recorded, with information regarding its condition (intact or disturbed), completeness, type, context number, and date of discovery carefully documented. Pottery and bone finds from each context were recorded collectively as assemblages, while other artifacts were recorded individually, with their precise dimensions and characteristics fully documented. After all cultural finds were recorded with separate accession numbers, they were also listed in a worksheet referred to as the Finds List. In Test Trench I (TTI), finds were assigned accession numbers beginning from 1000, and contexts were recorded starting from number 1. In Test Trench II (TTII), finds were assigned accession numbers beginning from 2000, and contexts were recorded starting from number 200. In the Finds List worksheet, one column was dedicated to the find number; additional columns recorded the spatial coordinates of each find: X (the distance from the western or eastern wall of the test trench), Y (the distance from the southern wall), and Z (the depth of each find relative to a fixed reference point). Additional columns recorded the date of discovery and brief descriptions of the finds. In the context recording worksheet, information such as the context number,

type, description, interpretation, and stratigraphic relationships with other contexts was documented. The analysis and interpretation presented in this article are based on the data recorded in the excavation report of the site.

Test Trenches and Finds

TTI and TTII

Two stratigraphic test trenches were excavated as part of this project. Test Trench I (TTI) was opened on the northern edge of the mound and initially measured 4×2 m (Fig. 3a). This location was selected because it represents the highest part of the mound and preserves the greatest thickness of cultural deposits. Its position along the eroded northern margin also exposed a vertical section suitable for stratigraphic investigation. Although the northern profile was initially irregular, erosion and soil removal had created favorable conditions for documenting the stratigraphic sequence. During the planning stage, a significant challenge arose concerning the excavation of a test trench measuring approximately 3–4 m in length, which is typically used in stratigraphic investigations. The existing vertical section and the cut described above were such that excavating a trench of this length would have created one or several promontories along the exposed section. These projections were highly unstable and posed a considerable risk of collapse, potentially resulting in both safety hazards and financial losses during the excavation process. Considering that the height from the trench surface to the surrounding ground was approximately 12 m, careful planning and precaution were required. For this reason, it was decided to extend the trench to a length of 7 m and, after removing the unstable promontories, reduce it to 4 m. The benchmark (BM) was established at the southwest corner of the trench (point A), which represents the highest elevation relative to the other points. All elevation measurements (Z values) were calculated relative to this benchmark. The benchmark is situated at an elevation of 1,554 m above sea level. In total, 113 contexts were identified and excavated in this trench, reaching a depth of 14.6 m below the benchmark.

The location of Test Trench II (TTII) was selected on the western side of the mound along its northern face, at the base of a cut and wall created by previous destructive human activities. This location was chosen because successive stratigraphic layers were clearly visible on the exposed wall of this part of the mound (Figs. 3b–c). The layers could be made even more distinct through careful cleaning using a pickaxe and trowel, which encouraged the excavation of a second test trench in this area. Another reason for selecting this location was that clarifying the stratigraphy in this section could help verify and complement the stratigraphic sequence identified in TTI. A considerable amount of debris and soil had accumulated at the base of the wall. After clearing and preparing the area, the exposed section was cleaned and made clearly visible through troweling. Test Trench II, measuring 3×3 m (Figs. 3d–g), was then excavated. The benchmark for this trench was established at the southwest corner (point A), which represents the

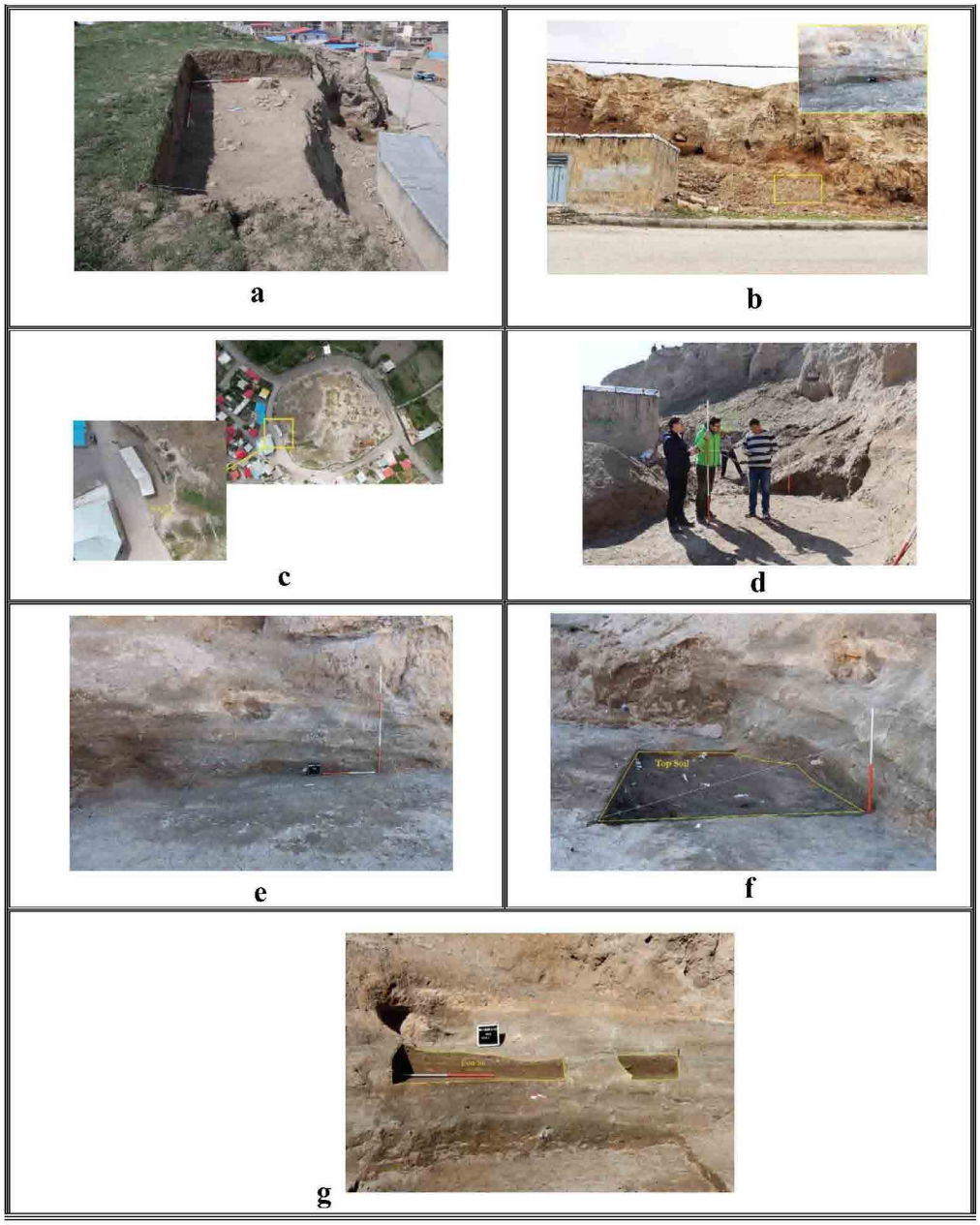

Fig. 3: a) Location of Trench I on the northern flank of the site, view from the east; Trench II on the northern flank of the site: b) Positioning of the trench, view from the north; c) Section wall and floor of the trench, view from the east; d) Establishment of Trench II, view from the north; e) Western section and floor of the trench, view from the east; f) Initial stage of excavation and the surface layer, view from the north; g) Scraping the western section of the trench with a trowel, view from the east (Abbasnejad Seresti, 2024).

highest elevation of the trench. All elevation measurements were calculated relative to this point. The benchmark is located at an elevation of 1,545 m above sea level. During excavation, the dimensions of the trench were modified. At a depth of 250 cm, the plan of the trench was adjusted to 300×160 cm, and at a depth of 460 cm, the dimensions of the northeastern corner were reduced to 100×150 cm. In total, 47 contexts were recorded in this trench. These included modern debris and waste deposits, settlement floors, kilns, mudbrick walls, pits, and areas associated with fire preparation. Additional

contexts consisted of cultural gaps, limestone and layered walls, deposits of river stones, rubble layers, ash filled spaces, heated soil deposits, and layers containing powdered organic remains. All stratigraphic layers identified in this trench date to the Bronze Age. Excavation ultimately reached virgin soil and river cobbles at a depth of 2.6 m.

Findings

Pottery:

Pottery dating to the Early Bronze Age (Kura Araxes), Iron Age, and the Historical and Islamic periods is scattered across the surface of the site. Similar materials were also identified and recorded during excavations in the two stratigraphic test trenches. In total, 1,663 pottery sherds were collected from these trenches. From Test Trench I (TTI), a total of 1,097 pottery sherds dating to different periods were recovered. These can be classified as follows:

1. 323 sherds originate from Contexts 1–42, primarily dating to the Islamic periods, although sherds from the Historical period are occasionally present.

2. 643 sherds, dating mainly to the Historical periods, were recovered from Contexts 44–88; some Iron Age pottery is also present in the later contexts, particularly in Context 88.

3. 131 sherds dating to the Bronze Age were collected from Contexts 93–113.

The distribution of pottery within the test trench is as follows. Islamic period pottery, with occasional Historical period sherds, was recovered from Contexts 1–29, extending to a depth of 350 cm. A clay oil lamp was discovered in Context 6, and a jar was recovered from Context 7 (Fig. 4). No pottery was recorded in Contexts 30–37, which correspond to architectural features. However, Islamic period sherds reappear in Contexts 38 and 42 (Fig. 5).

Fig. 4: Trench I: a) Ceramic brazier from Context 6; b) Single-handled ceramic jar from Context 7 (Abbasnejad Seresti, 2024).

Historical period pottery sherds were recovered from Contexts 44, 46, 47, 51, 52, 55, 56, 58, 59, 61, 63, 64, 66, 76, 79, 81, 82, 83, 84, 85, and 88 (Figs. 6–7). Context 88 represents the most substantial assemblage, containing 95 sherds distributed across the

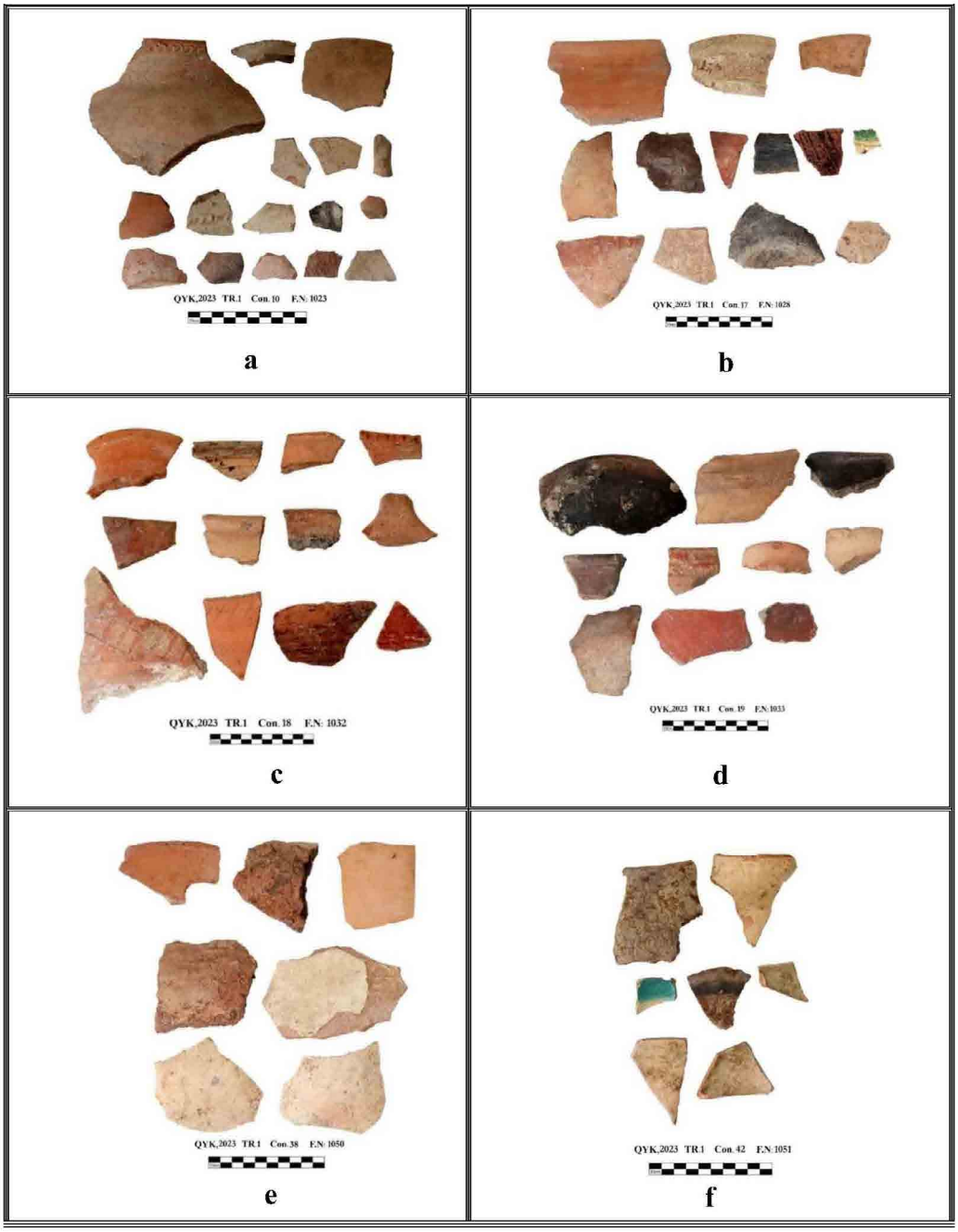

Fig. 5: Pottery sherds from Trench I: a) Context 10; b) Context 17; c) Context 18; d) Context 19; e) Context 38; f) Context 42 (Abbasnejad Seresti, 2024).

entire trench surface. This context is 15 cm thick and reaches a depth of 1,085 cm. In contrast, Contexts 89 (10 cm thick), 90 (13 cm thick), 91 (15 cm thick), and 92, which also extend across the trench surface, yielded no cultural materials and are therefore interpreted as natural deposits.

