

THE LATE COPPER AGE BUILDING BII-21B AT TELL YUNATSITE, SOUTH CENTRAL BULGARIA

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Abstract

This paper considers the structure investigated at the largest area (labeled as BII-21B) in the Chalcolithic level BII of Tell Yunatsite, located in the western parts of the Upper Thracian Plain. It collapsed during a sudden fire, which did not affect the neighboring house to the west. The debris sealed a large number of fragmented vessels, plant remains, and even some of the inhabitants. Detailed analysis of the materials found allows for a reconstruction of diet and storage practices, research on vessels' function and technology, decoration styles, etc. The plant remains are abundant and demonstrate a diverse species composition. The complex is dominated by lentils, barley, and einkorn wheat. Of particular interest is the evidence on purposeful gathering of grapes for producing a drink, perhaps wine. The investigation of the ceramic assemblage shows that it belongs to a developed – but not final – stage of the Late Copper Age in Upper Thrace. It also provides new information about the contact zone between the Karanovo VI and Krivodol cultures in this area.

Keywords: Late Copper Age house – storage practices – pottery styles – residue analysis.

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Introduction

Tell Yunatsite is situated in south Bulgaria, in the western part of the Upper Thracian Plain. Its base measures 110 x 100 m and it stands 12 m high. The tell developed on a low terrace on the then bank of the Topolnitsa River. It is located in a fertile plain bounded by the Rhodope Mountains to the south, Rila and Ihtimanska Sredna Gora Mountains to the west, and Sashtinska Sredna Gora Mountain to the north (fig. 1).

The first excavations at the site were carried out by Vasil Mikov in 1939. A systematic excavation project at the tell's eastern area began in 1976 and is ongoing (Katincharov et al. 1995; Boyadzhiev et al. 2011; Mazanova 2011). So far, the excavations have yielded evidence of occupation from the fifth millennium BC until the sixth century AD, including Copper Age, Early Bronze Age, Iron Age, and Roman occupations, as well as a medieval cemetery. Long-term habitation was identified for two periods: the Chalcolithic (fifth millennium BC) and the Early Bronze Age (third millennium BC).

Only the last Chalcolithic settlement (level BI) was investigated over the entire eastern area of the site (Mazanov 2011). Excavations since 2012 have mostly focused on the Chalcolithic sequence below level BI in the east central part, which includes Mikov's Trench and the area further south (fig. 2).

This paper focuses on the structure investigated at the largest area in the Chalcolithic level BII, which provides important evidence on the house construction planning, subsistence practices, and the ceramic assemblage.

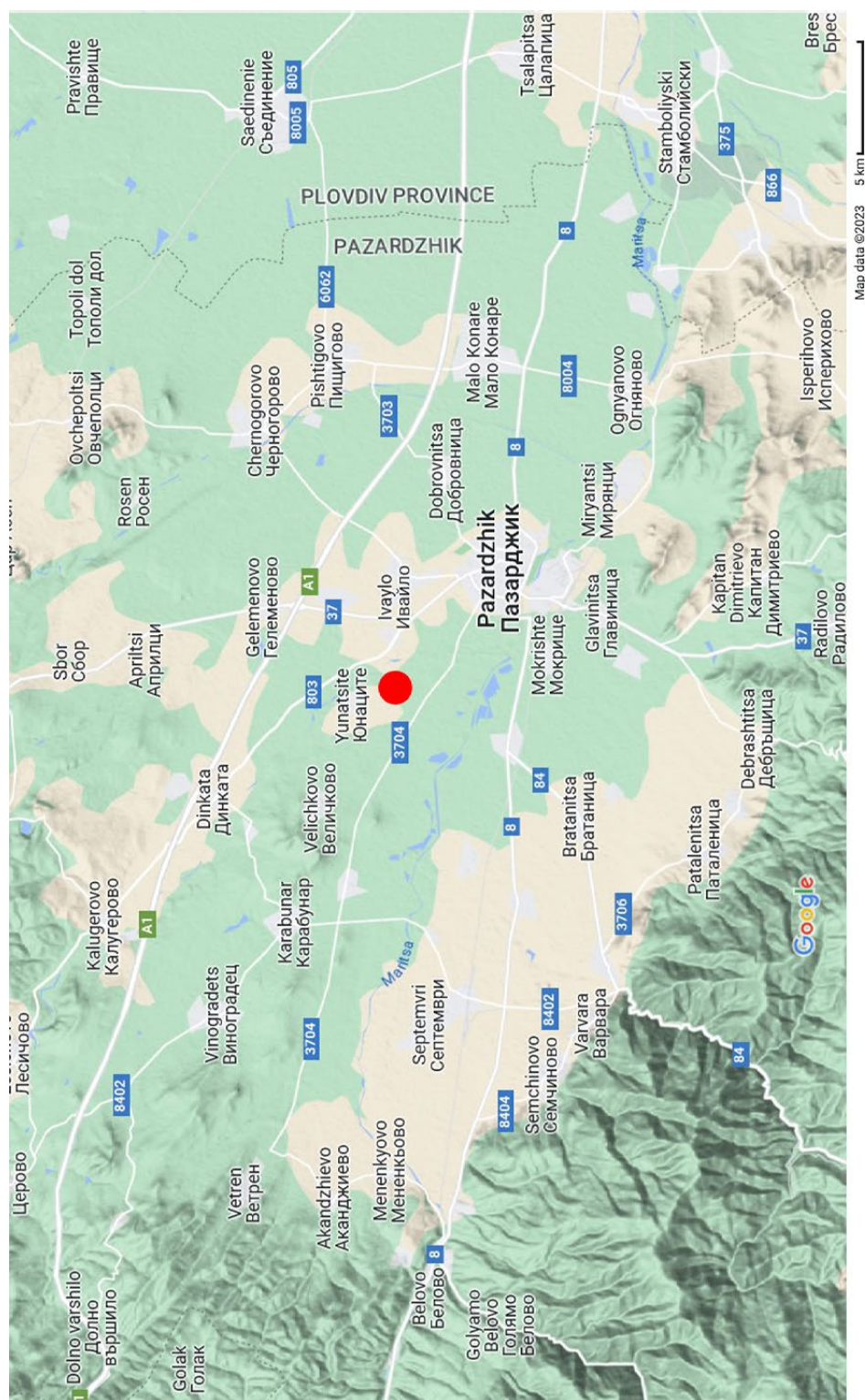


Figure 1. Map showing the location of Tell Yunatsite. Image Credit: Google Earth.



Figure 2. *Aerial view of Tell Yunatsite with the area investigated in 2012–19. Mikov's Trench is outlined in yellow and building BII-21B is outlined in red. View to the west. Image Credit: Tell Yunatsite Project.*

Building BII-21B

Stratigraphic sequence

So far, the remains of six Chalcolithic ‘building levels’ (BI–BVI)¹ were partially excavated in the east central part of the site. Evidence of at least four more is recorded in a section profile along the eroded east periphery of the tell (Boyadzhiev et al. 2021).

Building BII-21B is located in grid squares O4–O5, П4–П6, and P5 (figs. 2 and 3) and dates to the initial stage of level BII. The comparison of its stratigraphic position with the area to the west suggests that it was built simultaneously with building BII-20 in grid squares П6, O6, and O7. This is clearly evidenced by the greenish clay leveling, which was identified under the southwestern part of building BII-21B, under the southeastern part of building BII-20, and in the space between them. Several successive layers of floor plaster covered this leveling layer, and the burnt debris of building BII-21B lay on top of

¹ The term ‘building level’ is used here only provisionally as different buildings may have been built or destroyed at different times, had a different period of use and/or went through different interior reconstruction events.

The Chalcolithic layer is labeled with the Cyrillic letter B, while its consecutive levels are marked with Roman numerals (top to bottom). The grid is labeled with Cyrillic letters and Arabic numbers (cf. fig. 3).

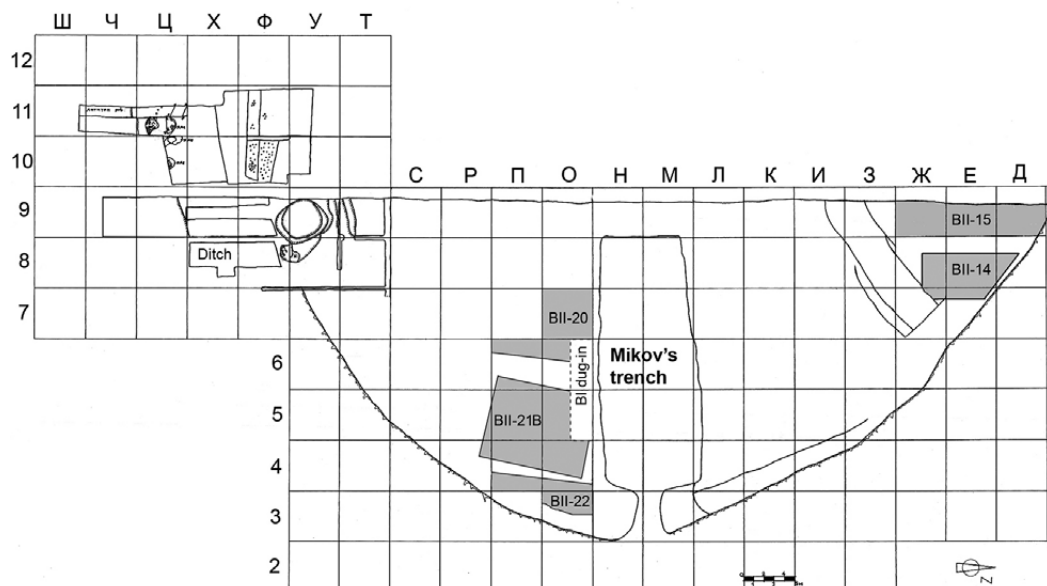


Figure 3. Tell Yunatsite, plan of building level BII. Image Credit: Tell Yunatsite Project.

them. However, the fire that destroyed the house did not affect the neighboring building BII-20, which continued to be used. Apparently, level BII had a long period of occupation, but with a different life-spans detectible in different parts of the settlement.

