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Agili Dere in Azerbaijan's Zayamchai Valley: A Late Chalcolithic Settlement and Late Bronze–Early Iron Age Burials

Agili Dere en el valle del Zayamchai, Azerbaiyán: un asentamiento del Calcolítico final y enterramientos del Bronce final–inicios de la Edad del Hierro

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Abstract
Agili Dere, located in the Zayamchai River Valley in western Azerbaijan, provides evidence of Late Chalcolithic settlement and the subsequent use of the site for burial during the Late Bronze–Early Iron Age. This study examines settlement remains and funerary contexts documented during rescue excavations conducted in 2005 and 2014 in connection with pipeline construction. Stratigraphic observations, ceramic and lithic finds, and burial contexts are considered together to distinguish the site's principal phases of use and situate them within the archaeological framework of the Middle Kura Basin. Excavations revealed a Late Chalcolithic cultural deposit containing pottery attributed to the Leylatepe culture, alongside six intrusive graves dating to the Late Bronze–Early Iron Age. The insertion of these graves into earlier settlement deposits demonstrates two chronologically distinct uses of the same location, without establishing continuous occupation between them. Agricultural ploughing and the mechanical removal of approximately 30 cm of topsoil before excavation restricted the interpretation of the upper deposits. Nevertheless, the surviving archaeological contexts provide valuable evidence for prehistoric settlement and mortuary activity in the region. Agili Dere contributes to understanding the later funerary reuse of settlement sites in the South Caucasus and highlights the importance of rescue archaeology in documenting stratigraphically complex sites affected by infrastructure development.
Keywords: Agili Dere; Leylatepe culture; Late Chalcolithic; Late Bronze–Early Iron Age; funerary practices; South Caucasus.

Resumen
Agili Dere, situado en el valle del río Zayamchai, en el oeste de Azerbaiyán, aporta evidencias sobre la ocupación durante el Calcolítico final y la posterior utilización funeraria del lugar durante el Bronce final y los inicios de la Edad del Hierro. Este estudio examina los restos del asentamiento y los enterramientos documentados en las excavaciones de rescate realizadas en 2005 y 2014, vinculadas a la construcción de infraestructuras de gasoductos y oleoductos. El análisis integra las observaciones estratigráficas, los materiales cerámicos y líticos y los contextos funerarios para caracterizar las fases de utilización del yacimiento y situarlas en el marco arqueológico de la cuenca media del Kura. Las excavaciones identificaron un depósito cultural del Calcolítico final con cerámicas atribuibles a la cultura de Leylatepe, así como seis tumbas intrusivas correspondientes al Bronce final y los inicios de la Edad del Hierro. La presencia de estos enterramientos en los depósitos del asentamiento permite distinguir dos usos cronológicamente diferenciados del mismo espacio, sin que ello demuestre una ocupación continua entre ambos períodos. Aunque el laboreo agrícola y la retirada mecánica de la capa superficial limitaron la conservación y la interpretación de los niveles superiores, los contextos subsistentes ofrecen información relevante sobre el poblamiento prehistórico y las prácticas funerarias de la región. Agili Dere contribuye así al conocimiento de la reutilización de antiguos espacios de asentamiento como lugares de enterramiento en el Cáucaso meridional.
Palabras clave: Agili Dere; cultura de Leylatepe; Calcolítico final; Bronce final–Edad del Hierro inicial; prácticas funerarias; Cáucaso meridional.

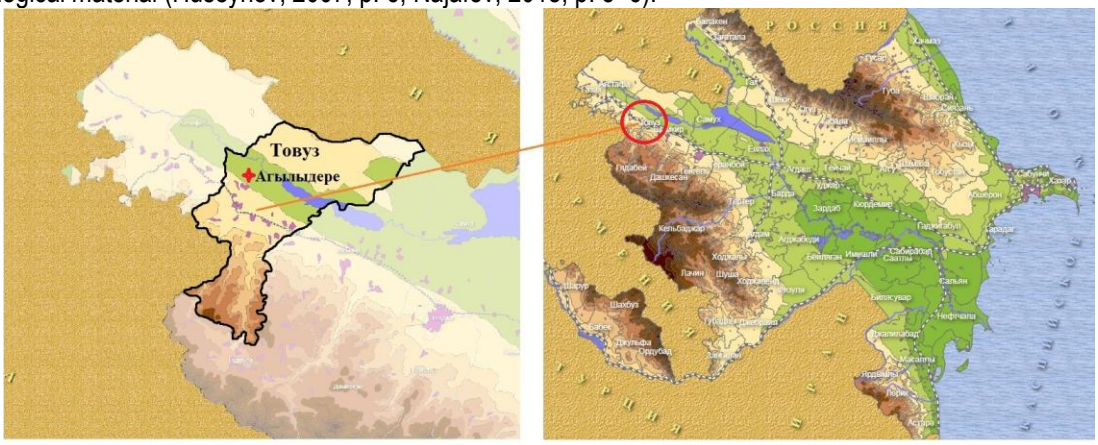
Introduction

The Agili Dere settlement was discovered during construction of the BTC pipeline in 2005 year. The settlement was revealed as a result of the archaeological monitoring conducted during the removal of the upper soil layer on the BTC route in connection with the construction of pipelines. Archaeological excavation was planned on the route of SCPX ahead of construction. The Agili Dere monument is located 1 km northwest of the Eyyublu village in the Tovuz district a 5 km south of the right bank of the Kura river (Fig. 1, *1*–*2*). It is situated at the end of the plain 1.2 km west of the Zayam riverbed at the foot of a low slanting hill (Fig. 2). This territory has predominantly fertile dark grey and black soil, which is suitable for sowing (Huseynov, 2007, p. 5; Najafov, 2018, p. 2).

The ground at the site had been frequently ploughed because the entire area had been planted as a vineyard (Fig. 1, *2*). Pottery pieces and stone objects were lifted from within the plough furrows that could be clearly seen on the ground surface. More cultural material was recovered from the lower subsoil layer. The majority of pottery ware collected belonged to the Leylatepe archaeological culture (Huseynov, 2007, p. 5).

It was impossible to precisely study the cultural content of the uppermost soil layer because during site preparation for the construction of the pipelines, a 30 cm thick topsoil had already been removed by machines. The spoil heap stacked along the construction corridor contained pieces of pottery and other archaeological evidence of Chalcolithic date. The 0.3–1.5 m thick lower layer of the site produced Late Chalcolithic material (Najafov, 2018, p. 2–3).

Six intrusive graves (Bronze Age graves) were detected at a depth of 0.5–1.5 m. The graves contained rich archaeological material (Huseynov, 2007, p. 6; Najafov, 2018, p. 5–6).



1



2

Fig. 1. 1 – location of Agili Dere settlement (author Sh.N. Najafov); 2 – general view of excavation area (photo by F.R. Huseynov).

Archaeological excavations in Agili Dere Chalcolithic settlement

In total, structural remains, storage pits, a potter's kiln, hearth places, six intrusive graves, potteries, metal & stone objects, beads were unearthed within the lower soil layer of the Agili Dere site. In this research the finds from excavation site I on BTC trench (ES–1) (Fig. 3) are presented and then the finds from excavation sites II on SCPX trench (ES–2).