Below this 40 cm interval, Context 93 appears at a depth of 1110–1141 cm (31 cm thick). It consists of a soft, powdery brown deposit containing charcoal, animal bones, and five greyware sherds (Fig. 8). From this level onward, Early Bronze Age pottery was also recorded in Contexts 95, 99, 102, 107, and 108. Contexts 109–111

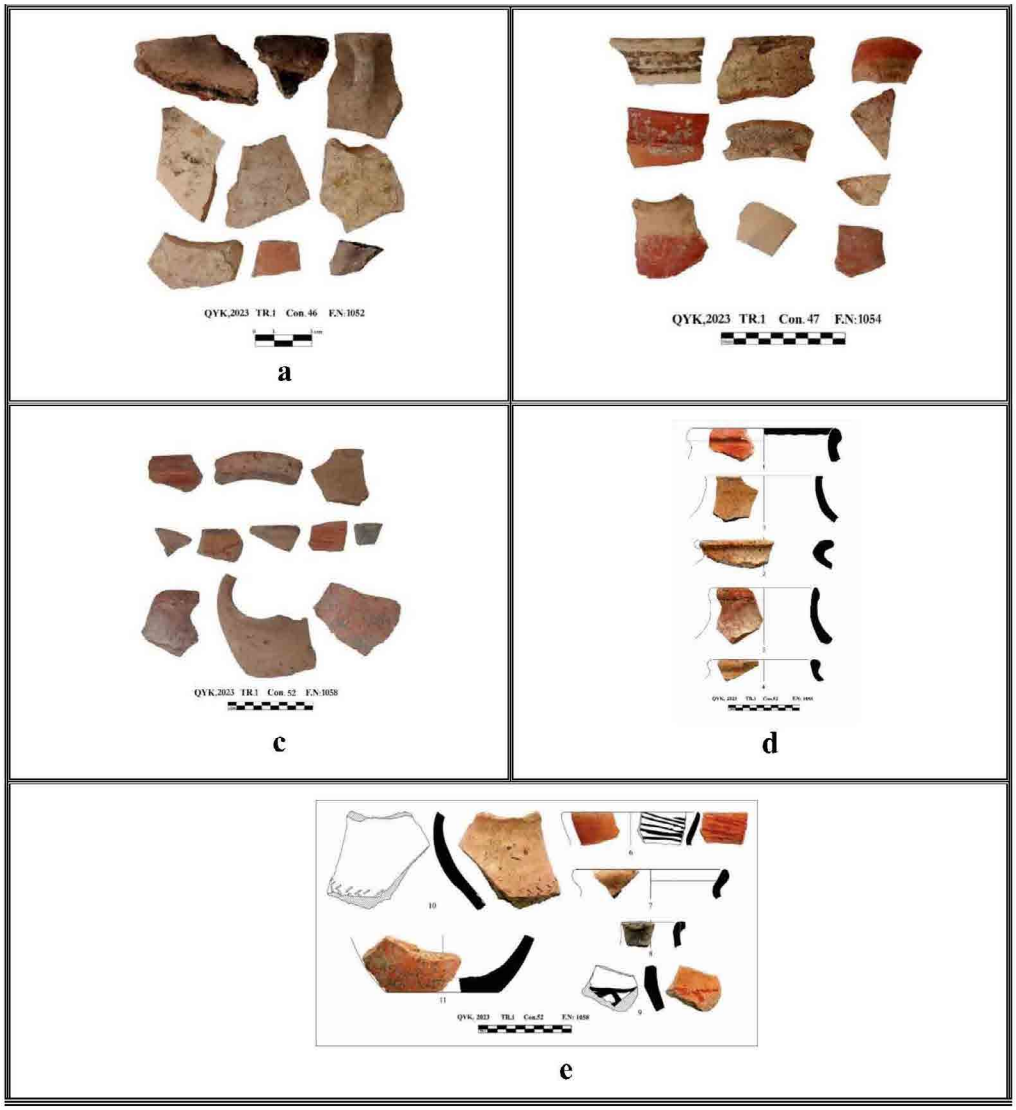

Fig. 6: Pottery sherds from Trench I: a) Context 46; b) Context 47; c) Context 52; d) Context 52; e) Context 52 (Abbasnejad Seresti, 2024).

(1360–1420 cm; 60 cm thick) yielded no cultural material. In contrast, Context 112 (1420–1440 cm; 20 cm thick) produced five buff to grey sherds and represents a burnt activity area characterized by ash, charcoal, heated soil, and a semicircular hearth feature. Context 113 consists of a kiln or hearth bed filled with ash and charcoal. The soil is very soft, powdery, and porous in texture. This deposit begins at a depth of 1441 cm and extends to 1460 cm, with a thickness of approximately 20 cm, and contains no cultural materials. Excavation in TTI was halted at a depth of 1460 cm due to time constraints. In addition, TTII, which was opened to investigate the lower (Bronze Age) layers of the site, corresponded stratigraphically with the lowest layers of TTI relative to the surrounding ground surface. Because excavation in TTII reached virgin soil at a stratigraphic level corresponding to the lowest layers of TTI, excavation in TTI was halted at 1460 cm, although virgin soil was not reached in that trench.

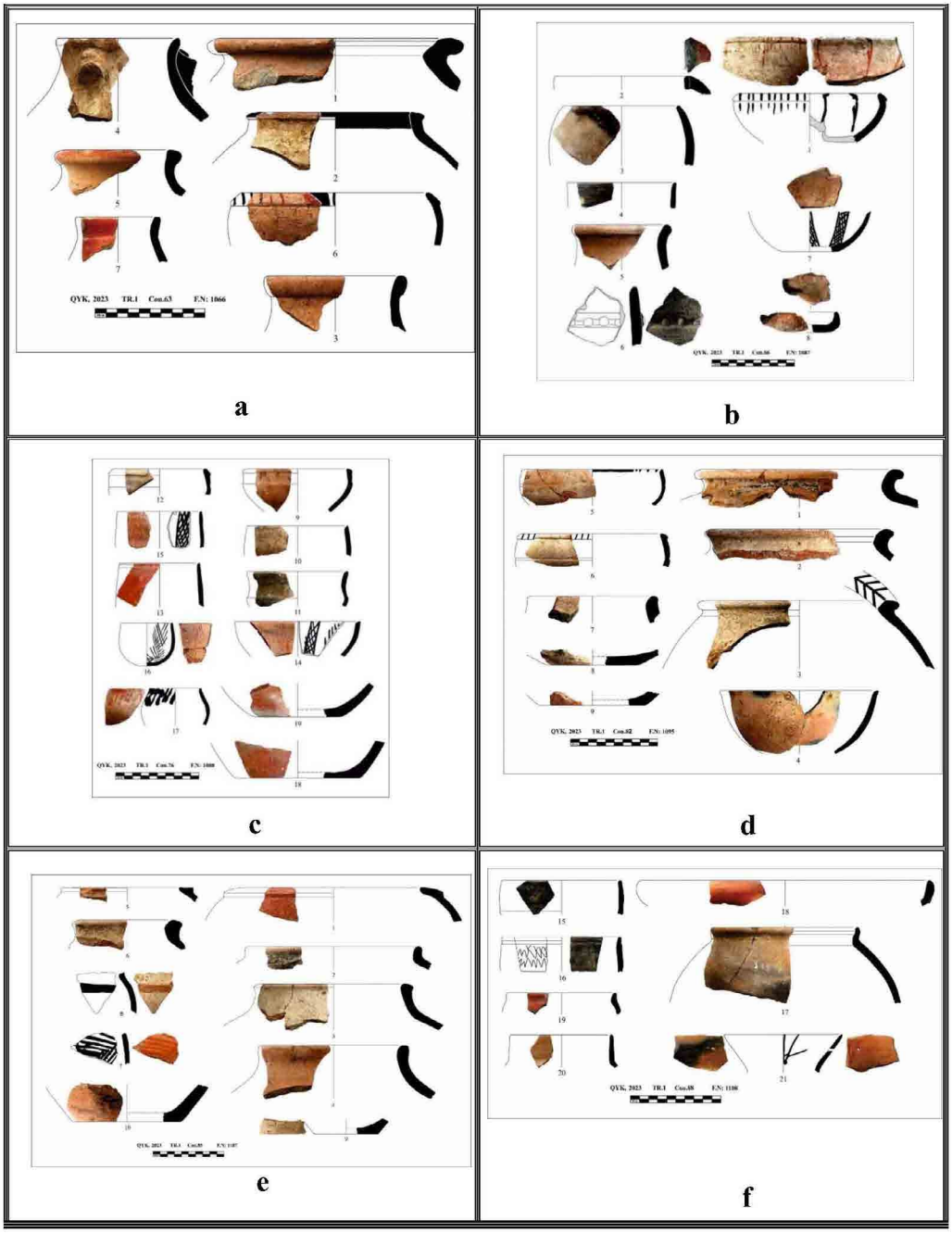

Fig. 7: Pottery sherds from Trench I: a) Context 63; b) Context 66; c) Context 76; d) Context 82; e) Context 85; f) Context 88 (Abbasnejad Seresti, 2024).

A total of 566 pottery sherds were also recovered from TTII. All pottery from the 47 contexts in this trench belongs to the Bronze Age, particularly the Early Bronze Age, and is identified as Kura-Araxes material. The assemblage ranges coarse to fine fabrics and shows a wide variety of colours (Figs. 9 and 10).

Architectural Structures

Remains of mudbrick architecture and stone walls, preserved in both intact and collapsed forms, were recovered from the Islamic and Historical-period contexts of TTI. The

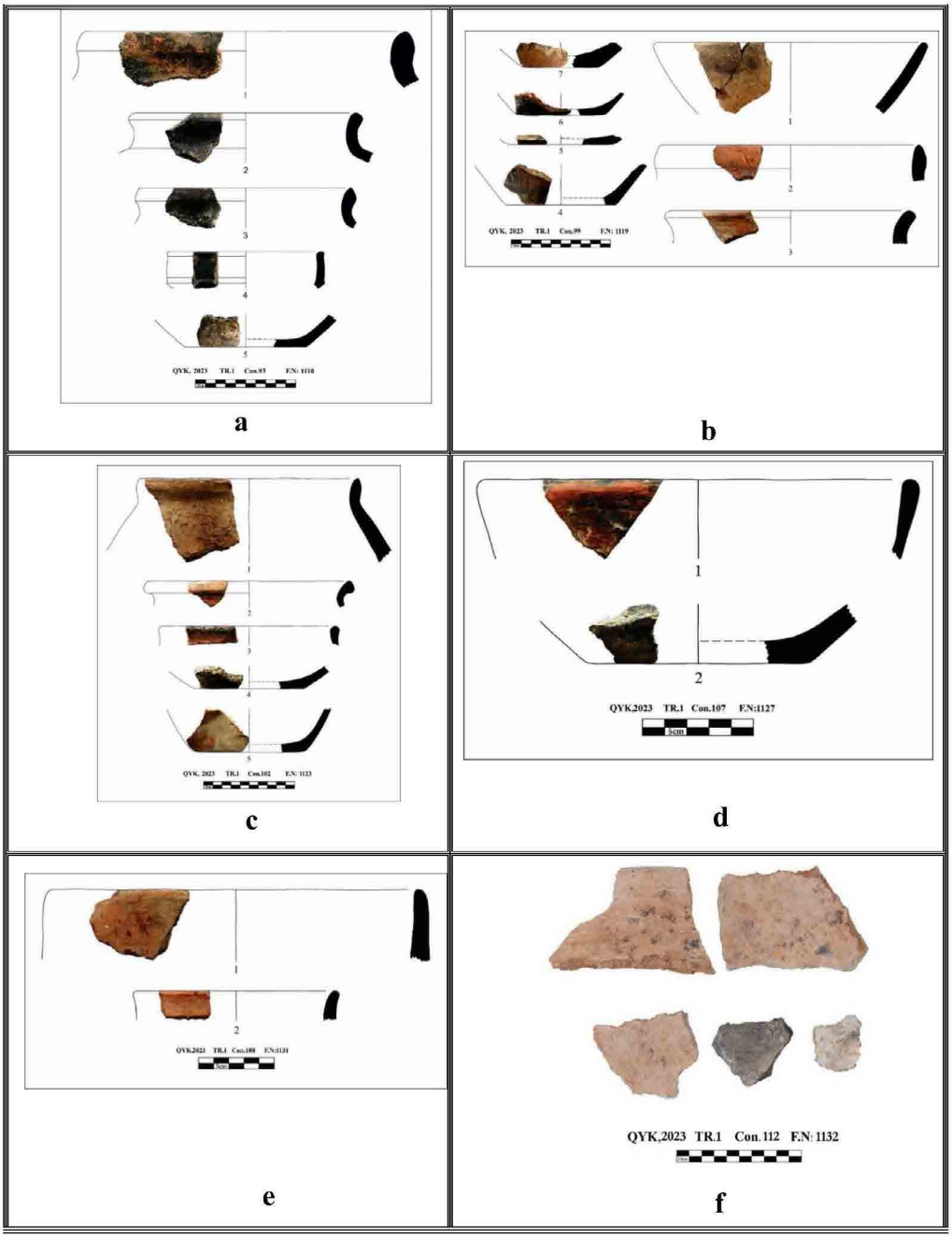

Fig. 8: Pottery sherds from Trench I: a) Context 93; b) Context 99; c) Context 102; d) Context 107; e) Context 108; f) Context 112 (Abbasnejad Seresti, 2024).

earliest architectural evidence in this trench was identified in Context 3, between depths of 44 and 280 cm. This context consists of stone rubble that appears to derive from an original architectural structure but was later disturbed and redeposited, most likely as a result of illicit excavation activities. At a depth of 300 cm below the benchmark, several small and large stone fragments were discovered. These stones were scattered and fragmentary in nature and were recorded as Context 9. Within this context, a regular stonemasonry texture (cairn), designated Context 13, was identified and documented.