Above the debris of building BII-21B, mainly in its northeastern part, there was a dark brown layer with a concentration of burnt daub pieces (context 356). Above, and in some places directly on the debris, lay a 'package' of several layers of clay plaster. Above this leveling, followed in succession a homogeneous layer of black clayish sediment, gray-green clayish sediment, and burnt debris that were spread and leveled (fig. 4). There were no installations in these layers, and the archeological materials were few. Several trenches and other cut features related to this stratigraphic stage (designated as BIIA) were uncovered. The interpretation of the context is ambiguous, but there is no definite evidence of occupation. Above the upper debris layer lay the base of the last Chalcolithic settlement (BI).

House layout, architecture, and interior

Most of the area of building BII-21B was excavated. A large cut feature from level BI truncated its northwestern part (figs. 3–6); several other disturbances from upper levels were revealed (trenches, pits, postholes). The structure's eastern wall was investigated almost entirely. The foundation trench measured 0.30–0.35 m wide and ca. 0.20 m deep, with postholes of 0.10–0.12 m in diameter. They are mainly concentrated in its northern part, in grid square O4. Parts of the western and southern walls were excavated in two



Figure 4. *Grid square II5, west section profile: the stratigraphic sequence of levels BIIA and BIIB.*
Image Credit: Tell Yunatsite Project.

stages, the latter having been revealed when the balk between grid squares II5 and II6 was removed.¹ Their substructures are similar to the eastern wall: foundation trenches about 0.30 m wide. In the southern trench, postholes of 0.10–0.12 m in diameter were uncovered set at 0.12–0.15 m from one another. Only the post at the southwestern corner had been larger, the posthole being 0.30 m in diameter. The eastern part of the wall in grid square P5 was largely destroyed by later pits. In the western trench, postholes were only recorded in its northern part in grid square O5 (fig. 5). Small parts of the aboveground clay construction of the southern and western walls were also revealed. The southern wall was better preserved; at the southwestern corner, it stood to a height of ca. 0.15 m and was ca. 0.15 m thick.

The northern wall was not found, but the lack of evidence of the building in the southern wall of Mikov's Trench suggests that it remains entirely below the balk between grid square O4 and the trench.

The burnt debris of the building is highly fragmented and provides scarce information about the construction of the house. Few imprints of posts and twigs were preserved. The daub pieces measured maximum 0.10 m and contained a large amount of chaff.

The building measures ca. 10.60 m long and ca. 7.50 m wide, with a total area ca. 80 square meters. It's NNE–SSW oriented and had at least two rooms. The main room was in its southern part, in grid squares II4–5 and in the southern parts of O4–5. Approximately 1 m west of the east wall, a ca. 2 m row of small-diameter (5 or 6 cm) postholes was uncovered in the southeastern part of the structure running parallel to the wall (fig. 5). They are probably the remains of a partition that partially divided the large southern room, similarly to the layout of building BIII-1.

The floor of the southern room is covered by a package of 8 or 9 layers of plaster, while a single plastering was identified east of the partition wall in the southeastern part. The uppermost layer was made of fine green clay (fig. 6). There is a pronounced difference

¹ This took place in 2023, when the paper was already in preparation. The main new information has been added here.

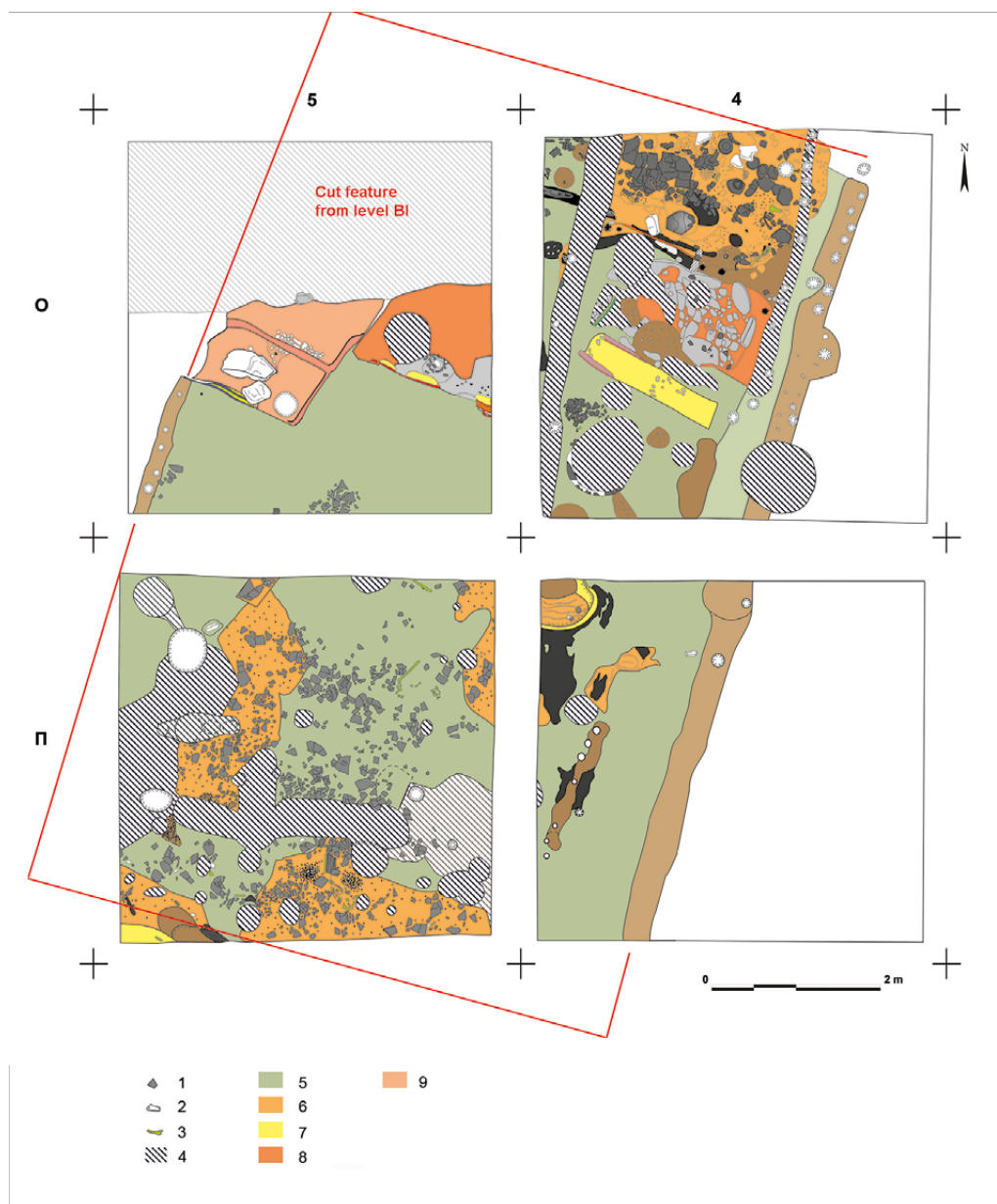


Figure 5. *Layout of building BII-21B. Key: (1) pottery; (2) stones; (3) bones; (4) later pits / postholes; (5) green clay – floor plaster; (6) burnt debris; (7) yellow clay; (8) debris of daub installations; (9) daub installations (contexts 376 and 377).*

Image Credit: Tell Yunatsite Project.



Figure 6. *Aerial view of building BII-21B. North points to the top. Image Credit: Tell Yunatsite Project.*

in the elevation of the southern and the northern part – from 7.30 to 7.55 m BD, respectively.¹ Most of the floor in the southern room was covered by broken pottery and charred grain (figs. 7 and 8); some were scattered directly on the floor, while others were found on a thin layer of charred organic matter. Vessels were missing east of the partition wall. Also, articulated human skeletal remains were uncovered in the southern part of the building lying under burnt structural debris and pottery sherds (fig. 9).

A fragmented ceramic model of an oven (fig. 66/11), ceramic anthropomorphic figurine (fig. 66/10), and a grindstone were found at a close distance from each other under the burnt debris in the southwestern corner of the southern room, in the balk between grid squares Π5 and Π6. The position of the first two artifacts seems to suggest that they have fallen from some height, possibly from a ‘domestic altar’.