Structural remains. In excavation sites II (ES–2) excavation at a depth of 1 m revealed structural remains (Najafov, 2018). Remains of 2 structures were recorded in this layer. *Structure 1* was located in the north-east section of the excavation site, in unit VII (ES–2). The structure of an oval shape had mud walls, 25–30 cm high and 40–55 cm wide. There were 10–12 cm diameter cavities, presumably post holes on the wall. The construction fairly well preserved had an entrance, 2.9 m long by 2.35 m wide on its southern side. The pit had an ash-rich fill containing pottery sherds, cattle bones and other archaeological material. A hearth was revealed inside this structure. *Structure 2* was located at the balk of unit VII and unit VIII (ES–2). This elongated rectanglar feature was 3.9 m east-west by 1.45 cm north-south. The walls measured 50–55 cm in thickness and 20–25 cm in height. There were 28–35 cm diameter and 12–15 cm deep holes, presumably post holes on the end of the northern wall close to the entrance of the structure. The ash-rich soil layer inside the structure produced pottery sherds, stone implements, including flint and obsidian blades and bone objects (Najafov, 2018). *Structure 3* was exposed in unit VIII (ES–2). The structure constructed of clay mortar had a rectangular shape and measured 25–27 cm in height. The wall thickness varied: the south-west wall was 42 cm wide, north-west wall was 50 cm wide and north-east wall was 48 cm wide. No wall remains were detected on the 3.2 m long south-east side which implied the entrance was on this side of the structure. The feature was 3.35 m long northeast-southwest by 2.5 m wide southeast-northwest. The floor of the structure was covered with an ash-rich soil layer and produced pottery sherds, cattle bones and other objects (Najafov, 2018).

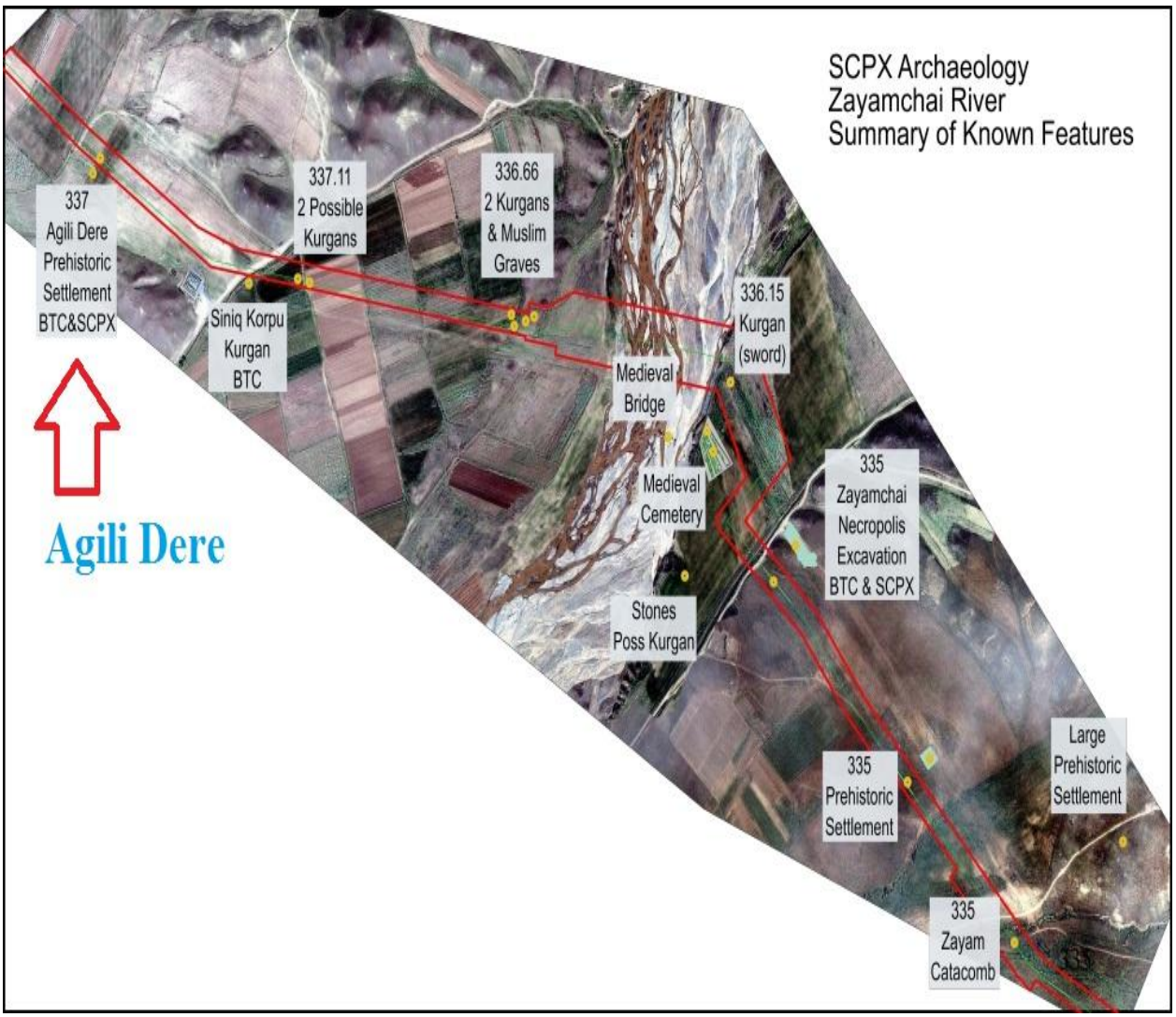


Fig. 2. Zayamchai river: summary of known features (author D. Maynard).

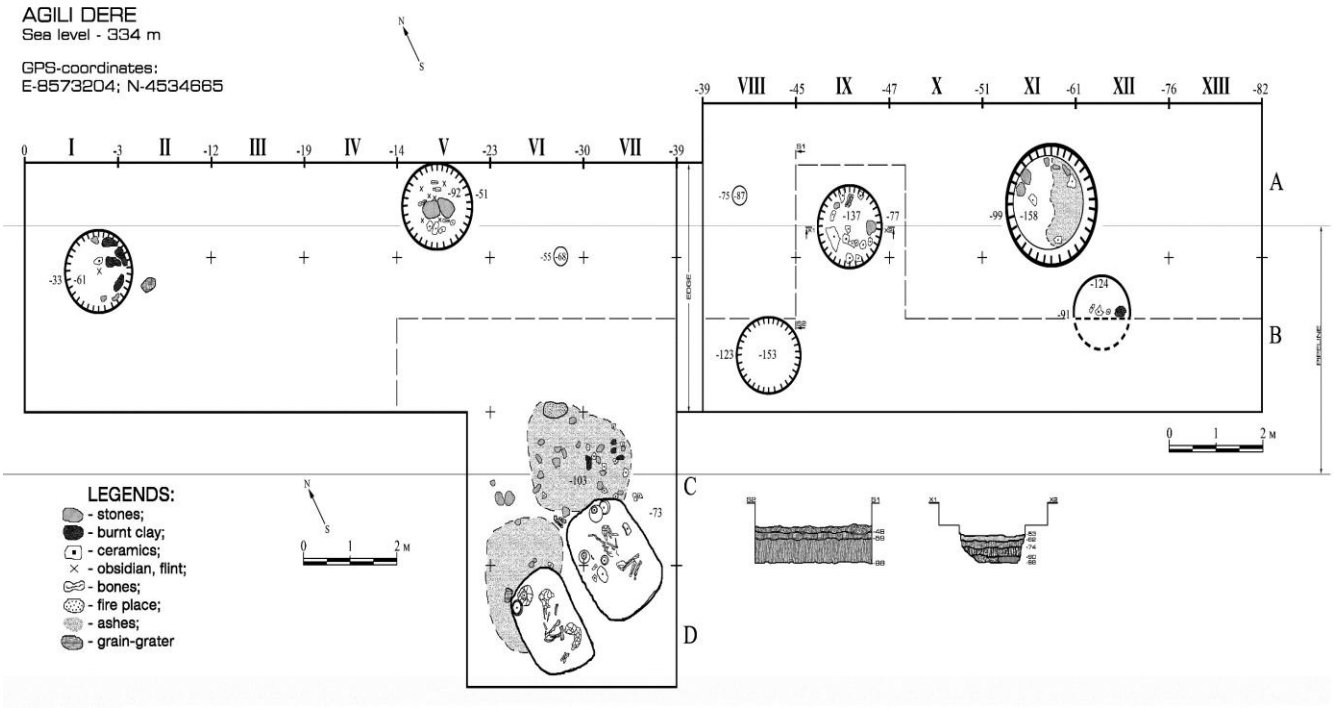


Fig. 3. Plan excavation site No I (ES–1) (author F.R. Huseynov).