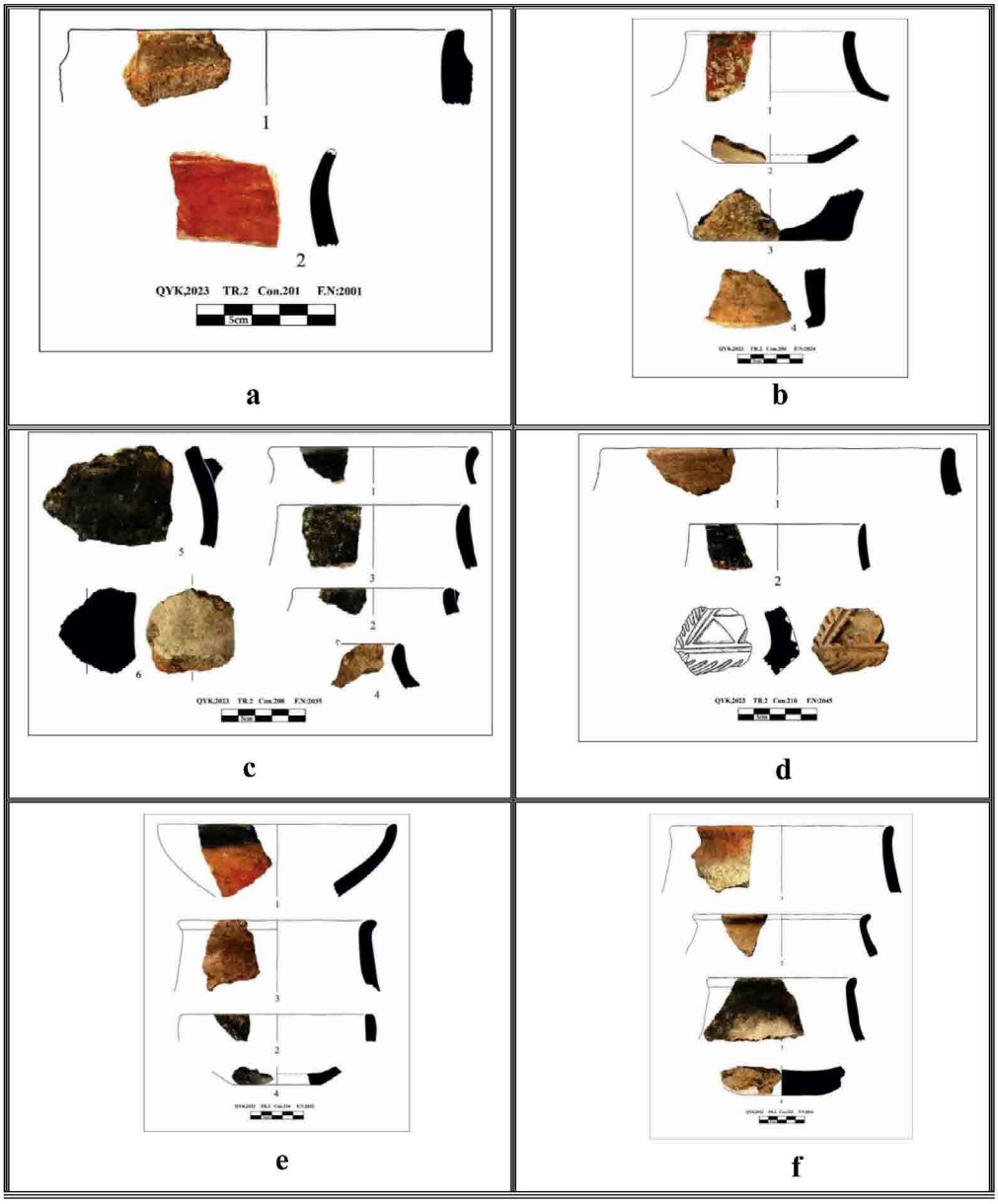

Fig. 9: Pottery sherds from Trench II: a) Context 201; b) Context 206; c) Context 208; d) Context 210; e) Context 214; f) Context 223 (Abbasnejad Seresti, 2024).

It is likely that these two contexts were originally connected and formed a coherent structural feature, with Context 13 remaining largely undisturbed by illicit digging. The presence of stone doorposts and occupation surfaces in several of these contexts indicates a clear association with the stone walls documented in the aforementioned layers. Context 22 contains a principal, well constructed wall that appears to form part of a stone architectural structure. This wall is overlain by the stone rubble of Context 24 (Fig. 11a). In Context 26, a deposit composed of various rock fragments associated with a detrital layer was identified. Contexts 27 and 28, located at depths between 305 and 328 cm, are associated with a settlement floor or a rubble-derived detrital deposit. Context 31 consists of a yellow, medium dense layer with no detectable moisture

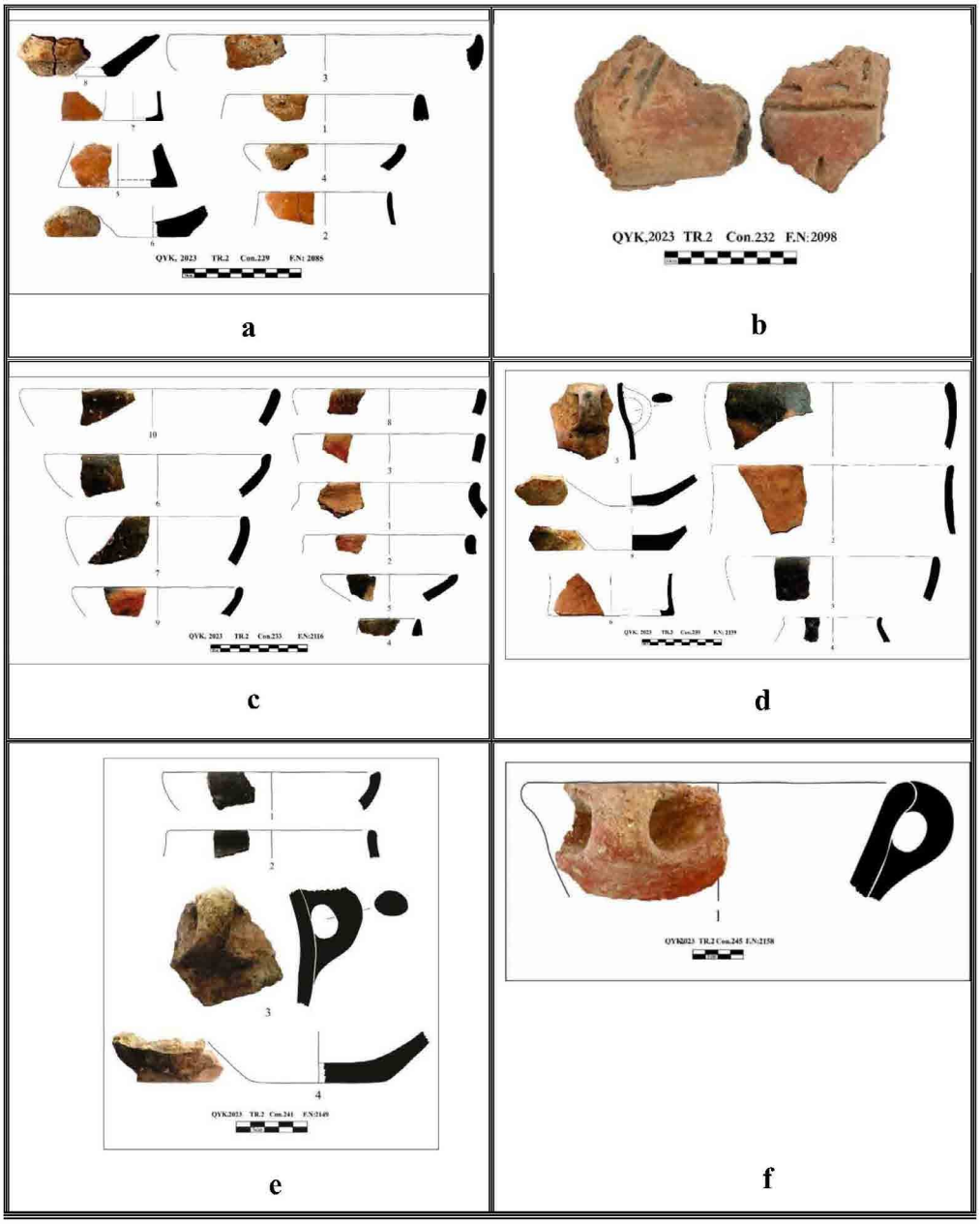

Fig. 10: Pottery sherds from Trench II: a) Context 229; b) Context 232; c) Context 233; d) Context 239; e) Context 241; f) Context 245 (Abbasnejad Seresti, 2024).

content. It appears to form part of a settlement area associated with the architectural remains and hearth related features recorded in Contexts 32, 33, 34, 35, 36, 37, and 38 (Fig. 11b–c). Context 33 contains the remains of a stone wall located in the western part of Test Trench I. This context includes two structural segments; however, because they are physically connected and share the same elevation and surface characteristics, they are interpreted as a single context. The feature consists of stones of varying sizes arranged in a dry stone construction, forming two rectangular spaces (Fig. 11d). Context 34 represents a compact and dense occupation surface containing vegetal inclusions and located within the stone wall of Context 33. It is composed of moist silty clay sediment

and displays traces of lime or lime plaster. Context 35 comprises an oval fire related installation surrounded by a limestone structure. A stone slab is positioned beneath the feature, while the interior is filled with ash, heat affected soil, and charcoal (Fig. 11e).

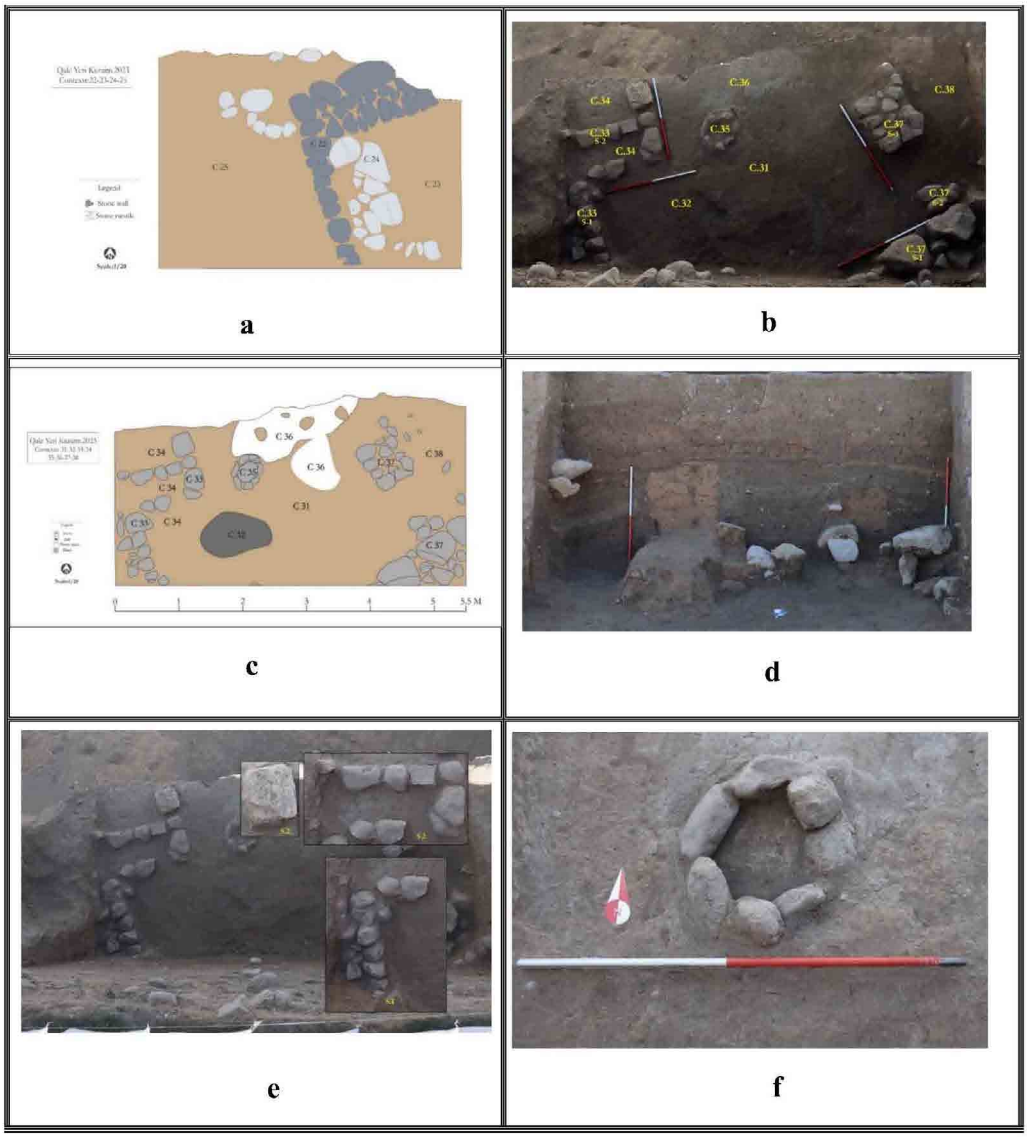

Fig. 11: Architectural remains from Trench I: a) Contexts 22–25; b) Layer 31 and adjacent contexts, viewed from above and facing north; c) Plan of Context 31 and adjacent contexts; d) Context 33, viewed from above and facing north; e) Context 35 (Abbasnejad Seresti, 2024).