Several installations were revealed in the northern part of the southern room. Next to the western wall of the house, there were two adjacent installations with a common clay wall (contexts 376 and 377; fig. 5). The south one is rectangular and measures 1.60 x 1.00 m. Its base lay ca. 0.30 m below the uppermost plaster surface of the floor of the building, and its walls were preserved at least ca. 5 or 7 cm high. It had vertical walls and flat base,

¹ The datum is located at the top of the tell.



Figure 7. *Aerial view of grid square IIS, the southern room of building BII-21B. North points to the top. Image Credit: Tell Yunatsite Project.*



Figure 8. *Grid square IIS. Concentration of fragmented vessels on the floor of building BII-21B. View to the west. Image Credit: Tell Yunatsite Project.*



Figure 9. *Burnt skeletal remains of a child under the debris of building BII-21B, southern room, grid square II5. North points to the bottom. Image Credit: Tell Yunatsite Project.*

both made from light brown clay. Two large slab stones were found on it. The northern installation was disturbed by a cut feature from level BI. The preserved part of the walls and the base were similar to the south one. A foundation of small pebbles lay under the clay plaster of the base. These installations might have served as storage bins, but there are no finds to prove this beside a few animal bones (fig. 18). So far, no similar features were uncovered in the settlement.

Immediately east of the northern facility, the remains of another installation were uncovered: highly fragmented burnt debris, including two or three plaster fragments from a thermal installation's base. It seems possible that the oven of the building could have been located there, its upper part having been destroyed during later leveling of the area. South of the burnt clay debris, there was a clay wall, preserved to a height of 0.10 m, the exterior of which was decorated with red paint. This was probably the south wall of the oven. Its eastern wall was partially identified in 2023 when the balk between grid squares O4 and O5 was removed. The northern wall was destroyed by the cut feature from level BI. The preserved part of the oven measured ca. 1.60 x 1.40 m.

Northeast of the thermal installation, a podium was revealed in the middle of grid square O4 (fig. 10). It had a roughly square outline measuring 1.80 x 1.70 m and ca. 0.15 m high. Its upper surface was flat. It was built of daub with a large amount of organic temper (chaff) that covered a wooden frame made of parallel, horizontal logs with a diameter of 6–8 cm (fig. 11). Imprints of planks could be seen in some of the daub pieces in its periphery. Its southern wall was made of yellow clay, with traces of red paint on the outside. No finds were uncovered on the podium.

Its northern side was attached to a partition wall which separated the southern and northern rooms of the building. Remains of charred posts with diameter of ca. 0.10 m were preserved in the foundation trench (figs. 6 and 10). The north room was quite narrow, probably about 1.70 m. Its length was at least 3.50 m, but to the west it was truncated by the cut feature from level BI. Its preserved part was completely covered by burnt debris, broken vessels, charred grain and fruit, and several rocks, including a mortar and three grindstone fragments (figs. 12–14). Some of the vessels were found in relatively compact areas standing upright on the floor. The sherds of others (like the vessel labeled as I in fig. 13) were scattered over a greater area (up to 2.00–2.50 m) among or above the burnt debris. The mortar also lay on top of burnt daub and a burnt plank (fig. 15).

In both rooms, some of the vessels were found standing upright on the floor, while others had obviously fallen from a certain height, which suggests that the latter might have been kept on shelves.¹ In some of the cases, however, the sherds lay on debris or human skeletal remains. It seems that the rooms had a wooden ceiling – above the northern room, it appears to have been daubed, but not above the southern one – and that this second level was used for the storage of vessels and food supplies. There is no evidence of

¹ Use of shelves has been theorized for level BI buildings by Mazanova et al. 2021, 227.



Figure 10. *Grid square O4. Podium in the northeast part of the southern room (outlined with a red punctured line) and fragmented vessels in the north room. North points to the top. Image Credit: Tell Yunatsite Project.*



Figure 11. *Grid square O4. Podium in the northeast part of the southern room: detail of its construction. View to the south-southwest. Image Credit: Tell Yunatsite Project.*



Figure 12. Grid square O4. Northern room of building BII-21B: uppermost level of burnt debris with fragmented vessels among them. North points to the bottom. Image Credit: Tell Yunatsite Project.



Figure 13. Grid square O4. Northern room of building BII-21B, with some of the fragmented vessels among burnt debris. North points to the bottom. Image Credit: Tell Yunatsite Project.



Figure 14. Grid square O4. Northern room of building BII-21B: fragmented vessels on the floor. North points to the bottom. Image Credit: Tell Yunatsite Project.



Figure 15. Grid square O4. Northern room of building BII-21B: stone mortar on top of debris and a burnt plank. Image Credit: Tell Yunatsite Project.

the height of this space and it's not clear whether it was a second floor or rather an attic.

The building was burnt down by a sudden fire. This is evidenced by the many fragmented ceramic vessels and charred plant supplies, as well as by the human skeletal remains found under the debris. The fire was stronger in the northern room and in the northeast part of the southern room. The analysis of fragments of the podium shows that the firing temperature was about 870° C. The faunal remains from this area also demonstrate evidence of a more significant thermal impact compared to the southern part of the building: above 500° C for most bones, and above 700° C for some of them (fig. 16). It is noteworthy that debris was not recorded over the entire area of the building, but mainly in its northeast and southwest part, while it was almost absent in the middle. This could be explained by the direction in which the walls collapsed and by the lighter construction of the roof, which did not leave clearly identifiable remains.

Faunal remains

A total of 74 faunal remains of mammals, fish, and mollusks were uncovered in the building. Twenty of them came from the topmost layer of dark brown sediment (context 356). Their connection to the building is not entirely secure. They also show evidence of thermal impact, but it's drastically lower than in the layer of compact debris below them.

The bones from the debris layer are very fragmented and badly preserved. Most of them show thermal impact, obviously as the result of the fire that burnt down the house; it's lower in the south room (ca. 200–300° C) and higher in the north room (fig. 16).

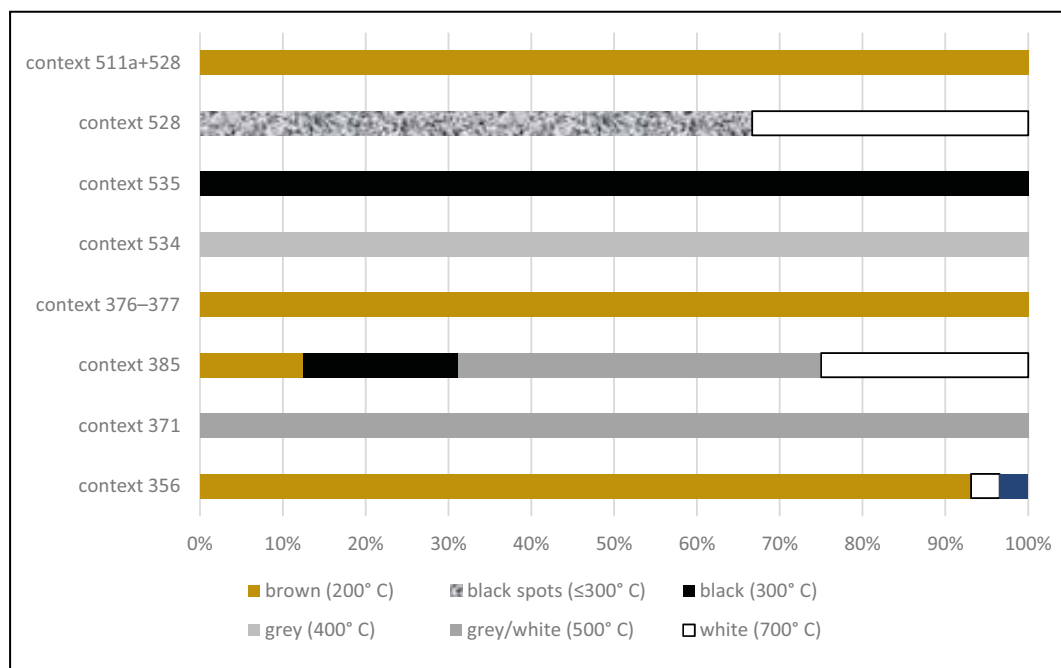


Figure 16. *Distribution of faunal remains by thermal impact and finding context (following Nicholson 1993). Image Credit: N. Karastoyanova.*

Sixty-nine of the analyzed remains were determined by species, family, or genus. The bones of domestic animals largely predominate, comprising over 80 percent of the identifiable remains. Among them, the largest number are those of sheep and goats, followed by cattle and domestic pigs (approximately equally), and dogs. Wild animals are represented by single bones of red deer, roe deer, wild boar, hare, and wild cat. A fragment of a rodent skull, two vertebrae of small fish and several shells of river mussels were also found (figs. 17 and 18).