Storage pits. *Storage pit No 1* was discovered in a borrow pit that fell within unit VIII–B (ES–1). It had a cylindrical shape and was 1.35 m in diameter. The floor of the storage pit was reached at 1.15 m depth. The storage pit truncated by a digging machine survived to a depth of 0.3m (Fig. 4, *1*). The pit produced pottery pieces of Chalcolithic date (Huseynov, 2007, p. 6). *Storage pit No 2* exposed at 0.38 m depth in unit IX–A extended to a depth of 0.98 m (ES–1). This was a roughly cylindrical feature measuring 1.25 m in diameter (Fig. 4, *2*). The northwest section of the pit was somewhat narrow at 0.74 cm depth. The pit had a fill consisting of five layers of ash deposits which contained Chalcolithic pottery, stone tools and osteological remains. The pit was assumed to have been originally intended for use as a rubbish pit. *Storage pit No 3* was located in the west corner of unit XI–A with a smaller portion extending into unit XII–A (ES–1). The top edge of the storage pit was exposed at 0.6 m depth; the bottom was reached at 1.19 m depth. The pit mouth had the shape of a round-cornered square with 0.6–0.7 m sides. The pit, widening downward like a cone, measured 1.5 m in mid-section diameter and 2 m in bottom diameter. Heart-affected stones and ash could be seen in the southeast part of the pit. When cleared out, the pit yielded Chalcolithic pottery, fragments of flint and obsidian tools and osteological remains (Huseynov, 2007, p. 6). *Storage pit No 4* was uncovered 0.12 m below the surface of subsoil in unit V–A (ES–1). It had a circular shape, measured 1.15 m in mouth diameter and extended to a depth of 0.56 m where the bottom diameter was 1.5 m. The preserved depth of the pit was 0.44 m. Burnt clay and heat-affected Chalcolithic pottery, stone tools (Fig. 4*, 3*) and osteological remains were contained in the pit. *Storage pit No 5* was revealed at a depth of 0.06 m at the baulk of units I–A, I–B, II–A and II–B (ES–1). It had a cylindrical shape and measured 1.25–1.3 m in diameter. The pit floor was reached at 0.34 m depth. The preserved depth was 0.28 m. The pit fill consisted of burnt ash-rich clay (Huseynov, 2007, p. 6). *Storage pit No 6* was found at 0.8 m depth in unit VII (ES–2). The pit measuring 80x75 cm in diameter and 73 cm in depth contained pottery sherds, animal bone and stone objects. *Storage pit No 7* was located at a depth of 1 m in the west corner of unit VI (ES–2) and measured 1.5 m in diameter and 1 m in depth. The pit fill consisted of an ashy soil layer. When cleared out this layer produced pottery sherds, animal bone and stone implements. Animal bones were largely represented by cattle thigh-bones and ribs. *Storage pit No 8* was located at 1 m depth at the balk of unit VIII and IX (ES–2). The pit could not be fully cleared out as it extended beyond the confines of the quadrat. Nevetheless it yielded measurements. It was 1.1 m in diameter and 55 cm deep. Animal bone and pottery sherds were contained in the pit (Najafov, 2018).

Potter's kiln. A patch of fire-reddened ground interpreted as a kiln was unearthed in unit XII–B (ES–1). The southern section of the kiln had already been damaged by the trenching machine. The feature exposed 0.52 m below the surface was 1.1–1.15 m in diameter and 0.85 m deep. It had a red ashy fill over a clay plastered base and contained large quantities of high quality Chalcolithic pottery (Huseynov, 2007, p. 6).

Hearth places. This circular feature measuring 0.50–0.60 m in diameter was discovered at the baulk of units VII–B and VII–C (ES–1). Its northern section had been damaged by the trenching machine. The base of the hearth places was

heat-affected and had a 0.3 m thick ash layer in its southwest part. Intact querns and Chalcolithic pottery were contained within this ash layer (Huseynov, 2007, p. 6–7).

A ruined facility with the diameter of about 2x3 m that included a large numbers of Chalcolithic-era pottery sherds was discovered adjacent to unit VII northwest walls and close to the northeast wall of unit 8 (ES–2) (Najafov, 2018, p. 4). The discovery was recorded at the depth of 0.9–1.1 m. An average size pitcher placed side up was found on the site. Although the pitcher had crumbled, all of its fragments were found on the spot and the item was restored. The vessel has a high rim that protrudes outward. The body is rather spherical, while the bottom is rounded. Vessels of this type are typical of the Chalcolithic period that lacked bases. A number of such vessels were found in Boyuk Kasik and the Poylu II settlements during the laying of the BTC pipeline (Museyibli, 2007; Museyibli, 2011; Taylor et al., 2011). Numerous animal bones were found near the pitcher. These included ribs and thigh bones of sheep and goats. Some of these bones were blackened due to significant burning. A number of coal remains, obsidian and flint cutting tools were found around the pitcher. One stone amulet was obtained during the cleaning in this complex. Other finds recorded in this facility included polished jug, pitcher and jar sherds that were of high quality despite vegetative admixtures in their clay composition, as well as roughly made ceramic with vegetative and sand admixtures. Evidently, the “high quality” and “rough” ceramic categories were already distinguished in the pottery making craft of Agili Dere residents at the end of the Chalcolithic period (Najafov, 2018, p. 7).



Fig. 4. 1, 2 – storage pits No 1 & 2 (unit VIII–B & IX–A, ES–1); 3 – stone tool (unit IV, ES–2); 4 – pitcher (unit VII, ES–2) (photos by Sh.N. Najafov & F.R. Huseynov)

The bones found at ES–2 depths (0.4–1 m) were mainly thigh bones and ribs of sheep and goats and some of these were affected by burning (Najafov, 2018, p. 4–5). The animal bones were found in piles alongside clay vessels and stone items. It is particularly worth pointing out that all the clay vessels found in the area were fragmented and date exclusively to the late Chalcolithic period. In addition to the piles of ceramic samples and animal bones, sparse Chalcolithic-era ceramic items with vegetative admixtures were encountered in different parts of the excavated units, in particular, in units 7, 8 and partially in units 6 and 9 following the depth of 0.9 m. These ceramic samples mainly included rim and body fragments of pottery vessels. Their bases were rounded with thick walls. Interestingly, the

Chalcolithic-era layer was observed only in units 7, 8 and partially in units 6 and 9 (ES–2). It appears that the main part of the Agili Dere settlement, or rather, the most abundant section of the occupation layer, was excavated and studied during construction of the BTC pipeline (Najafov, 2018, p. 4–5).



Fig. 5. Chalcolithic ceramics of Agili Dere (photos by F.R. Huseynov).

Chalcolithic artefacts: collection and analysis

The Agili Dere settlement site produced rich archaeological material the larger proportion of which is represented by pottery ware of Late Chalcolithic date. Forms include platter, bowl, kuza, jug and jar-type pots of different sizes (Fig. 5; 6; 11). The fragments recovered from the site come from pots made of different kinds of clay often tempered with plant and sand.