Given the presence of Historical period pottery sherds in Context 42, the architectural remains from this level onward are tentatively attributed to the Historical period, pending confirmation through absolute dating. Context 46 consists of a dense, moist, buff brown semi crescent shaped deposit containing scattered fragments of mudbrick. This deposit begins at a depth of 477 cm and extends to 525 cm, with a total thickness of approximately 48 cm. Context 47 comprises a dense and compact settlement deposit located between architectural spaces 48 and 49. The context consists of moist, compact brown silty clay soil and represents an accumulated occupation layer associated with the adjacent

structural features. Mudbrick fragments were observed in parts of this deposit. Contexts 48–49 represent the remains of a dry stone wall located in the western part of the trench and aligned along a west–east axis, with associated mudbrick and mortar debris. Context 50 is a compact occupation surface located at a depth of 518–525 cm (c. 7 cm thick; Fig. 12a), from which several kitchenware sherds were recovered. In Context 52, mudbrick traces were recorded at a depth of 540 cm, while scattered lime traces in its western part may be associated with Context 57. This context consists of a reddish orange clay layer containing streaks of mudbrick. Context 56 consists of clay rubble extending across the entire surface of the test trench. It was identified between depths of 621 cm and 629 cm and has an approximate thickness of 8 cm. Context 57 comprises a fire preparation area characterized by ash deposits and thermally altered soil, situated adjacent to the remains of a rammed and plastered floor in Context 58. Context 63 is a rectangular pit measuring 88×88 cm. It contains very porous, soft, powdery soil with moderate moisture content. This context yielded numerous pottery sherds, bronze objects, metalworking molds, and animal bones. Mudbrick fragments were also recorded in Context 64. Context 65 represents a compact rammed occupation surface consisting of a 3 cm thick lime or lime render layer. Several rubble mudbricks were recovered from Contexts 66 and 68. Context 72 comprises a brown settlement deposit located between two areas of mudbrick architecture and a zone of stone rubble. It extends from a depth of 779 cm to 810 cm and is approximately 31 cm thick. The context includes a collapsed mudbrick feature measuring 43×40 cm, interpreted as the remains of a thick but collapsed wall located 60 cm from the western trench wall (Fig. 12b). Context 74 consists of orange coloured mudbrick fragments forming a thick wall of eight courses in the centre of the test trench. The mudbricks have regular dimensions of 10×40 cm, 12×39 cm, and 10×15 cm (Fig. 12c). The mudbricks are soft, dense, and moist, occurring as lumps and rubble. This wall, together with the underlying occupation surface, may represent the remains of an interior space later sealed by Context 75. Context 75 comprises a zone of dry stone architectural rubble. The stones were laid without mortar beneath a mudbrick wall and likely represent the collapsed remains of an associated architectural feature (Fig. 12d). Context 76 consists of a rammed settlement surface located within an area of rubble. The contexts identified between depths of 813 and 1085 cm are as follows: Context 77 is a rubble layer; Context 78 is a deposit containing calcareous nodules; Context 79 is a thin settlement layer; Context 80 represents a fire preparation area; Context 81 is a layer containing mudbrick traces; Context 82 is a 15 cm thick settlement deposit; Contexts 83 and 84 are sedimentary layers; and Context 85 is a pit containing cultural materials. Contexts 86 and 87 contain no cultural deposits. Similarly, Contexts 89–92 also lack cultural materials.

The final context (113) of Trench I contains evidence of Bronze Age activity. Context 94 comprises a rubble deposit containing soft, dense, lumpy mudbrick mortar, together with scattered stone fragments, ash, and traces of reed preserved on some mudbrick

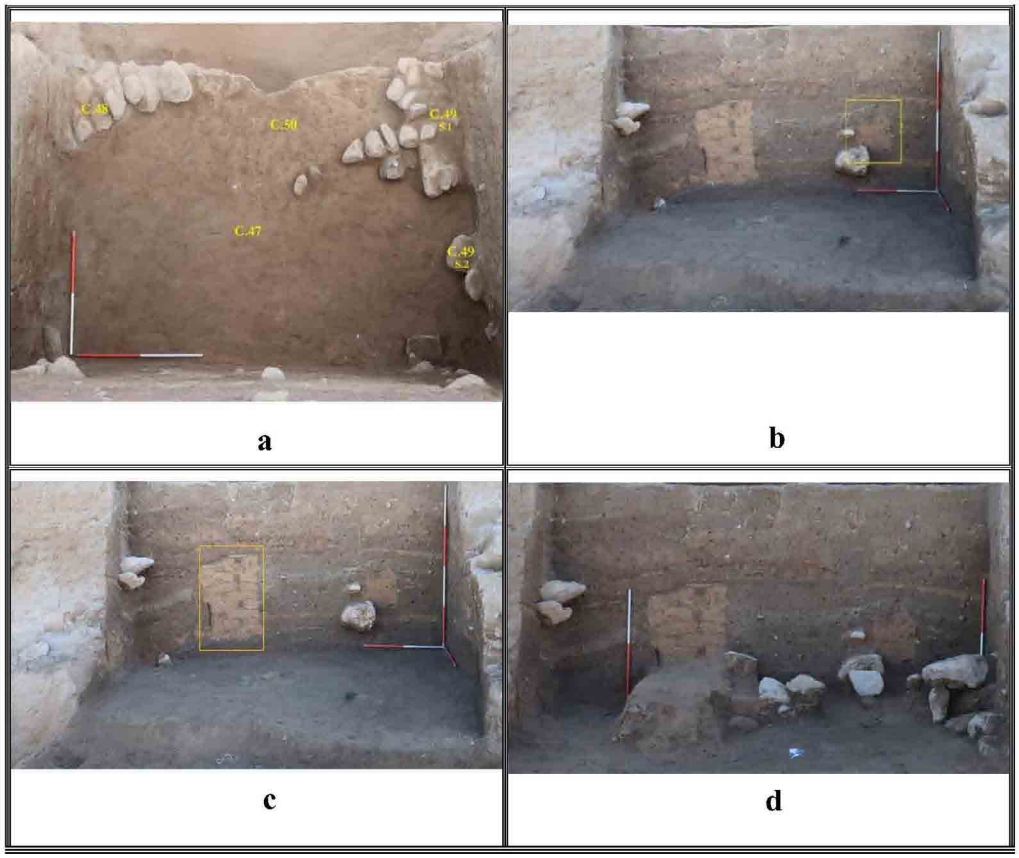

Fig. 12: Architectural features exposed in Trench I: a) Contexts 47–50, top view facing north; b–d) southern wall associated with Contexts 73, 74, and 75, viewed from the north (Abbasnejad Seresti, 2024).

pieces. Context 95 represents a brown occupation surface with inclusions of mudbrick rubble. Context 101 consists of a compact brown soil layer. Context 105 comprises a very dark brown, dense clay deposit embedded within a light brown compacted mud matrix. Its regular shape suggests a possible architectural feature or an organized space associated with a structure. Context 107 is a brown layer containing scattered mudbrick and rock fragments, charcoal, and heat altered soil. It extends across the entire surface of the test trench from a depth of 1287 to 1360 cm. Context 111 consists of stone rubble together with fragments of mudbrick and heat altered soil. This context extends from a depth of 1390 to 1420 cm and is approximately 30 cm thick. Context 112 comprises the remains of a heated area containing ash, charcoal, and heat altered soil, together with a semicircular hearth wall. It may represent a kiln or hearth, although its exact function remains uncertain. This context extends from a depth of 1420 to 1440 cm. Context 113 is associated with the base of the kiln (or hearth) and is rich in ash and charcoal. The soil is very soft, powdery, and porous. This context extends to a depth of 1460 cm and is approximately 20 cm thick. Architectural evidence in TTII begins with Contexts 204 and 205, which comprise a settlement floor containing compacted ash. Context 209 is associated with a fire preparation area. Context 210 consists of a layer containing plant fibres and reeds, with a dark grey layer observed between the two deposits. Contexts

216 and 217 are also associated with a fire preparation area extending from 150 cm to 161 cm below the test trench benchmark. Context 222 comprises a row of mudbricks arranged in a semicircle. The feature continues into the western and northern trench walls. The mudbricks are regular in form and occur in two sizes: 25×20 cm and 25×40 cm. The architectural remains of a metallurgical furnace were first identified in Context 226, while the associated finds are discussed in the section on Metallurgical Finds. Context 228 consists of a north–south aligned row of stone piles located in the eastern part of the test trench. The feature is constructed in dry stone technique (Fig. 13). Nine stone slabs are visible along the north–south axis. A second row of five smaller.

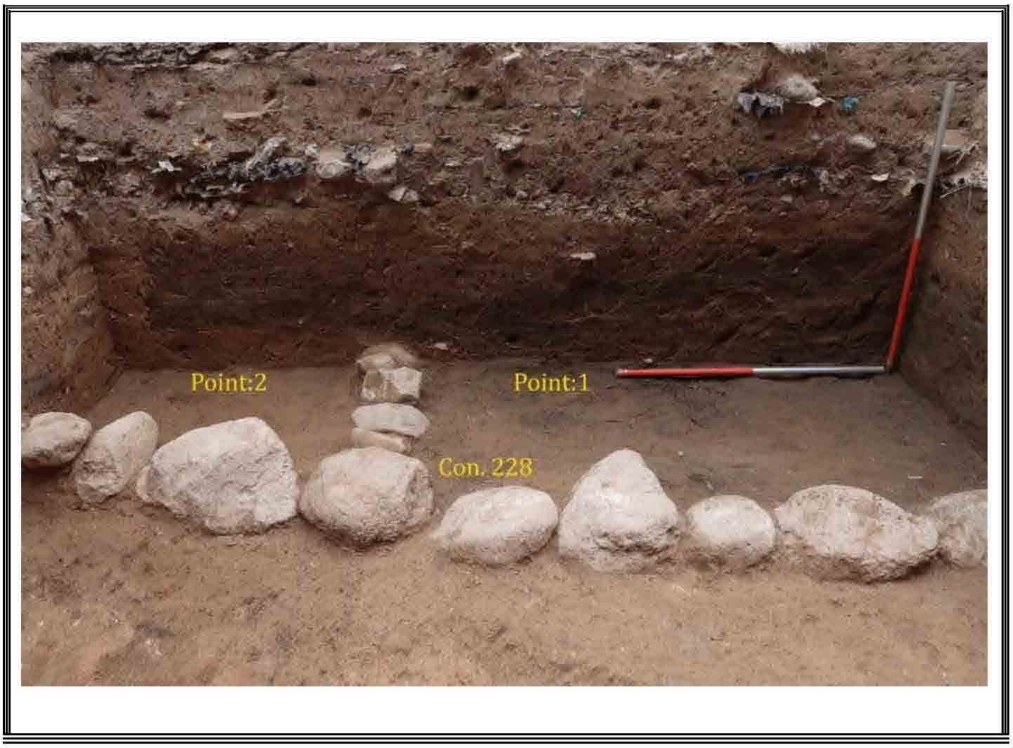

Fig. 13: Architectural feature exposed in Trench II (Context 228), viewed from the north (Abbasnejad Seresti, 2024).

Metallurgical Finds

Metalworking remains were recovered from various contexts in TTI and TTII, including slag, copper ore, fragments of metal tools and objects, and forge welding slag. A pottery vessel associated with metallurgical activity was identified and documented in Context 63 of TTI (Fig. 14a). More substantial evidence, however, was recovered from Context 226 in TTII and from several associated subsequent contexts (Figs. 14b–d). Context 226, which yielded cultural materials—particularly Early Bronze Age pottery—consists of a heat affected floor layer extending across the entire southwestern portion of the trench. The sediment ranges from dark to light brown in colour and shows clear evidence of heating. Because this context comprised several interconnected but distinct spaces, the entire heated area was recorded as a single context. For analytical clarity, the associated spaces were defined as separate features in order to better represent their spatial

relationships. Cultural materials recovered from this context include pottery sherds, animal bones, charcoal, and flotation samples. A centrally located oval furnace (50×25 cm) was identified within the heated floor and designated Structure 1, with upper and lower depths of 260 cm and 292 cm, respectively. The deposit is approximately 32 cm thick. The furnace floor is mud lined, and the surrounding heated area within the deposit was designated Structure 2. A large quantity of forge welding slag (Fig. 14e), green and red in colour and very lightweight, was recovered from the furnace, indicating an industrial function. The furnace structure itself is approximately 19 cm thick. A regular row of mudbricks (50×30 cm) forms the northern boundary of the furnace space. This row consists of five complete bricks and one partially preserved brick extending into the western trench wall. This feature was designated Point 3 and is associated with both the furnace and the heated floor. The mudbrick wall begins 70 cm from the southern trench wall and extends in a semicircular form into the southern section, terminating 30 cm from the eastern wall. Behind this wall, a space containing ash, heat affected soil, brick fragments, and soft powdery deposits was exposed. Abundant forge welding slag recovered from this area suggests that it functioned as an industrial waste zone associated with the furnace; this area was designated Point 4. In the southeastern part of the trench, a heat affected dark brown deposit lacking cultural materials was recorded behind the mudbrick wall and designated Point 5. Due to the stratigraphic nature of the excavation during this season and limitations in time and project objectives, excavation in this area was halted and the remains of the furnace were preserved. A number of small copper ore fragments and a metal object of unknown function were recovered from Context 232 of TTII (Figs. 14f–g). Several metallurgical casting mould fragments were also recovered and recorded from Context 239 (Fig. 14h).