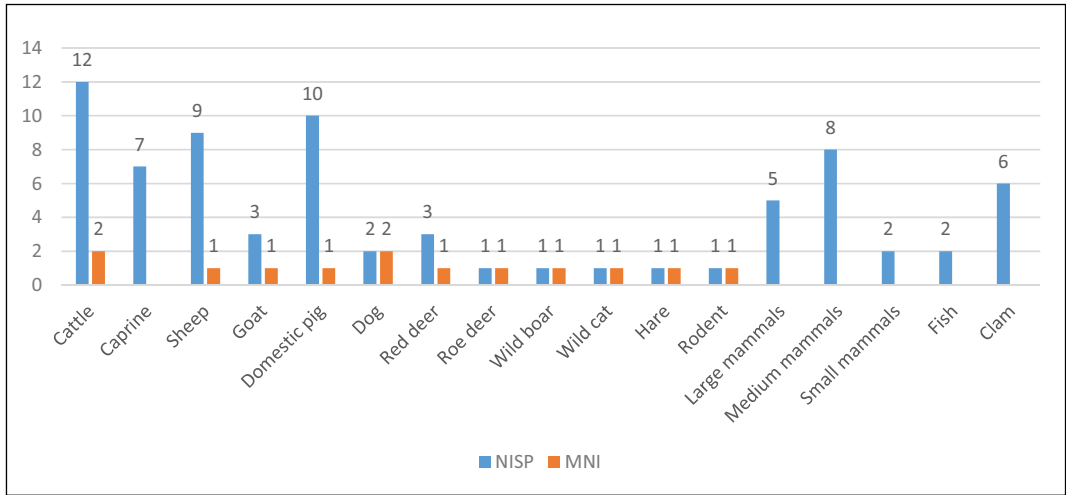


Figure 17. *Distribution of faunal remains by species: number of identified specimens (NISP) and minimum number of individuals (MNI). Image Credit: N. Karastoyanova.*

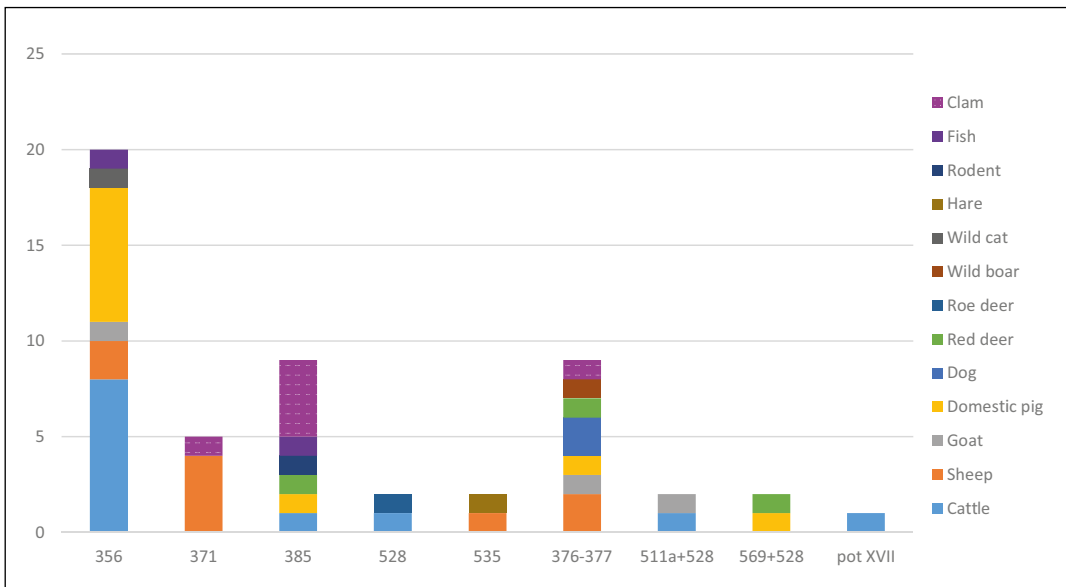


Figure 18. *Distribution of faunal remains by contexts. Image Credit: N. Karastoyanova.*

The bones of domestic animals are mainly phalanges and parts of the lower limbs. Most of the remains belong to adult individuals. Only the bones of domestic pig and a single bone of a dog come from young individuals. In terms of anatomy, the bones of the limbs and the head predominate (fig. 19). Several fragments of cattle and goat horn cores and red deer antlers were also uncovered, as well as a large male boar tusk.

Probably most of the animal remains are related to the diet of the building's inhabitants. Butchering cut-marks were identified on a single scapula of a domestic pig. Alternatively, the list of bones seems to suggest the possibility of stockpiling raw materials for bone tools.

Human skeletal remains

Human skeletal remains of at least four individuals were discovered in the building. Near the southern wall, the badly preserved articulated remains of a child aged 5 or 6 years were found, including fragments of the parietal bone, fragments of bones of the lower and upper limbs, ribs and vertebrae (fig. 20/1–4). Some of them show black to gray coloration (fig. 20/1) resulting from high temperature, but there is no clear evidence of cremation fractures.

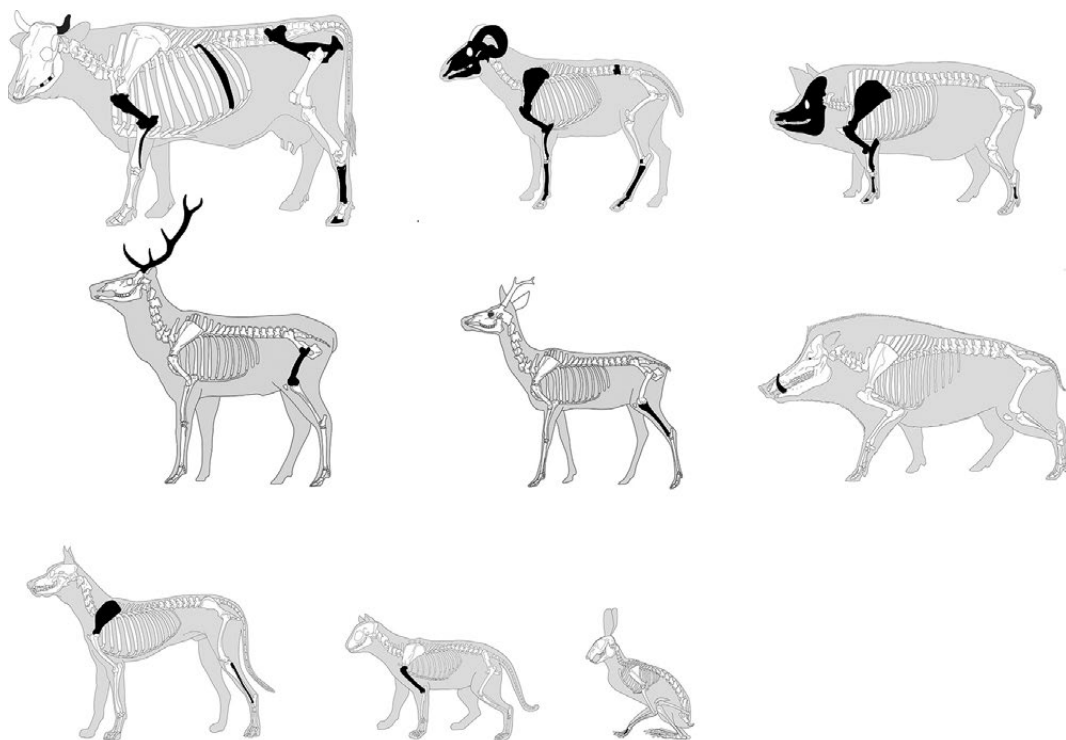


Figure 19. *Faunal remains found in the building by species and parts of the skeleton. Image Credit: N. Karastoyanova.*

Parts of a skeleton, single bones or bone fragments were also found in the northern part of the southern room (context 528), near the western wall (context 373), and in the layer above the debris (context 356). These include (fig. 20/5–9): the epiphysis of a femur and a fragment of the pubic bone with incomplete skeletal growth (context 356); fragments of



Figure 20. (1–4) Human bone fragments, individual from context 580a, child aged 5 or 6 years: (1) vertebrae, fragments; (2) femoral epiphysis, unfused, fragment of right ilium; (3) metatarsal bones, unfused distal epiphyses; (4) right talus and calcaneus, unfinished development; (5–9) bones and bone fragments from contexts 528 and 528/511a: (5) first cervical vertebra and cervical vertebra; (6) right fibula and left ulna; (7) right fibula, distal end, detail, bone reaction; (8–9) tarsals, metatarsals and phalanges. Image Credit: V. Russeva.

the cranium and dentition and fragments of pelvic bones (context 373); bones of the lower (right fibula and bones of the right and left foot) and upper (left ulna and wrist bones) limbs (context 528); bones of the foot (left heel and right third metatarsal bones) and spine (first cervical vertebra and single vertebra of the cervical area; context 528/511a).

It is possible that the two bone fragments of the postcranial skeleton from context 356 came from a single juvenile. The unfused epiphysis to the diaphysis revealed, and the overall bone size correspond to an age generally determined around the *Infans II* group, 7–14 years at death (Shaefer et al. 2008). The cranial skeleton and dentition fragments from context 373 (upper left deciduous central incisor and both molars and first permanent molar and the crown of developing second molar) can also be associated with this individual, pinpointing its age to the lower limit of ca. 7 or 8 years (Zubov 1968; Ubelaker 1989).