Ceramic. As regards firing, along with well fired pots there are poorly fired ones among the finds. The additives to the clay composition had also certain effect on the firing quality of pots. Different quality of firing was conditioned by the future function of the pot, as well as its shape, size and wall thickness. In addition, of great importance were the skills and workmanship of potters (Huseynov, 2007, p. 7–9; Najafov, 2018, p. 6–7).

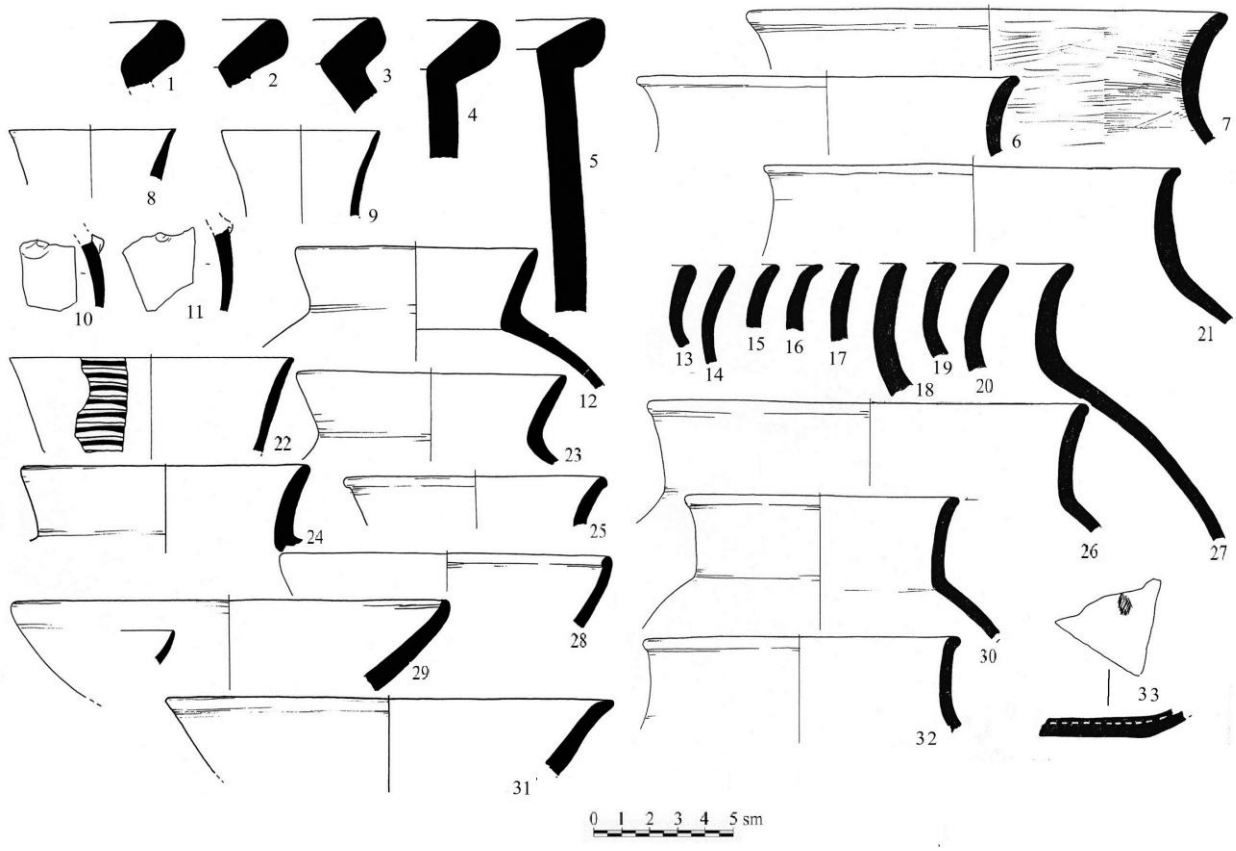


Fig. 6. Chalcolithic ceramics of Agili Dere.

Pottery is no doubt the major evidence for characterization of the Agili Dere settlement site. The pottery wares recovered from late Chalcolithic sites, including the Leylatepe settlement are divided by researchers into three groups according to their fabric, i.e. those made of: 1) plant tempered clay, 2) untempered clay and 3) clay, tempered with non-organic additives such as grit, sand or quartz (Museyibli, 2005, p. 136). The first and second group of pottery ware fall into the category of quality ceramics, whereas the third group is considered to be coarse ceramics. Pottery of all the three groups was found at Agili Dere site (Huseynov, 2007, p. 7).

A total of 2896 pottery sherds were found at the Agili Dere site. Of these 2209 fragments represent quality ceramics, while 687 pieces come from heavy clay products. The Chalcolithic pottery assemblage is plain in style which is indicative of plain household economy and lack of experience in pottery amaking (Najafov, 2018, p. 7–8). A certain proportion of pottery ware is straw-tempered heavy clay product made of poorly kneaded clay and poorly fired at an unstable temperature. The majority of pottery finds are of a red colour. There are also red, reddish and brown ceramic fragments having a black interlayer and irregular grey spots on the surface. The site produced a single fragment of a paint decorated pot. Several of the Chalcolithic pots have combed decorations (Najafov, 2018, p. 7–8). The distinguishing attribute of the Agili Dere pottery and those of Leylatepe Culture in general is that these are wheel-thrown plant-tempered pots that in most cases have rounded bases (Museyibli, 2011).