Evidence of Geological Faulting

Evidence of geological faulting was recorded in TTI (Fig. 15). Several faults were identified, one of which—probably related to the Sangavar Fault—was recorded as Context 15 at a depth of 160 cm, with its trace extending to 450 cm below the fixed datum. Examination of the eastern trench profile further confirmed the continuation of this fissure within the upper deposits. The Sangavar Fault appears to have significantly disturbed the cultural sequence, contributing to occupational discontinuities during the Islamic and Historical periods.

Some evidence of environmental and climatic changes that caused both minor and major discontinuities during periods of settlement in this area has been identified and is currently under study. A similar break was observed in Context 226 of TTII, located at a depth of approximately 270 cm below the fixed datum, within the central area of the remains of an Early Bronze Age metallurgical furnace.

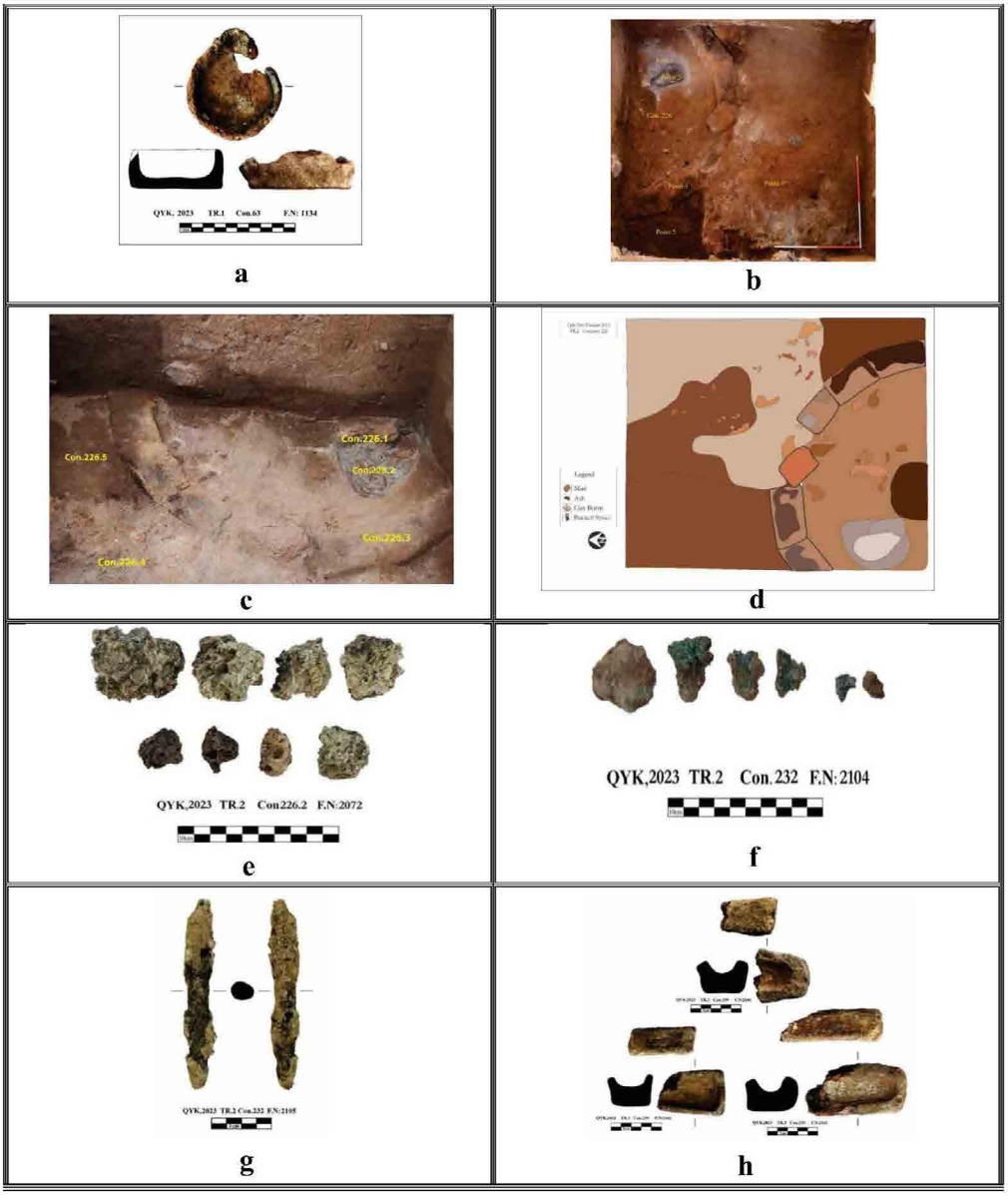

Fig. 14: Evidence of Archaeometallurgy; Trench I: a) Context 63, crucible; Trench II: b) Context 226, plan view, looking east; c) Contexts 226, 226.1, 226.2, 226.3, 226.4, and 226.5, viewed from the north; d) plan of Context 226, top view; e) Context 226, furnace-wall slag/vitrified furnace fragments; f) Context 232, copper ore fragments; g) Context 232, a metal object of unknown function; h) Context 239, casting molds (Abbasnejad Seresti, 2024).

Faunal Finds

A total of 476 and 307 animal bone fragments were recovered from the stratigraphic excavations of TTI and TTII, respectively (783 fragments in total) (Fig. 16). However, since nearly half of these finds belong to the Kura–Araxes period, a brief preliminary analysis of the bones from this period is presented here. Because all contexts in TTII belong to the Kura–Araxes period, all animal remains recovered from this trench (307 fragments) are included in the present analysis. In addition, based on the current relative chronology, Context 93 onward in TTI has also been assigned to this period; therefore, 54 additional fragments from these contexts have been included in the assemblage.

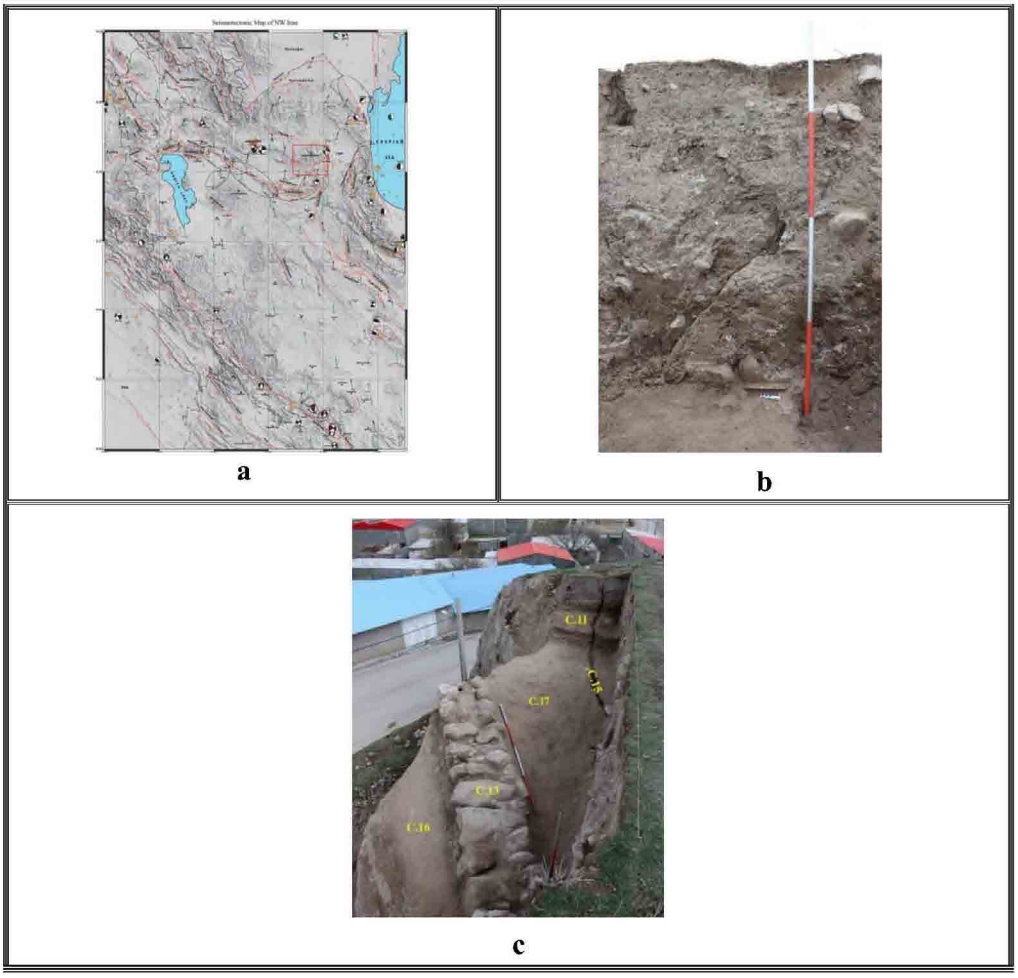

Fig. 15: Trench I: a) Seismicity map of northwestern Iran and the potential correlation between regional seismic activity and the fissures documented in the trench; b-c) fissures observed in the eastern and southern trench sections and on the trench floor, viewed from the west and north (Abbasnejad Seresti, 2024).

Preliminary analysis of the collection indicates that the identified faunal remains belong to mammalian and reptilian groups. The mammals include members of the ungulate order, with sheep constituting the largest assemblage, followed by bovines, boars, and cervids. The greatest number and weight of bones derive from Contexts 93 and 95 in TTI, as well as Contexts 232, 233, and 239 in TTII.

Flora Remains

Sampling for the identification and recording of plant remains was restricted to the Bronze Age layers, due to the specific characteristics of the site's contexts from this period. Approximately 255 liters of soil from 19 Kura–Araxes contexts were collected from TTI and TTII for flotation (Fig. 17). Of these, three soil samples (48 liters) were collected from TTI, while sixteen samples (207 liters) were collected from TTII. Approximately 80 percent of the plant remains derive from TTI, with the remainder originating from TTII. This distribution likely reflects differences in site activity areas. The TTI area was probably more closely associated with the daily activities and domestic

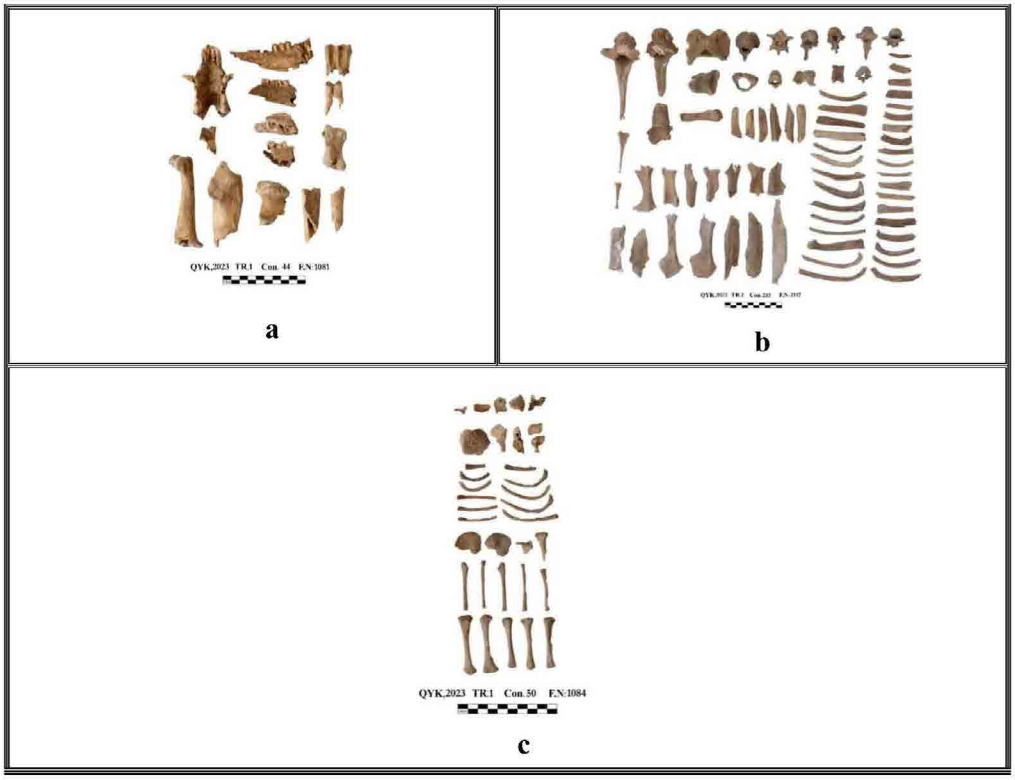

Fig. 16: Animal bone remains recovered from the excavation: a) Context 44, Trench I; b) Context 233, Trench II; c) Context 50, Trench I (Abbasnejad Seresti, 2024).

life of the site's inhabitants, whereas TTII appears to have been related to industrial or workshop activities. However, the large quantity of animal bones recovered from TTII (307 out of a total of 361 fragments) indicates a markedly different pattern.