The pelvic bone fragments from context 373 indicate an older individual, ca. 17–20 years, based on the unfused epiphysis of the iliac bone and the fused pelvic bones in the acetabulum according to the tables of McKern-Stewart and Shaefer (Shaefer et al. 2009, 244f). The shape of the major sciatic notch is described as rather sharp, characteristic to the male gender of the individual according to Walker's standard table (White & Folkens 2005). It is possible that both cervical vertebrae from context 528/511a belonged to this individual as well. The dimensions of the first cervical vertebra are characteristic of males according to the research techniques used (table 1; Marino 1995). The age at death of the individual can be determined at about 16–21 years by the other cervical vertebra, according to the tables of McKern-Stewart and Shaefer (Shaefer et al. 2009, 115ff).

Measurement	mm
Maximum length superior facet (LSF)	27
Maximum width superior facet (WSF)	16
Maximum length of inferior facet (LIF)	18
Maximum width of inferior facet (WIF)	16
Maximum length of the vertebral foramen (LVF)	30
Maximum width of fovea (WVF)	13

Table 1. *First cervical vertebra, context 528/511a; measurements in mm.*

The metatarsals and single upper and lower limb bones from context 528 show completed skeletal growth, indicating an age at death of 20 years and above. Whether they can be associated with a single skeleton remains uncertain, but a possible hypothesis can be formed. The ulna and fibula are gracile, more characteristic of the female sex. The length dimensions of the metatarsal bones are also closer to the average for females (table 2; Bidmos et al. 2021). The foot bones from context 528/511a may have also belonged to this individual. The two calcaneus bones are relatively massive, with a developed relief, more characteristic of the male sex. Their measured maximum lengths present close values

and fall between the male and female averages according to the standardized tables used (Gualdi-Russo 2007; Scott et al. 2017). It is possible that the skeleton belonged to an individual of very short stature and proportionally small metatarsal sizes, in which case the results would show values closer to the female average. It is also possible that the ulna and fibula belong to another skeleton, an adult female. No duplication of any of the fragments was found. The lengths measured on both bones reconstruct the heights of 157.47 ($153.9 \div 161.04$) and 163.66 cm ($159.36 \div 167.96$) according to the Trotter-Gleser formulas for a female, Caucasian race (Alexeev 1966). Difference in reconstructed heights is not big and could be a consequence of different proportions between lower and upper limbs of one individual. In this case, the used methods regard the height reconstruction after the lower limb's bones with priority. The results for stature reconstruction could be also after origin of both measured bones from different skeletons.

Context	Side	Bone	Measurement	mm
356	–	femur, proximal epiphysis	diameter	44
528	R	fibula	length	334
	L	ulna	length	248
	R	calcaneus	length	75.8
	R	MT1	length	56.9
	R	MT2	length	68
511a–528	R	MT3	length	65.5
	L	calcaneus	length	76
528	L	MT1	length	58
	L	MT2	length	65.8
	L	MT3	length	65.1
	L	MT4	length	62.5
	L	MT5	length	69/55*
580a	R	femur, proximal epiphysis	diameter	21
	R	calcaneus	length	39.4
	R	MT1	length	39.6

Table 2. *Measured bones, limbs. MT – metatarsal; *functional length measured from the medial edge of the articulation facet between articulations with fourth metatarsal and cuboid.*

Plant remains

The excavation of building BII-21B yielded a large amount of plant remains. Two main concentrations were identified that coincide with the concentrations of fragmented vessels and burnt debris: more in the north room (nearly 24,000 seeds) and less in the southern part of the south room (fig. 6). Charred plant remains were found both

among and below the debris. Some of them were scattered over a large area, but compact concentrations were also recorded. Some of the latter were associated with fragmented ceramic vessels and in some cases were revealed directly on large fragments (fig. 21/1). In the north room, a few small, compact clusters were uncovered lying among or under burnt debris, without any immediate connection to sherds (fig. 21/2). It seems that plant supplies were stored both in ceramic vessels and in small containers of non-durable material, like leather or cloth sacks.

The plant remains demonstrate a diverse species composition. Cereal crops are represented by three species of wheat – einkorn (*Triticum monococcum*), emmer (*Triticum dicoccum*), and free-threshing wheat (*Triticum aestivo/durum*) – as well as barley (*Hordeum hexastichon*), rye (*Secale cereale*), millet (*Panicum miliaceum*) and oats (*Avena* sp.), while legumes are represented by lentils (*Lens culinaris*), bitter vetch (*Vicia ervilia*) and grass pea (*Lathyrus sativus*). Flax (*Linum usitatissimum*), grapes (*Vitis sylvestris*), cornelian cherry (*Cornus mas*), pears, apples, walnuts, blackberries, and acorns were also identified. The weed flora is represented by milkweed (*Euphorbia helioscopia*), common knotgrass (*Polygonum aviculare*), soapwort (*Saponaria officinalis*), and goosefoot (*Chenopodium album*). All of them are common weeds and are found in fields. Their amount in the samples is insignificant.

The complex is dominated by lentils, barley, and einkorn wheat, which makes up over 98 percent of the cereals and legumes. They are followed by rye and free-threshing wheat. Spatial differences in the spread of the three main crops were identified. Barley dominates the assemblage in the north room (over 8,700 grains compared to over 1,600 of einkorn), while in the south room it is practically absent (only 6 grains) and the main cereal crop is einkorn wheat. Lentils are well represented in both rooms, slightly outnumbering barley in the north room and einkorn wheat in the southern room.

The high degree of fragmentation and spread of the vessels and the scattering of the plant remains make it difficult to analyze the individual supplies in detail. However, cer-

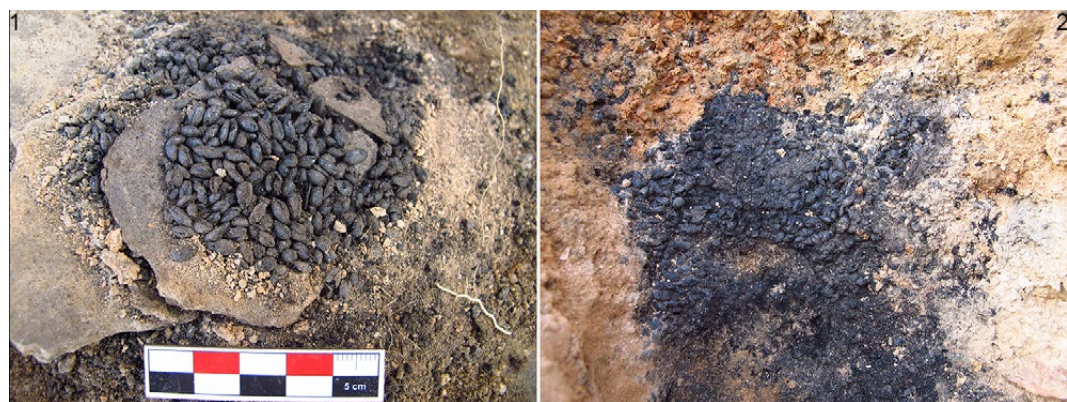


Figure 21. Grid square O4. Northern room: (1) charred wheat on sherds; and (2) concentration of charred wheat among burnt debris. Image Credit: Tell Yunatsite Project.

tain specifics are visible. Both pure stocks of the three main crops (barley, einkorn wheat, and lentils) and mixtures of barley with lentils and einkorn with lentils were recorded in the compact concentrations of grains. The analysis of the remains in the north room also shows the separate storage of barley in different stages of the *chaîne opératoire*. In one of the samples, it is completely uncleaned, with the chaff remaining. In many of the samples it was found crushed, suggesting that it was prepared for grinding. Finely ground barley in the form of bulgur was found in one sample. Barley may also have been prepared as tarhana.

Several fragments of charred mass with traces of grains in it, which probably represent the last phase of cereal processing, are of particular interest. Through the application of a scanning electron microscope (SEM), component analysis of the internal structure can be performed and important information can be extracted about preparation techniques and the changes that occur during the cooking process. SEM analysis produces highly magnified images of the analyzed samples and shows their composition on a microscopic scale. The possible magnification is significantly greater than with visible light microscopy (VLM), from 5x to 200,000x or more, giving a much greater depth of contrast so that more of the specimen is in focus (Frahm 2014).

Using a Bresser ICD Advance stereomicroscope and a Novex stereomicroscope, the external surface of three samples were examined that represented charred remains of processed cereal food and a bread-like fragment. Their size and characteristics were documented. The following procedure was carried out using a SEM (JEOL JSM 5510) at the Laboratory of Scanning Electron Microscopy (Faculty of Chemistry and Pharmacy, St. Kliment Ohridski University of Sofia). The samples were first broken manually into smaller fragments, then coated with a thin layer of gold. Their inner structure and different informative components were examined under magnification between 150x and 25,000x. Transverse cells that are typical for *Triticum* species were clearly visible in all the examined fragments (figs. 22–24). However, the remains were highly deformed and definite conclusions cannot be made about whether it was bread, tarhana, or bulgur.