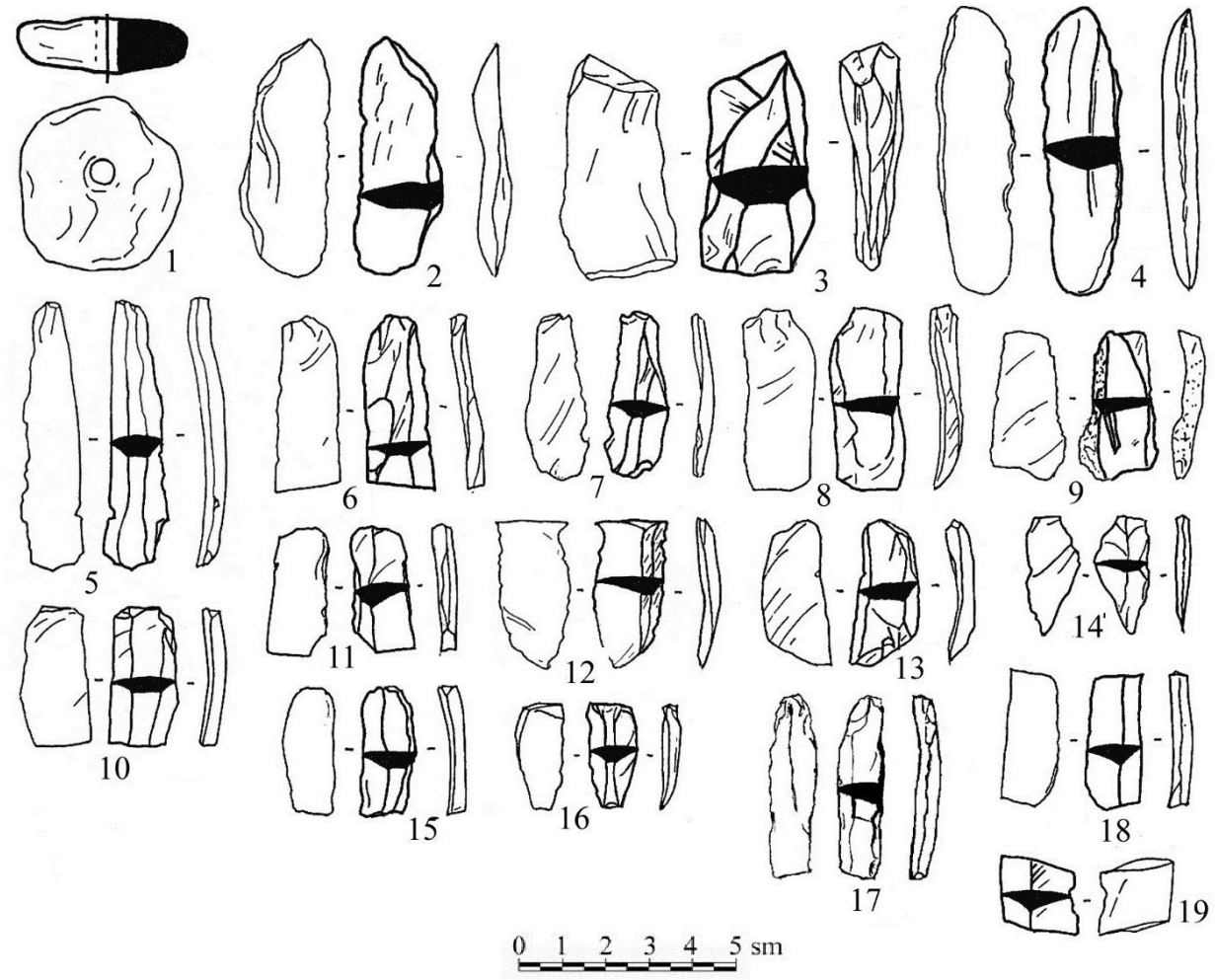


Fig. 7. Stone objects of Agili Dere settlement: spindle whorl (1), obsidian cutting tools (2–3, 6–9. 11, 13–15, 19) & flint cutting tools (4–5, 10, 12, 16–18).

One of the several *platter* fragments recovered from the site is worth special consideration. It comes from a straw-tempered pot with a slightly everted rim. The pot fired to a light orange colour bears traces of cream angobe on its outer surface. Both the interior and exterior surfaces are polished (Fig. 6, *31*). *Bowls* have slightly incurving rims (Huseynov, 2007, p. 8). They have polished interior and exterior surfaces of a light brown colour (Fig. 6, *12*). One of the fragments

represents a plant-tempered bowl having a greyish film on the surface caused by uneven firing (Fig. 6, *27*). *Kuzas* are fine sand-tempered pots well fired at a stable temperature to a light red colour (Fig. 5, *2*; 6, *22*). The majority of such pots have high necks and rounded bases. One of the rim fragments represents a paint decorated kuza made of untampered clay and fired to a light brown colour. Traces left by a potter's wheel are visible on its outer surface. The pot is decorated with alternating thick and thin parallel strips horizontally applied in black paint to the pot surface. Mouth diameter 17 cm. The pot is clearly distinct from the pottery samples typical of the site and entire area (Huseynov, 2007, p. 9). *Pitchers* are thick walled, well fired and brown coloured vessels with vegetative and sand admixtures in the clay composition (Fig. 4, *4*). These vessels have narrow and long necks (Najafov, 2018, p. 8). Some of these were red coloured items with wide rims. Their rim has a welt and is bent outward. *Jugs* obtained in the area were large vessels of high quality with vegetative and sand admixtures in the clay composition, which were once used in the household (Fig. 6, *6, 7, 26, 30*). Their rim has a thick welt and is bent outward. Some of these vessels are well fired, pink coloured samples with surfaces covered with white angobe coating. The neck part is girdled by a canal-like line (Najafov, 2018, p. 8).

Pots were decorated using five different methods: thumbing, incising, moulding, painting and burnishing. The number of decorated vessels is small. As mentioned above, the rims of some jugs and small pots are decorated with differently oriented thumbed hollows and roundels. However, these patterns cannot be considered typical of the pottery found at Agili Dere. As shown above, the top of some rims have channel-like undercuts. In addition, the traditional decorating technique for the Agili Dere pottery and ceramic artefacts from the Leylatepe Culture in general is incision of single lines, arched criss-cross lines or wheat seed-shaped ornaments on pots. These decorations were commonly applied prior to firing. Some pots were decorated after firing. The majority of wheat seed-shaped and bow-shaped patterns are thumbed. Decorations are applied close to mouth, shoulder and base areas of pots. This technique was commonly used for decorating quality ceramics, i.e. plant tempered or untempered pots (Korenevskiy, 1999, p. 7–23; Museyibli, 2011).

Stone objects. The stone assemblage from the Agili Dere site is represented by pounding tools, querns, hand stones, flint and obsidian cutting tools (Huseynov, 2007, p. 9–10), (Fig. 4, *3;* 7; 8).

One of *querns* was found at 0.33 m depth in trench II–B (ES–1). Made of black porous tufa stone, the quern has an oval resting surface and slightly concave grinding surface. The survived quern fragment was 25 cm long by 16 cm wide and 5.5 cm thick (Fig. 8, *1*). Fragment of a quern exposed at a depth 1.03 m in trench VI–D (ES–1) was made of grey porous tufa stone. The resting surface is flat; the grinding surface is concave from long use. Length 19 cm, thickness 6.2 cm (Fig. 8, *6*).

Two stone tools used for *pounding or grinding* were recovered from the site. Both are chipped out of river-washed stones. These small tools carefully executed to allow comfortable handgrip have marks of use at both ends. Lengths 7.5–8 cm, diameters 7–7.5 cm (Fig. 8, *5*). Four items used as *hammering and smashing tools* were found in the settlement. These tools had been made of river rocks. The small samples were processed into suitable shapes for convenient use by hand and were subsequently used on both edges (Huseynov, 2007, p. 9–10).

Obsidian cutting tools can be divided into several groups. They have largely rectangular-oblong shapes and three or four faces. Some obsidian blades have one serrated edge, while others have two serrated edges (Najafov, 2018, p. 8). Some cutting edges became blunt from long use. These tools are thought to have been used as sickle teeth. The blades made of opaque and translucent obsidian flakes measure 3–4 cm to 8–9 cm in length and 1.5–2.2 cm in width (Fig. 7, *9, 11, 13–15, 19*). Obsidian blades could have been used as either knives or teeth of assembled sickles.



Fig. 8. Stone objects of Agili Dere settlement: querns (1–4, 6), pounding (5) & hammering and smashing tools (7–8) (photos by Sh.N. Najafov & F.R. Huseynov).

Flint cutting tools are of pink, dark brown or dark grey colour, have largely oblong rectangular shapes and three or four faces. Some flakes are knife-shaped with serrations on both edges. Others have serrations along one edge, while the other edge is sharp for attaching to a wooden or bone sickle frame. These blades are thought to have been used as front, mid and rear teeth of assembled sickles. Dimensions: length 3–6 cm to 10–11 cm, width 1.5 cm to 2.5 cm (Fig. 7, *4–5, 10–12, 16–18*). This is a distinct feature of the Agili Dere settlement in contrast to other Chalcolithic-era monuments, which normally have high proportions of obsidian and cherty. The abundance of working tools made of flint indicates that the ancient residents of this territory prioritized such tools in their domestic life (Huseynov, 2007, p. 9–10; Najafov, 2018, p. 8).

Spindle whorl recovered from the site is chipped of white limestone (Huseynov, 2007, p. 10). Diameter 5.6 cm, thickness 1.8 cm, whole diameter 0.8 cm (Fig. 7, *1*).