The collected samples generally consisted of ash, heat affected soil, charcoal accumulations, pit fills, soil from inside the kiln, and soil associated with fire preparation areas. A total of 1,072 plant seeds were identified and recorded, including 338 complete seeds and 734 fragmented seeds. Because the type, species, and genus of most fragmented seeds could still be determined, they were considered to be of equal analytical value to the complete specimens. Preliminary identification suggests that these remains likely belong to various species of the Gramineae family, Galium (a type of weed), grape seeds, and lentils. The greatest abundance is associated with wheat and barley. Based on the size of the recovered grains, most appear to represent domesticated and cultivated varieties. Furthermore, as these remains were recovered from the settlement layers of the site, they are directly related to the subsistence economy of the Bronze Age community inhabiting the Kuraim site. The presence of large quantities of Galium seeds (Lady's Bedstraw), alongside barley and wheat, indicates that the inhabitants practiced agriculture and that cultivated fields likely existed around the site, since Galium commonly grows in cereal fields. Therefore, the presence of cultivated crops—including cereals, legumes (lentils), and fruit seeds—provides evidence for the predominance of an agriculture based subsistence economy in the region. By integrating the faunal and botanical evidence, a

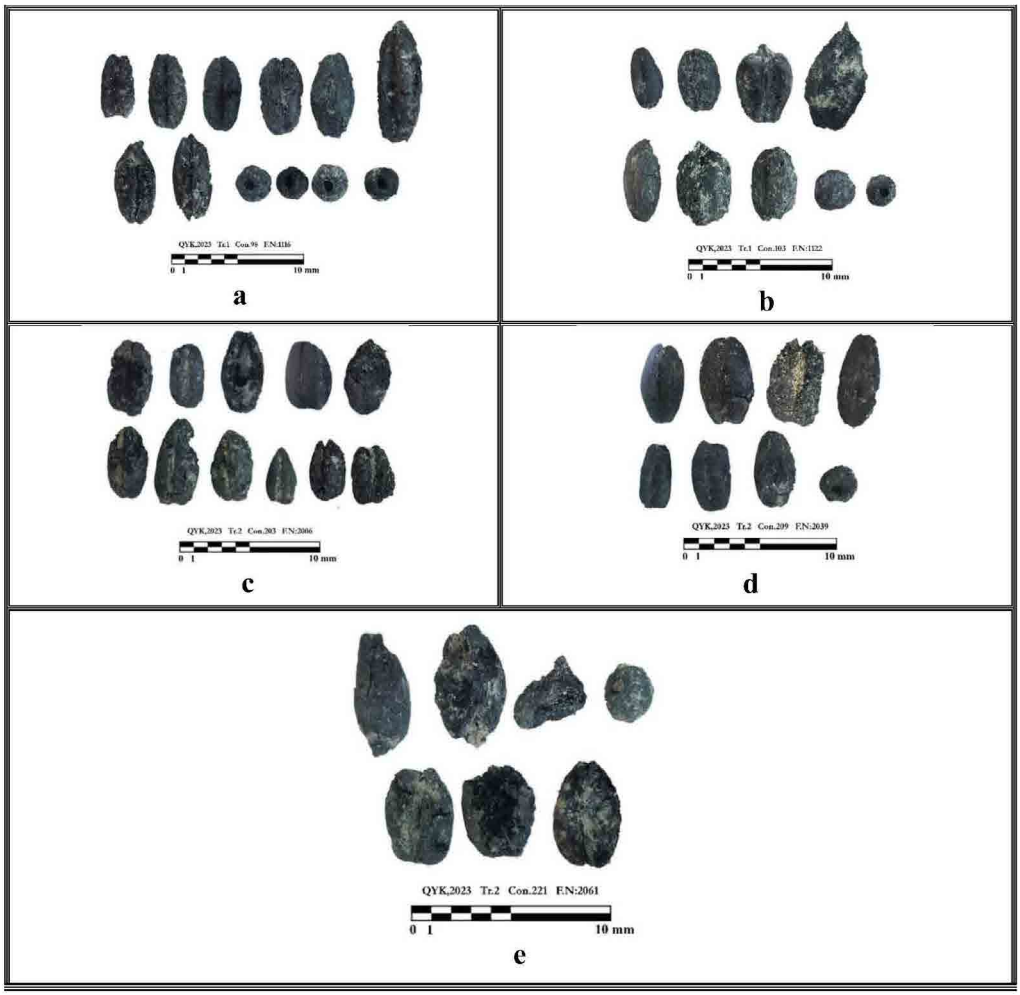

Fig. 17: Archaeobotanical remains recovered from the excavation; Trench I : a) Context 98; b) Context 103; Trench II: c) Context 203; d) Context 209; e) Context 221 (Abbasnejad Seresti, 2024).

preliminary conclusion may be drawn that the subsistence economy of this area during this period was based on agriculture and animal husbandry.

Human Burial

Context 91 consists of a soft, porous, powdery, olive coloured layer with moist, fine grained particles. A large concentration of river stone fragments of various sizes was observed within 210 cm of the western wall of the test trench. This context originated in the southwestern corner of the trench and extended across the entire trench surface. It began at a depth of 1,095 cm and ended at 1,110 cm, with an approximate thickness of 15 cm. Near the eastern wall of the test trench, adjacent to this context, the disturbed remains of a human burial were exposed; the burial had been damaged by the mechanical destruction of the mound. This burial was assigned to Context 91 due to its proximity to the aforementioned deposit. It appears to have been a simple pit burial, although the exact burial position could not be determined. Given the conditions in this part of the mound and the difficulty of excavation and documentation, only skeletal fragments and

associated grave goods were recovered (Fig. 18a). Theis included part of an engraved pottery vessel, a bronze ring, a glass paste bead, and a clay bead (Fig. 18b).

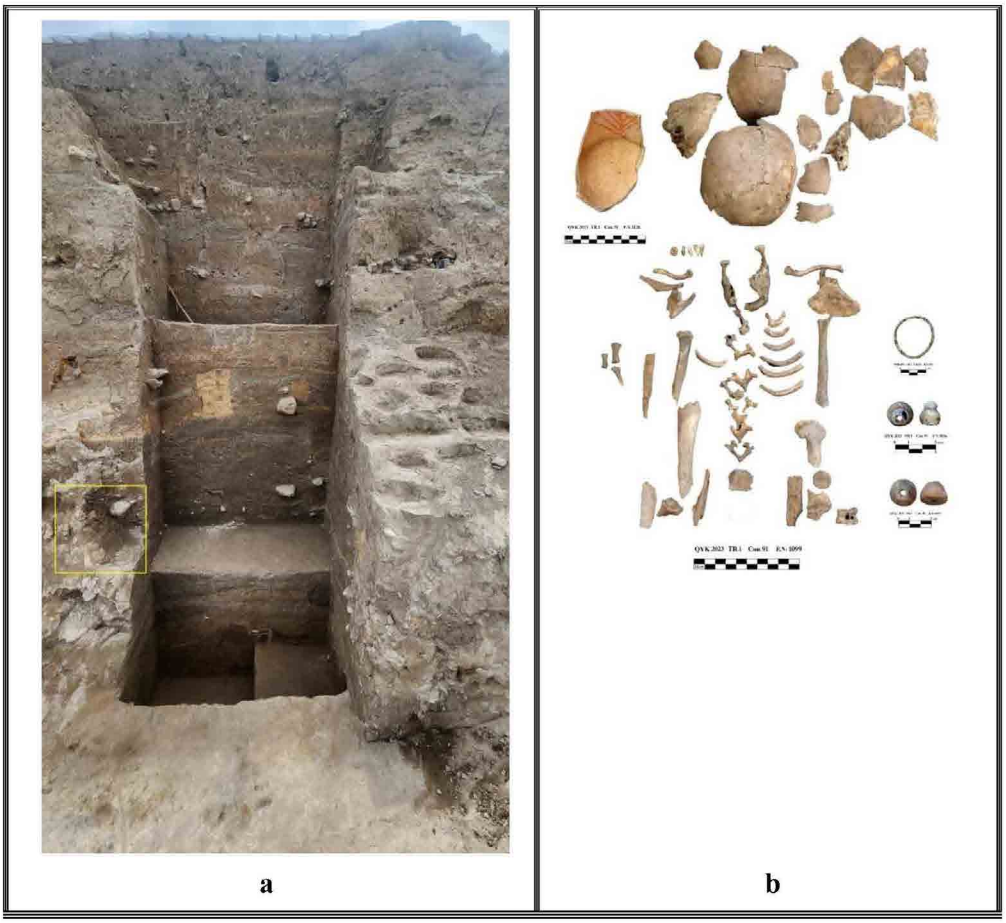

Fig. 18: Context 91; Trench I: a) Disturbed human burial identified in the eastern profile of the trench, viewed from the north; b) Human skeletal remains and accompanying grave goods, including a bronze ring, a glass-paste bead, and a ceramic bead (Abbasnejad Seresti, 2024).

Special Finds

Several obsidian pieces were recovered from Contexts 206 and 232 of TTII, including complete and fragmented lithic artifacts, as well as an unworked obsidian fragment (Figs. 19a–b). Two ceramic spindle whorls were discovered in Contexts 54 and 56 of TTI (Fig. 19c), and a stone pestle was recovered from Context 99 (Fig. 19d). Distinctive bone tools, attributable to the Bronze Age, were found at various depths in a nearly continuous sequence across several contexts in both trenches (Figs. 19e–l). In addition, an artifact made from animal antler was recovered from Context 209 of TTII (Fig. 19m).

A perforated clay disk was recovered from Context 81 of TTI. Adjacent to the burial—located at the same level as Context 91 of TTI—part of an incised pottery vessel, a bronze ring, a frit bead, and a clay bead were discovered (Fig. 18b), although these items were not examined in further detail. A sedimentary grinding stone was recovered from Context 223 of TTII; both ends are turned upward and may have functioned as handles (Fig. 20a). A broken clay figurine was retrieved during the sieving of Context 206, measuring 23×14×14 mm (Fig. 20b). The fragment represents the hind part of a

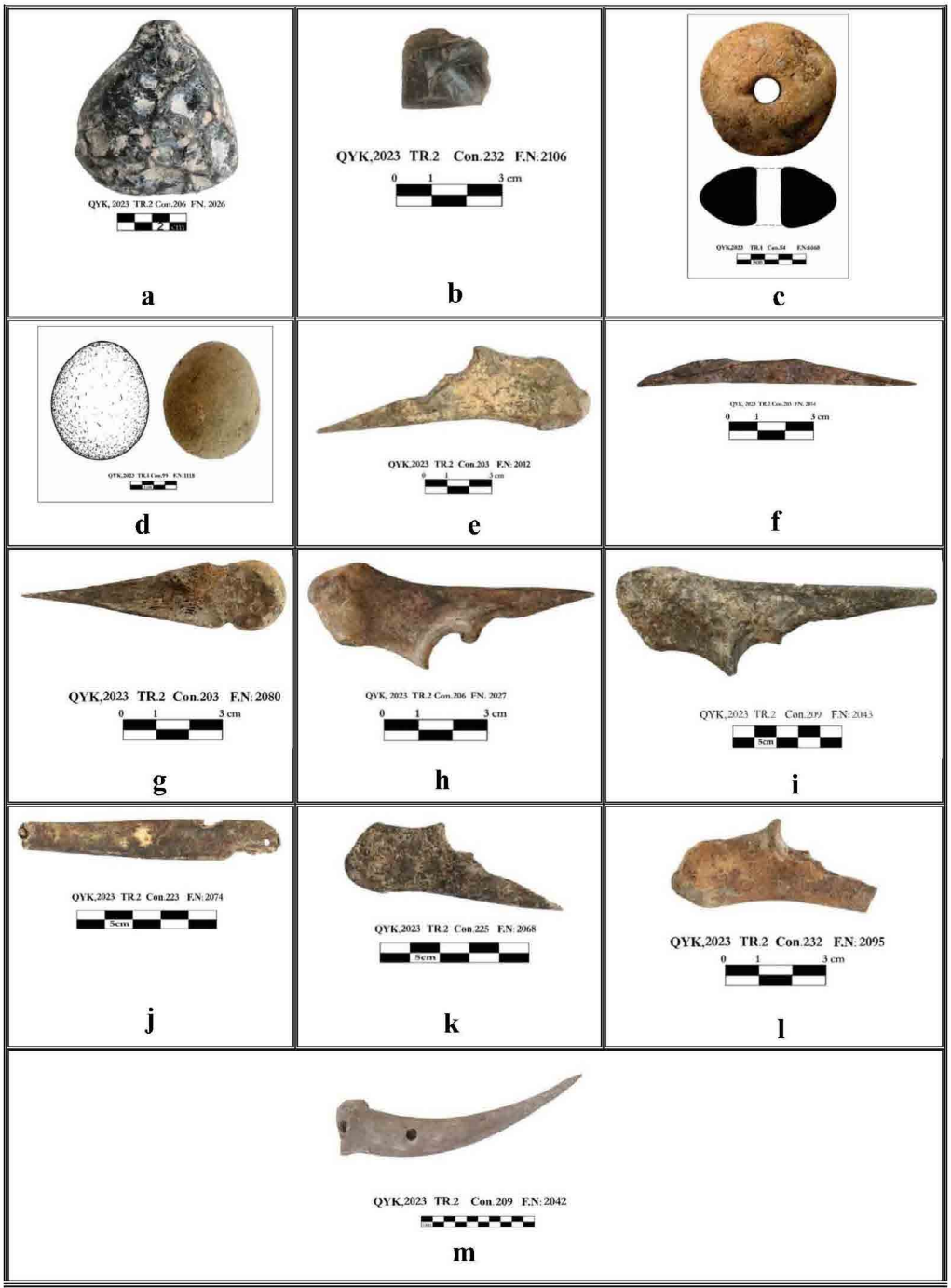

Fig. 19: a-b) Obsidian fragments from Contexts 206 and 232, Trench II; c) Ceramic spindle whorl from Context 54, Trench I; d) Stone pestle from Context 99, Trench I; Bone tools from Trench II: e-g) Context 203; h) Context 206; (I) Context 209; (J) Context 223, recovered through flotation; (K) Context 225; (L) Context 232; m) Antler tool from Context 209, Trench II (Abbasnejad Seresti, 2024).

probable bovine figurine; the central body and back are missing, but both hind legs are preserved. Another fragmentary clay figurine was also recovered from the same context. This second fragment measures 18×15×23 mm in maximum dimensions and preserves two intact legs. It appears to represent the forepart of a buffalo (Fig. 20c). The right ear is broken, and a perforation is visible beneath it. Another perforation appears in the nasal area, suggesting that the figurine may have been suspended. The figurine is made of

fired clay with a black paste. Another animal figurine, probably representing a buffalo, was recovered from Context 207 of the same pit. Although largely intact, both horns and the left leg are broken (Fig. 20d). Its maximum dimensions are 63 mm in length, 32 mm in width, and 50 mm in height. A mane like projection is visible on its back which, when reconstructed together with the horns, suggests that the figurine exhibits characteristics of a buffalo. A perforation is present beneath the left ear (front view), and the surface is covered with greenish mud that darkens along the flanks. Another figurine from Context 232 of TTII (Fig. 20e) has broken hind legs, a perforation beneath the right ear, visible burn marks, and broken horns. It measures 60×30×33 mm. A further animal figurine from the same context shows broken horns and legs, along with burn marks on half of the body (Fig. 20f), measuring 48×20×20 mm.