Regarding the additional plant resources exploited, the analysis shows an extremely successful use of the local environment. The presence of nearly 160 flax seeds, which are very rarely found in prehistoric deposits, suggests a deliberate collection. Whether the flax was used for oil extraction, weaving, or both, is not possible to answer.

Among the fruits, the grape seeds are of greatest interest (fig. 25). Their quantity is impressive, numbering nearly 3,000 pips, mostly concentrated in the north room. According to their morphological characteristics, they belong to wild grapes, with certain differences having been observed: some pips are larger while others are smaller. They were probably collected from different places. In some of the samples, whole grapes were found, as well as their stalks. Traces of maceration were identified by the presence of crushed seeds and seeds with remains of the fleshy part. It is entirely possible that they were intended to produce grape juice or another beverage, e.g., wine. This is very similar

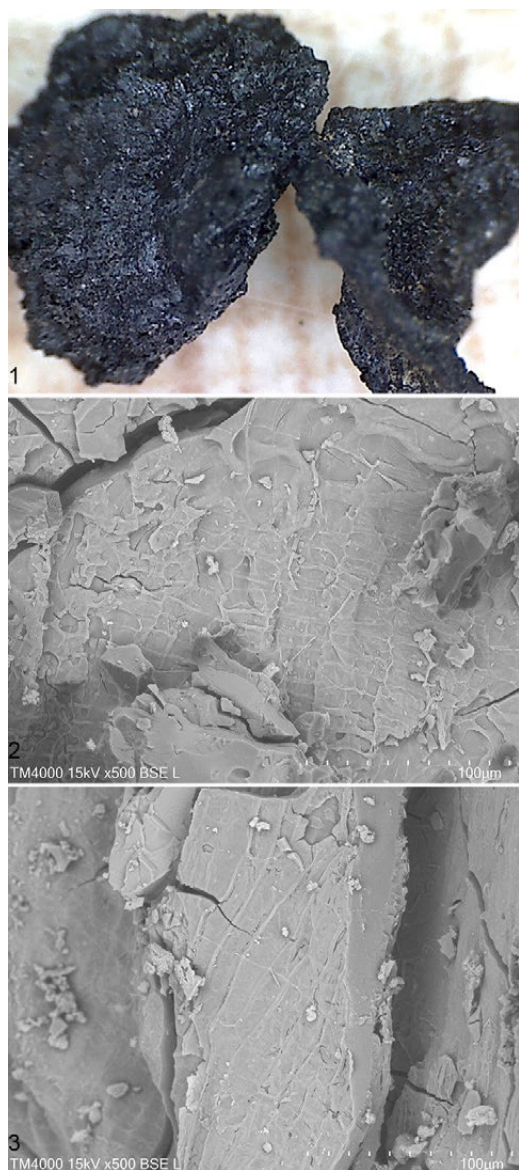


Figure 22. Charred food fragments from the southern room: (1) macroscopic overview, low magnification, stereomicroscope Novex; (2 and 3) Transversal cell of *Triticum* sp.; magnification x500 SEM Hitachi TM3030 PLUS. Image Credit: S. Todorova.

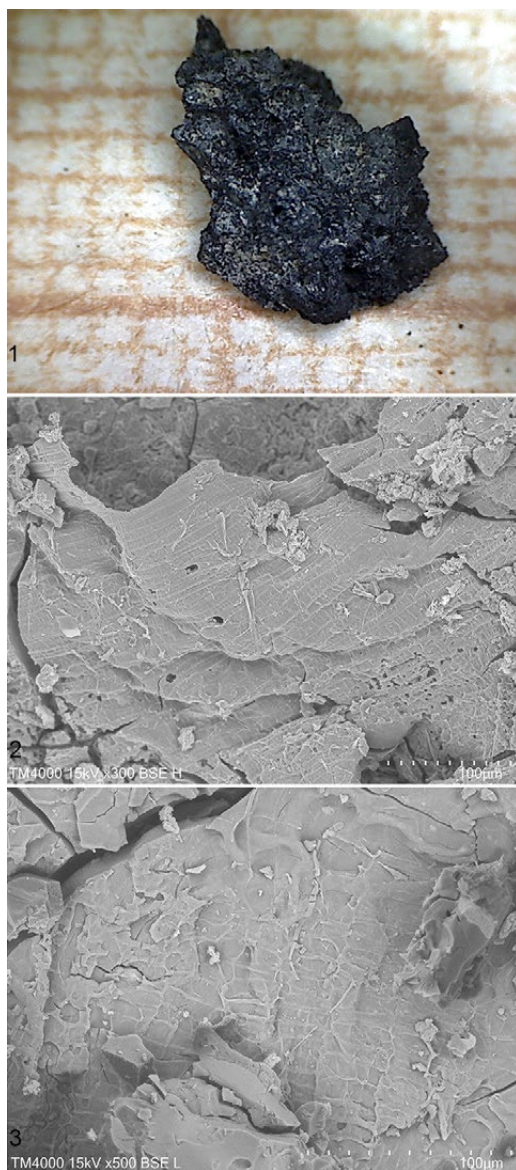


Figure 23. Charred food fragments from the southern room: 1) macroscopic overview, low magnification, stereomicroscope Novex; 2) Transversal cell of *Triticum* sp.; magnification x300; 3) close view magnification x600, SEM Hitachi TM3030 PLUS. Image Credit: S. Todorova.

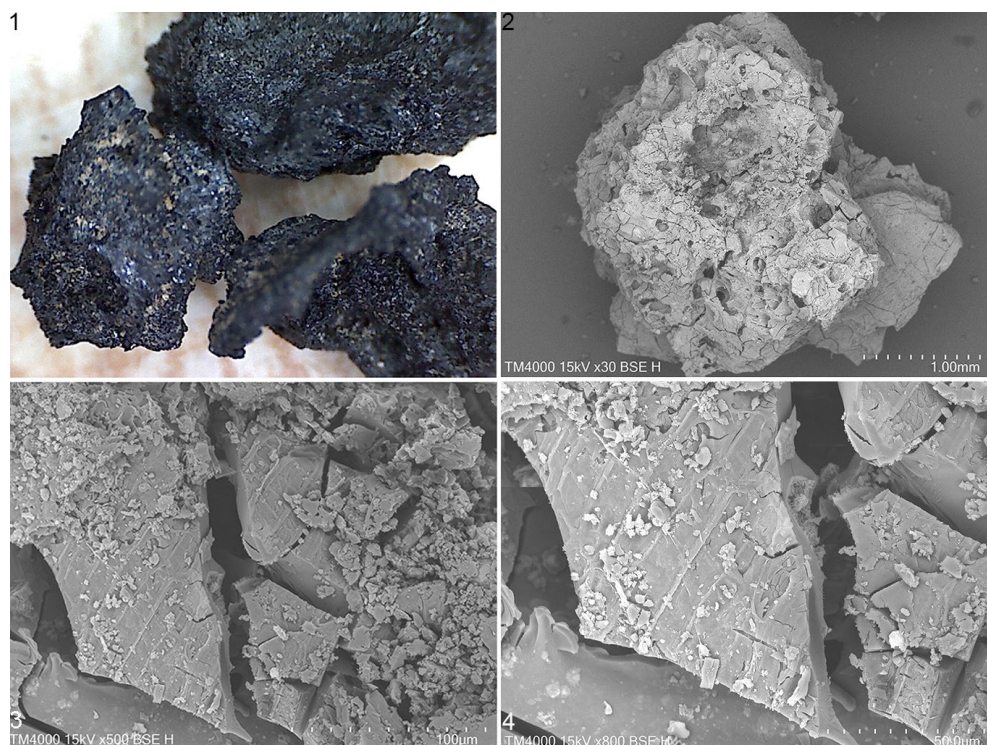


Figure 24. Charred food fragments from the southern room: (1) macroscopic overview, low magnification, stereomicroscope Novex; (2) macroscopic overview of a food fragment – SEM (x30 magnification); (3) transversal cell of *Triticum* sp.; magnification x500; (4) close view, magnification x800, SEM Hitachi TM3030 PLUS. Image Credit: S. Todorova.



Figure 25. Charred grape from the northern room. Image Credit: Tell Yunatsite Project.



Figure 26. Grid square O4. Northern room: charred acorns and fruits. Image Credit: Tell Yunatsite Project.

to what was recorded at Tell Dikili Tash in northern Greece, based on which the earliest wine production in the Aegean has been suggested by Vallamoti et al. (2007).

Cornelian cherry, walnuts, pears, apples, blackberries, and acorns were also gathered (fig. 28). The most common fruit remains are cornelian cherry stones (*Cornus mas* L.): 31 whole and 140 fragments. They were all found in the north room. Of particular interest are the whole charred fruits of apple and pear, which are preserved extremely rarely in the archaeological record. Apples were found only in the north room, and pears in both, with a concentration of about 10 fruits recorded in the southern room.

The finds of acorns number about 50. It is worth mentioning that a compact concentration of a dozen acorns was uncovered among the debris in the northern part of the south room (grid square O4), where a golden ring-idol¹ was also found (fig. 66/4). They were probably kept in a container of perishable material.