Fig. 9. Bronze Age graves in Agili Dere: 1– grave No 1 & No 2; 2 – grave No 3; 3 – grave No 4; 4 – grave No 6 (photos by F.R. Huseynov & Sh.N. Najafov).

Bronze Age graves

Six later graves rich in archaeological material and traced back to the Bronze Age were revealed in the dark grey colored gravelly soil layer during the excavations conducted at the depth of 0.5–1.5 m in the excavation. The burials were rich in tangible cultural remains, which dated to the Late Bronze and Early Iron Age, the late 2nd millennium and the early 1st millennium BC. The human remains buried there were mainly slightly or densely folded, in accordance with relevant burial customs (Najafov, 2017, p. 100–109).

Grave No 1. Grave No 1 was unearthed in units VI–C, VII–C and VII–D (ES–1). The burial chamber had the shape of a rectangle with oval corners. It had a north-east alignment and was 2.05 m long by 1.30 m wide and 0.95 m deep (Fig. 9, *1*). The skeleton was lying in a flexed position on its left side with the head at the north end. The left arm was flexed and lay close to the head; the right arm was stretched along the body (Huseynov, 2007, p. 7). Large quantities of pottery ware and jewellery were found in the grave. Grave No1 produced eight pottery pieces. These could be identified to forms to be graphically illustrated. The pottery sherds represent jug, bowl and cooking–type vessels with globular bodies and flat bases. The pots have polished surfaces; some are decorated with various ornaments. The jewellery recovered from grave includes bracelets, pendants, buttons and beads (bronze, stone, agate and paste).



Fig. 10. Artefacts Bronze Age graves in Agili Dere: 1–2 – daggers; 3–6 – bronze jewelry; 7–8 – beads paste and agate (photos by Sh.N. Najafov).

Grave No 2. This grave was uncovered in unit VI–D (ES–1), 30 cm west of grave No 1. The burial chamber was also rectangular shaped and had oval corners. It had a north-south alignment and measured 1.5 m north-south by l.85 m east-west (Fig. 9, *1*). Two skeletons were discovered in the burial chamber. One was in a flexed position on its left side with the head at the north end and appeared to belong to a female with short stature. The other was represented by child's skeletal remains placed against the knees of the woman's skeleton. This grave produced two ceramic fragments (Huseynov, 2007, p. 7).

Grave No 3 was discovered at the intersection of unit's 5 and 6 close to the southwest wall of unit 5 (ES–2). The burial chamber was 1.55 m long (in the east-west direction) and 1.45 m wide (in the north to south direction) (Fig. 9, *2*). Clay vessels, human skeleton remains and metal fragments were found inside. The burial stretched along the entire chamber, and orientated in the west-east direction. The skeleton was in a relatively good condition. Remains of the skull and a dental bone were found, along with a thigh, the spine and certain parts of the pelvis. The fact that finger bones were found in front of the skull showed that the hands were raised toward the face from the elbows and the dead body was buried in the half-folded position. Large river rocks were placed on the opposite side (Najafov, 2018, p. 5). Moreover, three big pitchers were put by the feet. All the three vessels had flat rims and convex bodies. Little boiler, bowl and platter fragments were found in the grave as well. The remaining parts of the human skeleton were obtained in the middle of the burial chamber. Two metal fragments, namely, a finger ring part and metal plates, were found in the central part of the grave (Fig. 10, *3–5*). Two bronze daggers were encountered during cleaning of the burial chamber, at a depth of 0.35 m (Fig. 10, *1–2*). These daggers, which have dome shaped latticed pommels (Najafov, 2017, p. 107–108), could be attributed to the first of the four types defined by A.A. Iessen (Iessen, 1935, p. 161–163). The blade of this type of dagger has a tongue to attach to the wooden support from above (Pogrebova, 2011, p. 38-39). The blade is

attached to the handle using a triangular latticed frame. The hilts of these daggers were decorated with net-like shaped lattices, similar to the pommels of the bronze daggers found in the Zayamchay necropolis graves (Museyibli, Najafov, 2019, p. 79–80). Daggers of this type were also found in Dovshanli No1 (four items), Akhmakhi kurgans No1, in Sarichoban (Jafarov, 2000, p. 77), Goygol and Khachbulag monuments (Kesamanly, 1999, p. 98–102), the Ganjachay basin, Mingachevir (Gaziyev, 1951, p. 10, fig. A, B), the Goyche lake basin, as well as in Georgia (Chubinishvili, 1952, p. 44).

Grave No 4. This soil grave was discovered at the depth of 0.7 m below the ground right in the middle of unit 3 (ES–2) (Fig. 9, *3*). Four clay vessels were found in the burial chamber. The first one was a boiler with a wide rim and a spherical body, which emerged at the northeast corner of the burial chamber. Three pitcher-type vessels were lined up in a row at the chamber's eastern corner. Soil in the chamber was yellow with clay admixture and differed from the surrounding soil. The chamber was 0.1 m wide (in the north to south direction) and 1.1 m long (in the west-east direction). Two more clay vessels (a total of six items) emerged after the mentioned vessels were removed. These were a little plate and a basin. No skeletons were found in the grave (Najafov, 2018, p. 5).



Fig. 11. Clay vessels from Bronze Age graves in Agili Dere (photos by Sh.N. Najafov).

Grave No 5. This grave was discovered 0.7 m below the ground toward the southwest wall of unit 2 (ES–2). Clay vessels and a human skeleton were found in the burial chamber. A bronze bracelet, agate and paste beads were found around the skeleton. The latter was located in the east part of the chamber, while the clay vessels were lined up in the west part above the skull. The burial chamber, which had a rather oval shape, was 1.7 m long and 1.55 m wide. No

rocks were found inside the burial chamber. The yellow colored soil in the grave was soft. The skeleton found in the grave was in poor condition. Parts of the skull, arms and thighs, as well as ribs, were the only bones to survive. The skeleton's condition made it clear that the dead body was half-folded and buried in the west-east direction with the face slanted southward. Beads made of agate and paste, a bracelet and a bronze pendent were found from the neck and chest parts of the skeleton. The pendants were made of thin bronze plate and shaped as a heart. The grave's floor was plastered. A total of seven clay vessels, namely, two boilers, a jar, two pitchers, a jug and a plate, were found (Najafov, 2018, p. 6).

Grave No 6 was found 0.5 m under the ground near the northwest wall of unit 4 (ES–2). A total of three average size stones were placed over the soil grave. Soil inside the grave contained hard clay which complicated the excavation. Therefore, the human skeleton found in the burial chamber was in poor condition and excavation was challenging. The burial chamber's length was 1.3 m (in the north to south direction). The chamber's depth was 45 cm. The human skeleton discovered in the chamber was inclined in the northwest to southeast direction. Most likely, the burial was conducted in this manner. The dead body was buried in a half-folded position on the right shoulder with the face slanted southward. A large set of paste & agate beads was found from the neck part, along with a big obsidian rock placed over the pelvic bone and the chest (Fig. 10, *7–8*). The rock, which was processed, might have been placed there due to a popular belief in stones. Furthermore, three vessels, namely, a boiler, a pitcher and a jar, as well as fragments of various clay vessels, were found in the burial chamber (Fig. 9, *4*). A medium size stone was placed near the pelvis part. The skull found in the grave was smashed and flattened, while the knee cap bones were found near the pelvic bone (Najafov, 2018, p. 6).