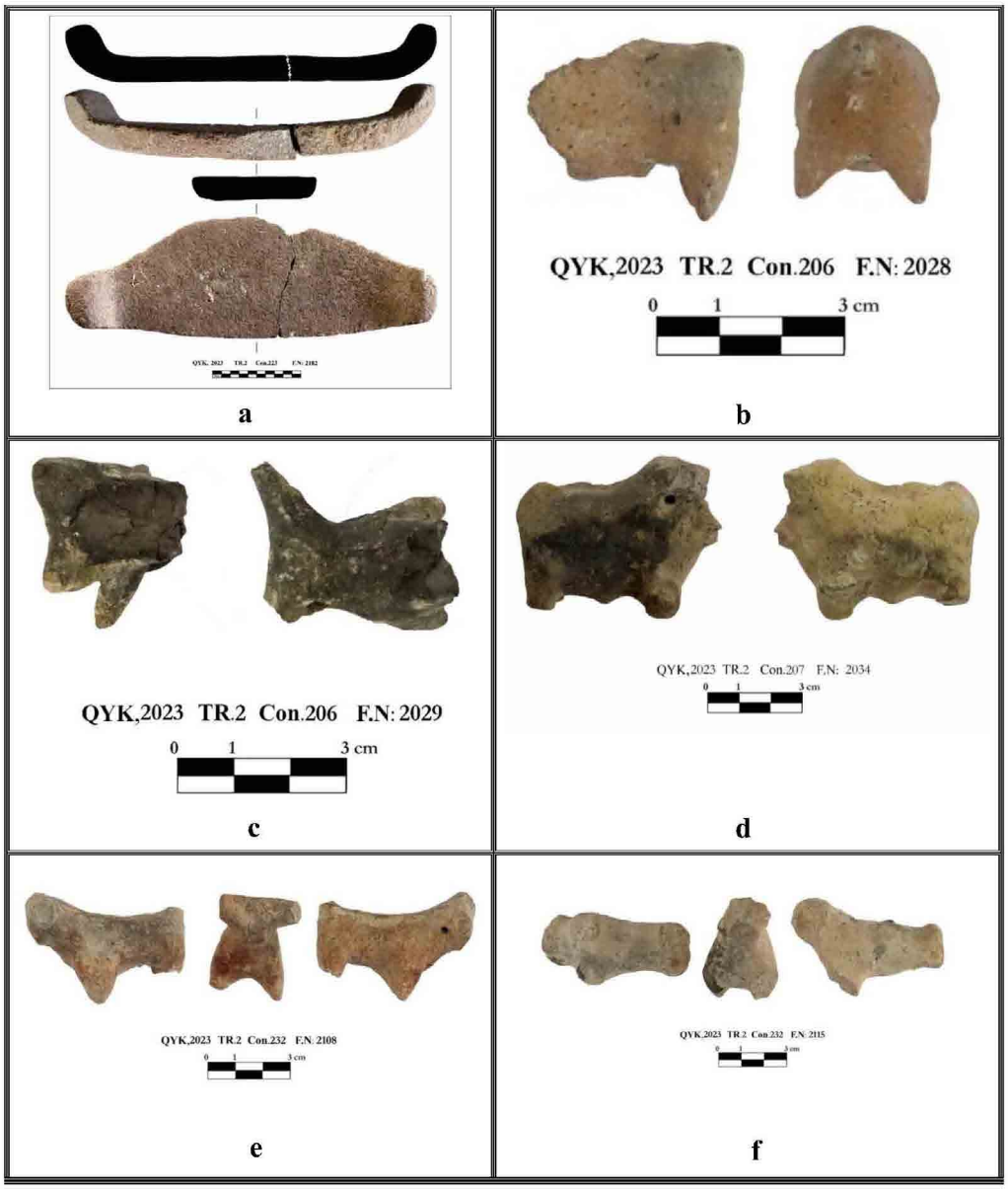

Fig. 20: Finds from Trench II: a) Grinding stone recovered from Context 223; Figurines: b-c) from Context 206; d) from Context 207; and e-f) from Context 232 (Abbasnejad Seresti, 2024).

Sampling

Numerous charcoal samples were collected from both test trenches for absolute dating, and preparations for laboratory analysis have been completed. Micromorphological analysis, a relatively recent method in the study of soils and archaeological deposits, contributes to the identification of constituent components and the reconstruction of the temporal and spatial relationships of deposits (Banerjea et al., 2015; Batiuk et al., 2022). Through micromorphological studies, it is possible to identify soil compositions, bone remains, animal dung, wood fragments, pottery, lithic materials, charred grains, sedimentary layers, and post depositional changes, as well as to distinguish between calcareous sediments and secondary calcium carbonate deposits (Goldberg, 1981). Accordingly, this method has been applied to the study of the site's deposits in order to improve understanding of both natural and anthropogenic depositional processes involved in the formation of cultural layers, as well as the human activities that took place at the site. A total of 13 sediment blocks were sampled from the western section of TTII for micromorphological analysis (Figs. 21a–c). The sampling strategy was specifically designed to investigate the nature, formation processes, and stratigraphic relationships of both cultural and natural depositional sequences. Soils can act as reservoirs of anthropogenic organic matter and may preserve mineral components as part of their geochemical signature. Consequently, past human activities are often reflected in soil properties and elemental concentrations, which may persist over long periods and thus provide evidence of human occupation (Heron, 2001). As discussed previously, the deposits within the layers of TTII are associated with a range of human activities. Evidence identified in these layers includes animal skeletal remains, industrial and metallurgical activities, and natural deposits influenced by fluvial sedimentation processes. For further analysis, 22 sediment samples were collected from different contexts and depths (Figs. 21d–e). Given the effectiveness of the geochemical methods mentioned above, the measurement of various elements can provide valuable information regarding the nature and extent of activities carried out at the site.

Discussion and Analysis

The upper three disturbed contexts of TTI yielded Safavid and Qajar pottery, together with associated finds including oil lamps, ceramic jars, a stone basin, a door pivot stone, grinding stones, and hammerstones. Evidence of the Sangavar Fault, recorded in TTI as Context 15, appears to have played a significant role in disturbing the cultural layers. Surface pottery recovered from the site dates to several periods, including the Bronze Age (particularly the Kura Araxes period), the Iron Age, the Historic period, and the Islamic period. This chronological pattern was investigated and documented through two stratigraphic test trenches. In TTI, Contexts 1–42 are predominantly Islamic in date. At a depth of 5.25 m below the fixed datum, pottery sherds dating to the Seljuk and Ilkhanid periods were recovered, together with architectural remains in the form of

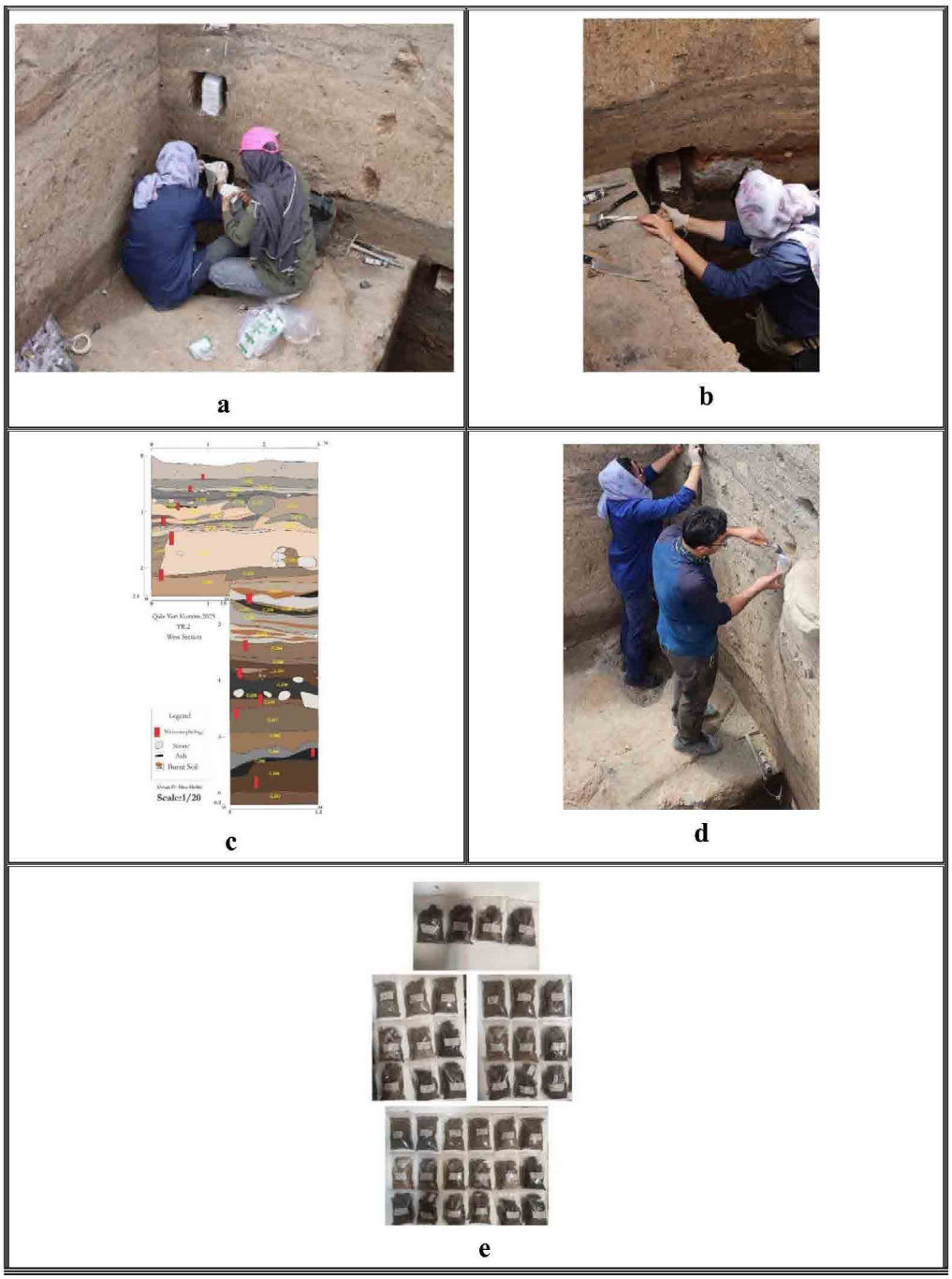

Fig. 21: Sampling from the western section of Trench II: a-b) Extraction and preparation of micromorphology samples; c) Sampling scheme indicating the positions of micromorphological samples; d-e) Extraction and preparation of samples for geochemical analyses (Abbasnejad Seresti, 2024).

rubble. Evidence of repeated occupation and abandonment during different phases of the Islamic period has been identified in this area. Contexts 44–88 are mainly attributed to the Historic period. The beginning of this phase is marked by the presence of Parthian pottery recovered beneath layers associated with a cultural discontinuity. Associated finds include clay spindle whorls, a clay disc, grinding stones, hammerstones, and a metallurgical mould. This occupational phase extends from approximately 5.5 m to 9

m below the fixed datum. A substantial mudbrick wall, preserved to eight courses with bricks measuring 40×10 cm and set in mortar, is also likely associated with this period. Beneath this structure, a sedimentary layer approximately 1 m thick was identified. Below these deposits, limited evidence of the Iron Age was identified. Iron Age pottery, post dating the Parthian period, was recovered at a depth of approximately 9 m below the benchmark, together with fragmentary stone and mudbrick architectural remains. Given the presence of Historic period pottery in Context 42, the overlying architectural sequence is cautiously attributed to the Historic period. Although the limited exposure of the stratigraphic trenches restricts detailed architectural interpretation, the presence of successive occupation layers allows for a preliminary assessment of spatial organization and functional variation across different periods. Layers of mudbrick and mudbrick rubble (Contexts 46, 56), compacted floors (Contexts 47, 50, 65, 72, 76), dry stone walls (Contexts 48, 49), and areas associated with fire and heat (Contexts 57, 80), together with evidence of additional activities such as rectangular pits, abundant pottery, bronze objects, metalworking tools, and clay remains extending into deeper contexts, support the interpretation of a multifunctional habitation and workshop area. Between approximately 8.10 m and 11 m below the fixed datum, a period of occupational hiatus appears to be represented in this area. Below this interval, evidence of the Bronze Age was identified. Contexts 93–113 mainly represent the Bronze Age, particularly its early phase. From Contexts 94 to 113 in this test trench, a sequence of mudbrick and stone collapse layers, together with compacted surfaces, ash, charcoal, and traces of burning, was identified, generally reflecting Bronze Age activities. The presence of the semicircular oven wall (Context 112) and the furnace bed (Context 113), together with layers containing burning and ash, indicates activities related to cooking or other thermal processes. TTII, which yielded 566 pottery sherds, is almost entirely associated with the Early Bronze Age (Kura Araxes period).