Pottery

The pottery from building BII-21B was completely processed. It was initially examined by archaeologists and a restorer, along with the pottery from all features cut into the

¹ For similar artifacts, cf. Leusch et al. 2015.

structure's remains. The finds from context 356 were also included. Some of the sherds found in later cut features (mainly foundation trenches) come from vessels from the building, indicating that they were backfilled, at least partially, with the excavated earth. At the same time, most of the restored vessels miss sherds, which is probably due to later disturbances and materials remaining in the balks.

After this stage, all restored vessels and single sherds that could be reliably attributed to the building were entered into a Microsoft Access database. It was developed by the research team to process the ceramic assemblage from Yunatsite and other Copper Age sites in the area (cf. Boyadzhiev et al. 2022). It contains detailed information on the context of discovery, the technological, metrical, and morphological characteristics, and the decoration of each vessel or sherd.

After the restoration was completed, the total number of ceramic units from the building (restorable vessels and single sherds) was 1833. Some of them apparently originate from the same vessels, and in these cases, they were entered as a single record in the database. As a result, the database includes a total of 1720 records. Twenty-two of them are completely reconstructible vessels (labeled as 'whole vessels') and six more are certainly reconstructible, with the bottom or the rim-edge missing (fig. 27). Among the rest, wall sherds predominate: 1000 in total.

Based on typologically diagnostic material, minimum number of vessels should be 140.

Typology

The investigation of the ceramic assemblage aims at representing the major categories and types of vessels discovered in the building, their relationship with various decoration techniques and patterns, and with certain technological characteristics, and finally, their possible function. The classification scheme used here was developed by the project team and is based on published schemes in which the main criteria used were ratios between the main metric characteristics: rim diameter, maximum diameter, base diameter, and height (Petrova 2003; Georgieva 2012). At the same time, due to the fragmentary state of a large part of the material, specific morphological criteria were also used for the additional differentiation among the variety of vessels.

Nine vessel categories were distinguished: plates, bowls, jars, jugs, cups, storage vessels, lids, vessels with perforated walls, potstands, as well as an intermediate category of plates/bowls and miniature vessels.

(I) Plates. Open shapes with their maximum diameter being at the rim. Based on the shape of the rim, types and subtypes have been distinguished (figs. 28, 31, 32, and 33/1–4).

(II) Plates/bowls. The shape of some vessels is transitional between plates and bowls (figs. 28, 33/5 and 6, and 34). In some of them, the maximum diameter is at the rim, but the height and the angle of the wall towards the base indicate that they are deep vessels (II.1). At the same time, the upper part is higher and more emphasized than that of the 'common' plates. In other cases, the maximum diameter is at the carination, but is similar

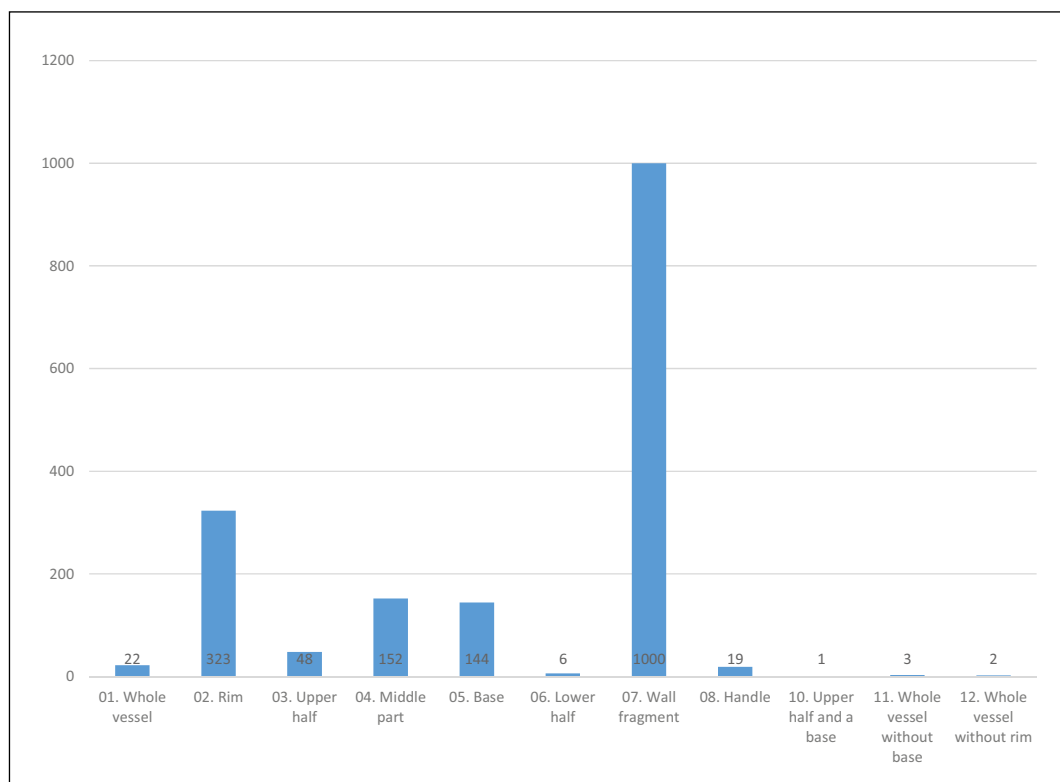


Figure 27. *Ceramic assemblage of building BII-21B: distribution by preserved parts of the vessels.*
Image Credit: Tell Yunatsite Project.

to that of the rim (II.2 and II.3).

(III) Bowls. This category comprises vessels of two or three morphological parts whose rim diameter is equal to or smaller than the maximum diameter, but not smaller than $\frac{2}{3}$ of it. The height is less than or equal to $\frac{2}{3}$ of the maximum diameter. Based on morphological specifics of the carination and the upper part of the vessel, types and subtypes have been distinguished (figs. 29 and 35–40).

(IV) Jars. This category comprises pots of two or three morphological parts whose rim diameter is less than $\frac{2}{3}$ of the maximum diameter. The height is less than or equal to the maximum diameter. The body is rounded. Based on its shape, and on the presence of a distinct neck, types and subtypes have been defined (figs. 30, 41, and 42).

(V) Jugs. High necked, elongated body pots of three morphological parts with handle(s) (fig. 43/1 and 2).

(VI) Cups. These vessels are defined by their small size and small capacity, which determine their specific function.

(VII) Storage vessels. Large pots of three morphological parts, with their height greater than the maximum diameter, often with handles (figs. 32 and 44–49).

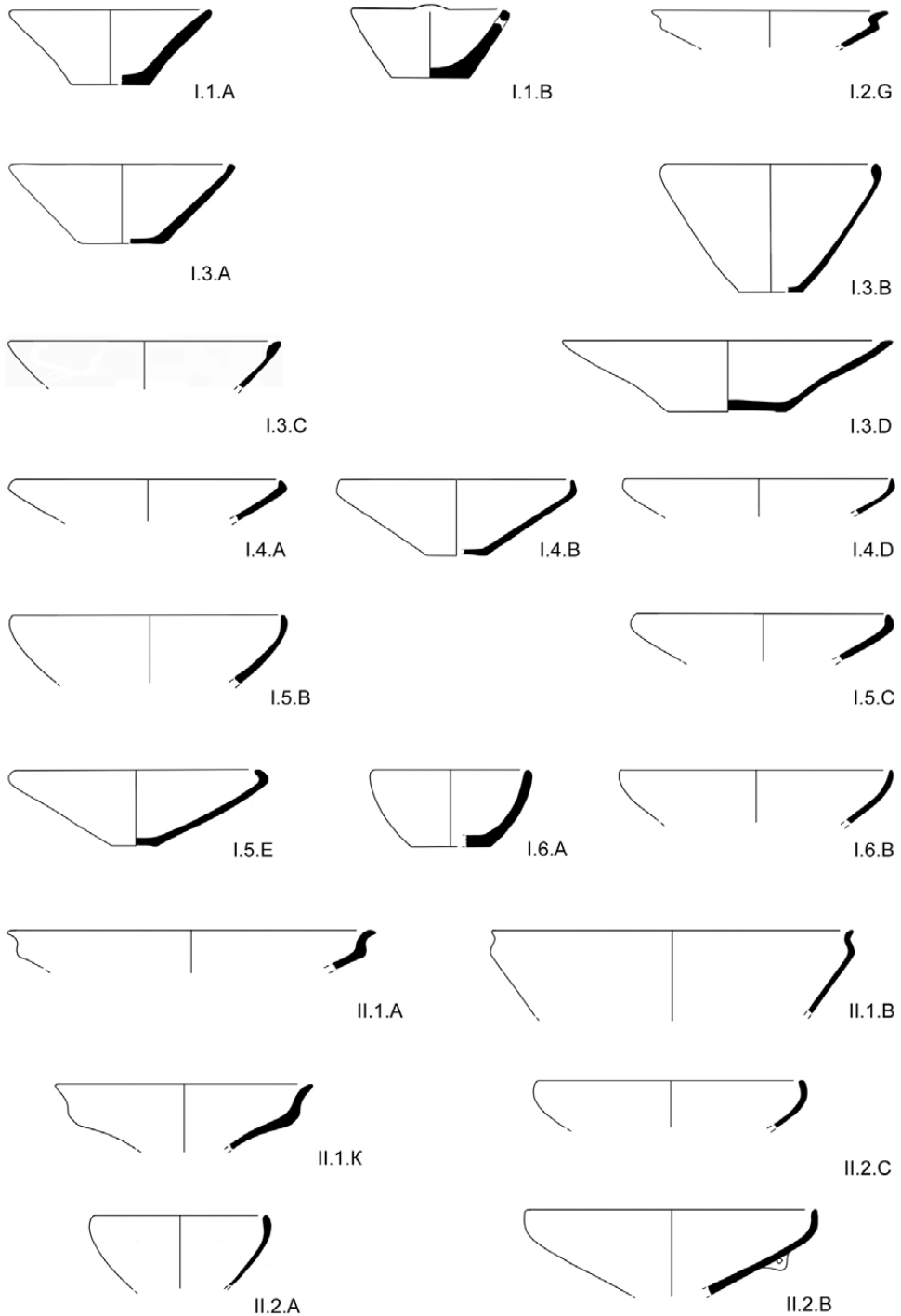


Figure 28. *Typology of plates found in building BII-21B. Image Credit: Tell Yunatsite Project.*