The pottery vessels found in the graves could be divided into two groups in terms of their designated purpose, namely, household items and domestic kitchenware (Fig. 11). Clay vessels of this type are inherent to the territories with the widespread Khojaly-Gadabay archaeological culture, as well as the entire South Caucasus region (Guseynova, 1989, p. 10). Such vessels are common for the Saritepe (Narimanov, Khalilov, 1962, p. 9–10, 13–15) and Sarvantepe settlements in the Gazakh district (Nadzhafov, 2018, p. 275–278); the Aziztepe necropolis (Najafov, 2021, p. 131–143); the kurgans in the Dashkasan district on the Goshgarchay bank (Kesamanly, 1999, p. 90–97); the kurgans of Gazanbulag & Avey (Nadzhafov et al., 2024, p. 70–83; Nadzhafov, 2026); the Hasansu necropolis of the Late Bronze Age and Early Iron Age located in the Aghstafa district (Huseynov, Najafov, 2013, p. 100–104); the Gazygulu necropolis (Nadzhafov, 2022, p. 118–129); the Zayamchay and Tovuzchay necropolis (Museyibli, Najafov, 2019; Najafov, Maynard, 2020; Museyibli et al., 2021) and most settlements of the same period in Gadabay (Khalilov, 1959); the Mughan fields; Hasan Zamini, Agaevlar, Chilakhana, Shirshir, Veri, Khoja Davud Kopru, Joni, Shuguladere, Kraveladi at the foot of the Talish mountains (Makhmudov, 2008, p. 15–20; Agalarzade, 2022, p. 135–138); various locations in Nakhichevan, Absheron (Djafarzade, 1948, p. 81–90), etc., as well as the Goyche lake basin in Armenia, Georgia's Samtavr cemetery (Chubinishvili, 1952, table 5), etc. The surface of these vessels is covered with wax. More precisely, it is slightly polished and smoothened and is also frequently decorated with depressed lines and stripes, cord-like, spike-like and grooved patterns.

Burial customs

It is noteworthy that the direction of the graves in the Agili Dere necropolis was the same as the direction of the bodies buried there. Most of the burial chambers were slanted in the north to south direction. No human remains were discovered in grave No 2 & No 4 (Huseynov, 2007, p. 7; Najafov, 2018, p. 5). The principle of following the same direction while conducting burials in the graves at the necropolis was somewhat anticipated (Najafov, 2017, p. 108). Thus, mostly graves positioned in the north to south direction were encountered inside the burial chambers. The skeletons were partially folded or even completely folded and placed in the graves upon the right and left shoulders (Huseynov, 2007; Taylor et al., 2011). It is worth mentioning that traces of such burials have been tracked in most of Azerbaijan's burial monuments dating to the Late Bronze Age and Early Iron Age. This is similar to some material discovered in the monuments pertaining to the Khojaly-Gadabay culture and are attributed to the same chronological range (Khalilov, 1959; Museyibli, Najafov, 2019; Huseynov, Najafov, 2013). Based on the burial traditions and the analysis of the obtained archaeological samples, the Agili Dere soil graves could be traced to the Late Bronze Age and beginning of the Iron Age, i.e. the late 2nd millennium and the early 1st millennium BC.

Dating and chronology of Agili Dere settlement

The determination of the chronological range of the ancient Agili Dere settlement is based on comparative analysis of the obtained samples of tangible culture and special tests. Scholars concluded on the basis of similar analysis, stratigraphic conclusions and the typological features of the discovered ceramic items that the first settlement in Agili Dere dates to the Late Chalcolithic period (the first half of the 4th millennium BC), while the six graves found in the occupation layer of the monument are of the Late Bronze and Early Iron Age (II-I millennium BC) (Huseynov, 2007; Najafov, 2017, p. 107–108).

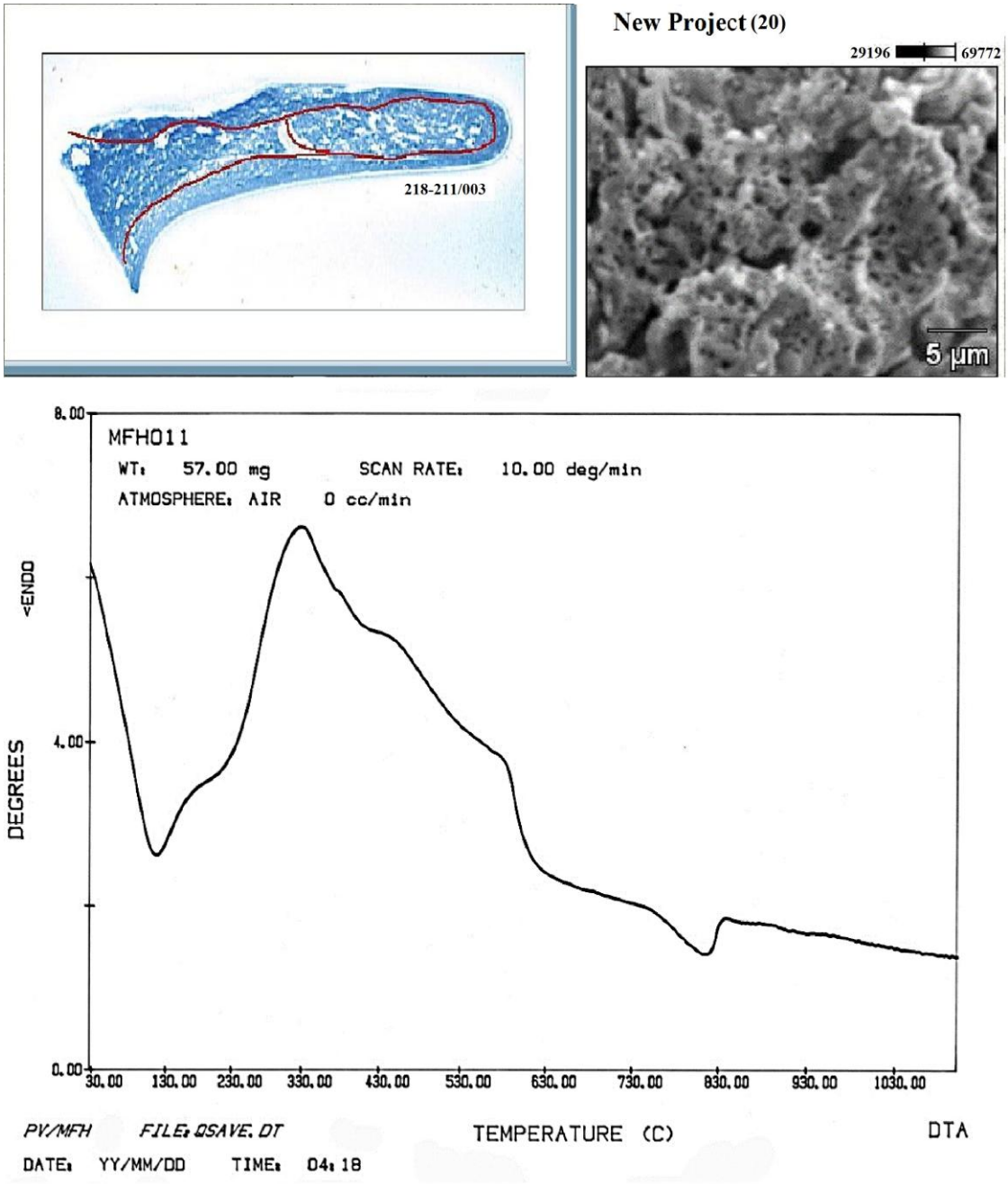


Fig. 12. Differential thermal analysis or DTA.