The deeper stratigraphic levels, together with the settlement patterns and activities of this period, are therefore more clearly represented in this trench. The pottery assemblages from both test trenches, in combination with the stratigraphic sequence, provide a coherent framework for understanding the development of occupation and site use over time. Although evidence of metalworking—including slag, copper ore, tools, and metal objects—was recovered from several contexts in both test trenches, the principal concentration of this material was identified in Context 226 of TTII. The heated floor, together with the presence of an oval shaped furnace, mud plastering, large quantities of coloured forge welding slag (green and red), copper ore, slag, and fragments of metal objects, indicates an industrial function and most likely reflects smelting and refining activities within this context. The discovery of additional tools, such as moulding implements and fragments of copper ore in Contexts 232 and 239, further highlights the importance of metalworking activities in this area during the Early Bronze Age. Multiple faults identified in TTI, including one associated with

the Sangavar Fault (Context 15) extending to a depth of approximately 450 cm, have displaced and disturbed the cultural layers and appear to have affected deposits dating to the Islamic and Historic periods. A similar fault was also identified in Context 226 of TTII within the remains of an Early Bronze Age kiln. The cut profile of the southern wall of the trench is illustrated in Figure 22.

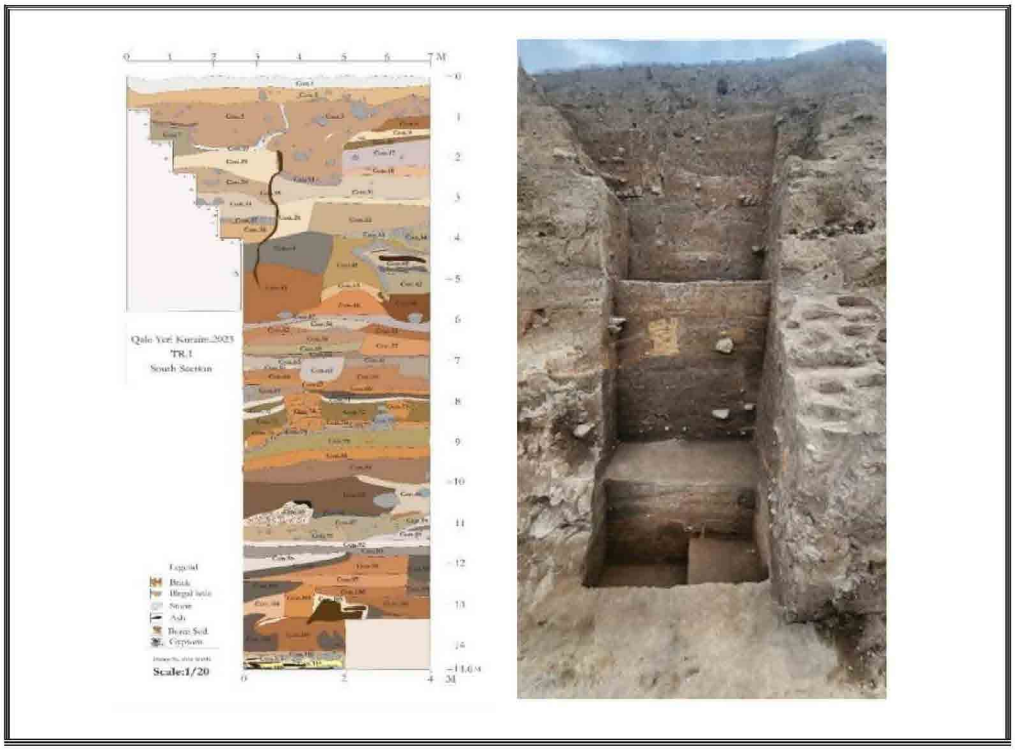

Fig. 22: South profile of Trench I; Section drawing and photograph (Abbasnejad Seresti, 2024).

Analysis of Bronze Age Faunal Remains

Analysis of Bronze Age faunal remains from both test trenches indicates the presence of a range of species, including mammals—primarily sheep, followed by bovids, boar, and deer—as well as reptiles. This assemblage suggests a subsistence economy largely based on animal husbandry. This pattern is further supported by preliminary archaeobotanical data. The presence of domesticated cereals within settlement layers indicates a mixed agro pastoral economy combining agriculture and livestock management. In the following discussion, the Early Bronze Age assemblage is examined in greater detail, given the significance of this period in the region. As noted above, TTII was placed in an area where successive stratigraphic layers were visible in the mound profile, allowing the excavation to complement the sequence documented in TTI and further clarify Early Bronze Age occupation. The 47 contexts recorded in TTII include settlement floors, kilns, mudbrick walls, pits, fire related installations, cultural gaps, limestone and rubble walling, river stone deposits, ash and heat affected layers, and deposits containing organic remains. These contexts reflect multiple phases of Bronze Age occupation, particularly during the

Early Bronze Age. Two seismic events are suggested within the sequence, possibly contributing to episodes of abandonment. Evidence of flood related deposits was also identified in contexts associated with these events, including Context 226. No evidence of metalworking was identified in the upper layers (Contexts 201–226). However, Context 226, with its metalworking furnace and associated finds, indicates the presence of this early industrial activity in the area. Evidence of such activity continues almost uninterrupted into the lower layers of this test trench. The Kura Araxes pottery recovered from this context downward indicates that these layers were contemporaneous with the metalworking activities described above. It is therefore highly likely that this furnace and its associated finds—including moulds, crucibles, and slag—belong to the well known metalworking tradition associated with the Kura Araxes culture. The available evidence suggests that the site was inhabited during the Early Bronze Age by a community familiar with the material culture of the Kura Araxes horizon, including its characteristic pottery and metallurgical practices. The cultural remains of the excavated contexts, especially Context 226 and the layers below, show similarities to the Shengavit IV phase—considered one of the developmental stages of the Kura Araxes (Old Transcaucasian) culture—as well as to Yanik Tepe VI (Sagona, 2023). These findings suggest that the Qaleh Yeri–Kuraim site was one of the active centers of the Kura Araxes cultural sphere in the easternmost part of northwestern Iran during this period. The profile of the western wall of TTII at the end of the excavation is shown in Figure 22.

Conclusion

The stratigraphic excavation at Qaleh Yeri–Kuraim Tepe demonstrates a long, multi layered, and complex occupational sequence, characterized by both continuity and fluctuations in settlement patterns from the third millennium BCE to the Middle Islamic period. The results of the first excavation season allow a relative reconstruction of the site's cultural and occupational development and provide important evidence for refining the regional chronology of the easternmost part of northwestern Iran. The significance of these findings lies not only in establishing the stratigraphic sequence but also in identifying phases of change, discontinuity, continuity, and reoccupation within the site. The finds from the deepest cultural layers—especially in TTII and in Contexts 101–113 of TTI—indicate that the earliest phase of occupation at the site dates to the Early Bronze Age and corresponds to the Kura Araxes (Old Transcaucasian) cultural horizon. The high concentration of burnished black and gray wares with geometric incised decoration, together with the remains of dry stone architecture and evidence of industrial kilns, points to the existence of an organized, active, and probably production

oriented settlement during the third millennium BCE. The similarity of these materials to assemblages from the South Caucasus, Eastern Anatolia, and the Lake Urmia basin places the site within the broader Kura Araxes cultural sphere and indicates that Qaleh Yeri–Kuraim was not a peripheral settlement but one of the important eastern centers of this cultural tradition. Accordingly, during the Bronze Age, Qaleh Yeri–Kuraim functioned not only as a habitation site but also as a place of production. Recent archaeometric studies of Kura Araxes pottery assemblages from northwestern Iran further support this interpretation, demonstrating that communities in this region maintained strong technological and cultural links with the core Caucasian zone while simultaneously developing localized ceramic traditions (Maziar & Erfurth, 2025).

Stratigraphic evidence indicates that occupation at the site was not continuous but was interrupted by at least two major hiatuses. The first, dated to the transition from the Bronze Age to the Iron Age at a depth of approximately 10.8–11 m, represents a significant break in occupation. The second occurs at depths of 5.25–5.5 m and marks the boundary between the Historic and early Islamic periods. These discontinuities suggest that the occupational history of the site was episodic rather than continuous and was shaped by changing environmental and cultural conditions. In addition, data from TTI—particularly from levels associated with the Iron Age and the Historic period—indicate that the site during these phases functioned as more than a simple residential settlement and may have developed industrial and possibly defensive characteristics. The presence of a substantial mudbrick wall, a metallurgical mould, and features associated with a furnace suggests that the area functioned as a combined settlement and production space and possibly as a fortified workshop during this period. From a methodological perspective, this study demonstrates that, even in the absence of absolute dating, a combined approach integrating stratigraphy, pottery typology, and interregional comparison can provide a reliable framework for constructing relative chronologies. The correspondence between the ceramic and architectural evidence from Qaleh Yeri–Kuraim and established cultural horizons in the South Caucasus, Eastern Anatolia, and northwestern Iran allows the site to be placed within a broader regional chronological context. Furthermore, the possible influence of tectonic factors—particularly the Sangavar Fault—may help explain some of the occupational discontinuities identified at the site, highlighting the importance of interdisciplinary approaches such as geoarchaeology and geomorphology in the analysis and interpretation of archaeological data. The site contributes to a better understanding of the Kura Araxes horizon in northwestern Iran and, by revealing patterns of continuity and interruption in settlement, provides a more realistic picture of the cultural and environmental dynamics of the region. Accordingly, the continuation of stratigraphic excavations, together with absolute dating and supplementary studies

in pottery typology, technical analyses, geoarchaeology, and laboratory investigations, will further refine this framework and improve the chronological understanding of both the site and the region.

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Author Contribution

The contribution of all authors to the writing of the article has been equal.

Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

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نویافته‌های کاوش لایه‌نگاری در محوطهٔ قلعه یئری کورائیم، اردبیل

رحمت عباس‌نژادسرستی[I]، شیدا اشرفی[II]، نرجس حیدری[III]

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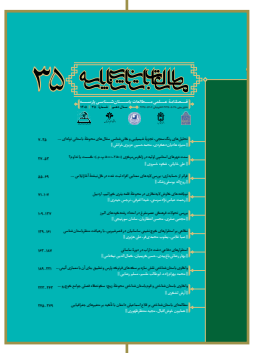

چکیده

محوطه‌های باستانی دشت اردبیل شواهدی بنیادین برای شناخت توالی‌های فرهنگی شمال‌غرب ایران و بررسی تعاملات این منطقه با فلات ایران، قفقاز جنوبی و آناتولی شرقی فراهم می‌کنند. درمیان این محوطه‌ها، تپهٔ قلعه‌یئری کورائیم از اهمیت ویژه‌ای برخوردار است. نتایج نخستین فصل کاوش‌های لایه‌نگارانه این محوطه در ۱۴۰۲هـ.ش. براساس داده‌های کاوش دو گمانه حاصل شده است. گمانهٔ I با هدف دستیابی به توالی کامل استقراری محوطه و گمانهٔ II با تمرکز بر نهشته‌های مرتبط با افق عصر مفرغ قدیم ماوراءقفقاز (کورا-ارس) ایجاد شد. کاوش‌ها شواهد باستان‌شناختی قابل‌توجهی شامل بقایای معماری سنگ‌چین خشک و خشت‌گلی، تأسیسات صنعتی نظیر کوره‌ها، شواهد فلزکاری و مجموعه‌های گستردهٔ سفالی را آشکار ساخت. در گمانهٔ I توالی لایه‌نگاری منسجم و نسبتاً کاملی به ضخامت حدود ۱۴٫۶متر مستند شد که دربرگیرندهٔ لایه‌های متوالی و گاه متناوب دارای سفال‌های دوران اسلامی، تاریخی و عصر مفرغ است. این توالی یکی از پیوسته‌ترین شواهد لایه‌نگاری شناخته‌شده در بخش شرقی شمال‌غرب ایران به‌شمار می‌رود. در گمانهٔ II شواهد مهمی از فعالیت‌های فلزکاری شامل: بقایای کوره، سرباره، قطعات سنگ معدن مس، قالب‌های سفالی و بوته‌های فلزگری به‌دست آمد که نشان‌دهندهٔ ذوب، پالایش و تولید اشیائ فلزی در عصر مفرغ قدیم است؛ هم‌چنین بقایای جانوری، عمدتاً گوسفند و گاو، و بقایای گیاهی به‌ویژه گندم و جو، بیانگر اقتصادی مبتنی‌بر کشاورزی و دامداری است. یافته‌های ویژه‌ای هم‌چون ابزارهای ابسیدینی، سردوک‌ها، سنگ‌ساب‌ها، ابزارهای استخوانی و پیکرک‌های سفالی نیز گویای فعالیت‌های معیشتی، اقتصادی و نمادین جوامع ساکن محوطه از عصر مفرغ تا دوره‌های تاریخی و اسلامی هستند. باتوجه به فقدان تاریخ‌گذاری مطلق، چارچوب گاهنگاری محوطه برپایهٔ گاهنگاری نسبی و گونه‌شناسی سفال استوار است. نتایج پژوهش، تداوم بلندمدت استقرار را نشان می‌دهد که با دو وقفهٔ عمدهٔ سکونتی، احتمالاً درنتیجه فعالیت‌های زمین‌ساختی مرتبط با گسل سنگاور و نیز تحولات محیطی و تاریخی منطقه، همراه بوده است.

کلیدواژگان: دشت اردبیل، کاوش لایه‌نگاری،قلعه‌یئری کورائیم، توالی لایه‌های فرهنگی، دورهٔ مفرغ قدیم، فلزگری کهن.

I. گروه باستان‌شناسی، دانشکدهٔ هنر و معماری، دانشگاه مازندران، بابلسر، ایران (نویسندهٔ مسئول).
Email: r.abbasnejad@umz.ac.ir
II. گروه باستان‌شناسی، دانشکدهٔ هنر و معماری، دانشگاه مازندران، بابلسر، ایران.
III. گروه باستان‌شناسی، مؤسسه آموزش‌عالی نیما، محمودآباد، ایران.

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