As noted above, like other Leylatepe Culture sites (Boyuk Kasik, II Poylu) the Agili Dere site is closely related to the north Ubaid Culture (Narimanov, 1985, p. 271-272; Museyibli, 2007; Huseynov, 2007; Museyibli, 2011; Najafov, 2017, p. 107–108). As is commonly accepted the North Ubaid Culture was also widespread in areas around Urmia and most likely it penetrated into the South Caucasus from these territories (Narimanov, 1985, p. 272; Museyibli, 2007; Museyibli, 2008; Museyibli, 2011). Radiocarbon dating of samples from the Pijdali Tepe, one of the settlement sites located around Urmia showed that the lower cultural layer of this site was coeval with the North Ubaid period. This layer was dated to the first half of the 4th millennium, B.C. (3857±99; 3688±85; 3674±164; 3510±160) (Munchaev, 1975, p. 122; Korenevskiy, 1999). In addition to pottery ware typical of the Leylatepe Culture the Agili Dere site and other similar settlement sites (Boyuk Kasik, II Poylu, Khojakhan) produced Shomutepe – and Kultepe-type pottery fragments. Pottery samples dating to the Shomutepe Culture, especially to its final stages were encountered at the Agili Dere, Boyuk Kasik and Poylu II archaeological sites (Museyibli, 2011). The majority of these are pots tempered with non-organic additives. At Agili Dere such pottery constitutes 20–25% of all pottery finds. Fragments of pots with combed surfaces typical of the Late Chalcolithic (first half of the 4th millennium BC.) monuments of the South Caucasus were recovered from the Agili Dere, Leylatepe (Aliev, Narimanov, 2001, p. 19) and Poylu II settlement sites (Museyibli, 2008).

The excavations carried out at the Agili Dere site are of all Caucasus importance. One of the distinguishing features of this archaeological monument from other similar sites is that it belonged to a culture that was local (aboriginal) to the area. From this point of view, the artefacts recovered from the archaeological site differ from the rest by their peculiar characteristic features.

Differential thermal analysis or DTA

Samples of Chalcolithic pottery were retained for laboratory differential thermal analysis. These were analysed at Archaeometry Laboratory, University of Missouri (Archaeometry Laboratory, Missouri University Research Reactor, University of Missouri, Columbia, MO 65211) (Huseynov, 2007, p. 5).

Differential Thermal Analysis or DTA, is useful for describing the bulk chemical profile of the clay and characterizing the sample as either a montmorillonite, spectate, kaolinite, or illite.

An important step in understanding the primary working properties of the clay from site, a Stokes Law Separation was performed. This analysis involves dissolving a measured quantity of clay in water and calculating the fraction of sand, silt and clay in each sample (Fig. 12).

Agili Dere: High silt measurement and fine clays remaining in suspension. These numbers are estimates. 12.5% sand, 79.5% silt (both coarse and fine), 8% clay (Huseynov, 2007, p. 26).

Re-firing tests were carried out in order to assess the range of kiln and firing techniques that may have been used in Agili Dere. Small samples of a representative collection of sherds were re-fired at sequentially higher temperatures (Fig. 12).

In general, the lowest temperature firings ranging between 700-800 degrees Celsius and are found for most pottery samples at Agili Dere.

Conclusions & analytical results

The parameters of features revealed during excavations and comparative analysis together with the stylist study of the archaeological material recovered allowed the Agili Dere site to be classified as a one-layer archaeological monument. The upper soil layers of the site had been greatly damaged by ongoing ploughing and recent topsoil stripping related to pipeline construction. The layer of the site measuring 1.5 m in thickness produced features dating to the Late Chalcolithic – structural remains, storage pits, a hearth and a potter's kiln. In addition, six intrusive graves of Late Bronze & Early Iron Age date were uncovered within the Chalcolithic cultural layer (Najafov, 2018, p. 9).

Pottery ware prevails among the finds recovered from the Agili Dere settlement site. The analytical study of the manufacturing technique and typological analysis of the pottery ware recovered from the site make it possible to characterize the pottery industry in this area as possessing distinctive features and the tribes that occupied the area as very skilful in the art of pottery making.

The majority of harvest and cutting tools revealed at the archaeological site are made of flint. This is worth special consideration as tools of this type discovered at other Late Chalcolithic sites, including the Boyuk Kasik settlement site are also largely made of flint (Museyibli, 2005; Museyibli, 2007; Museyibli, 2008; Museyibli, 2011). The great skill, with which these cutting tools were made of flint, notable for its hardness, attests to a high level of development of the art of stone working in the area. Excavations at Agili Dere and similar sites (Boyuk Kasik, II Poylu) have revealed drastic differences between the Leylatepe stone ware and similar stone assemblages from other coeval sites. It was established that significant prevalence of flint cutting tools over those made of obsidian is one of the characteristic traits of the Leylatepe Culture (Museyibli, 2007; Museyibli, 2008; Museyibli, 2011). Prevalence of flint tools at Agili Dere, also Boyuk Kasik and Poylu II sites could possibly be interpreted as follows. Firstly, it should be noted that the inhabitants of Agili Dere, also Boyuk Kasik and Poylu were largely cognate with the people of the Near East – Mesopotamia. Available obsidian sources were located in Lake Ajigol basin in Central Anatolia and Lake Van basin west of Central Anatolia (Museyibli, 2011, p. 26). There were no sources of obsidian in other regions of the Near East, including Iran and Iraq (Arazova, 1986, p. 25; Narimanov, 1987, p. 96). Ubaid tribes of Mesopotamia located a relatively long distance from the sources in Anatolia were more skilled at making flint tools.

The spindle whorl discovered at the archaeological site suggests that local tribes in the late Chalcolithic Azerbaijan were also engaged in weaving.

Only soil graves were encountered in Agili Dere and all of the discovered six graves were attributed to this type (Huseynov, 2007; Najafov, 2017). Such graves, which reflect a certain burial tradition, differ from the graves that had gravestones only due to the type of their cover.

The people that settled in Agili Dere during the Chalcolithic period lived in this territory for a certain period of time and left behind an abundant legacy of tangible remains. Nevertheless, Chalcolithic era graves were not discovered. Bronze Age residents of the Zayamchay basin carried out their burials in this area significantly thereafter. Graves were set up at a distance from one another. This is due to the fact that the graves were discovered near the northern boundary of the necropolis. River rocks lined up densely above the ground in the southern part of the hill indicate that this area served

as a cemetery in the ancient period. Specific chambers were found in the graves. However, tracking the boundaries of the burial chambers was challenging due exclusively to certain soil in the necropolis. The necropolis graves were set up in accordance with the same principle and their surfaces and the surrounding area were further covered with river rocks, gravel and soil with sand admixture based on the territory they occupied. Comprehensive research of the Late Bronze age soil graves and the evidence in the Agili Dere settlement enables study of the overall historical and cultural development of the ancient Zayamchay residents in the Late Bronze Age and Early Iron Age.

Declarations

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Ethical considerations
This study concerns archaeological settlement remains and ancient burials documented during the Agili Dere excavations of 2005 and 2014. Excavation permits and authorizations relating to the recovery, handling, and study of human remains are not specified in this article.

Author contributions
Shamil N. Najafov and Fuad R. Huseynov are the co-authors of this study. Individual contributions have not been separately specified. Both authors bear responsibility for the final manuscript.

Competing interests
No competing interest statement has been provided by the authors.

Data availability
The sources supporting this study include the excavation reports and scholarly publications identified in the reference list. Access arrangements for the underlying excavation records and archaeological materials are not specified.

Use of artificial intelligence
ChatGPT (OpenAI) assisted with language editing, translation, abstract and keyword drafting, and reference formatting. It was not used to generate excavation data or archaeological findings. The authors remain responsible for verifying the final text, interpretations, and references.

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