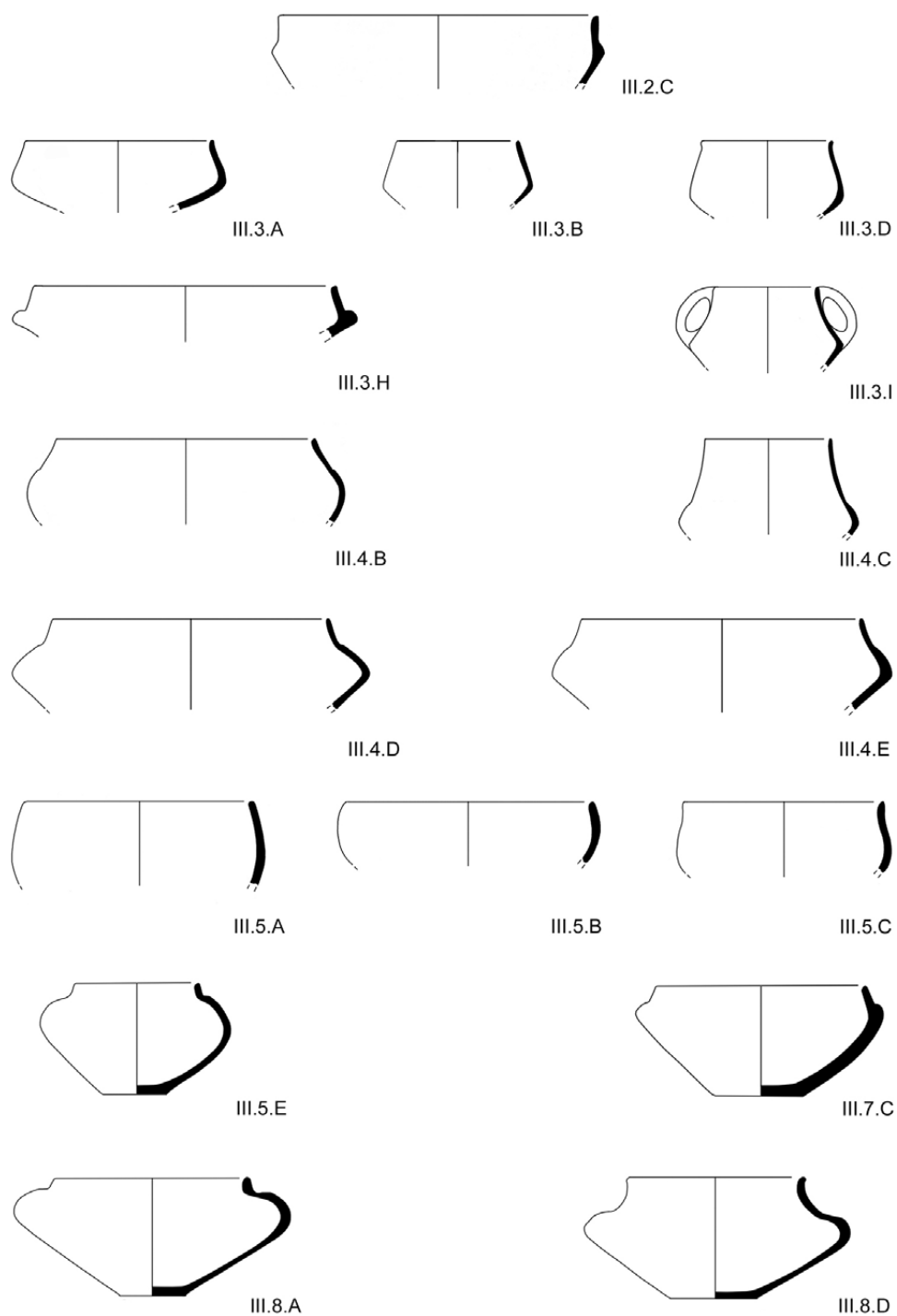


Figure 29. *Typology of bowls found in building BII-21B. Image Credit: Tell Yunatsite Project.*

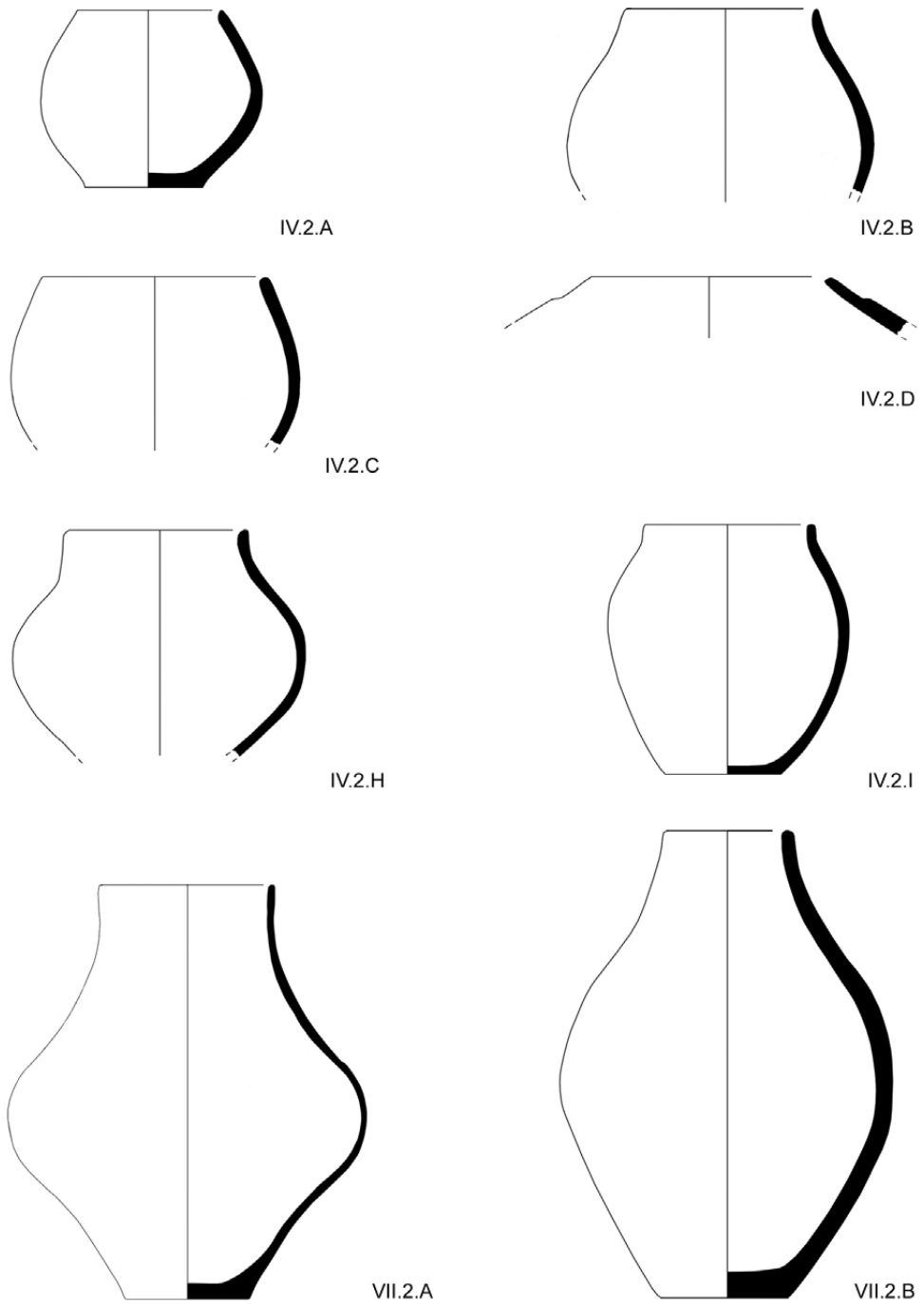


Figure 30. *Typology of jars and storage vessels found in building BII-21B. Image Credit: Tell Yunatsite Project.*

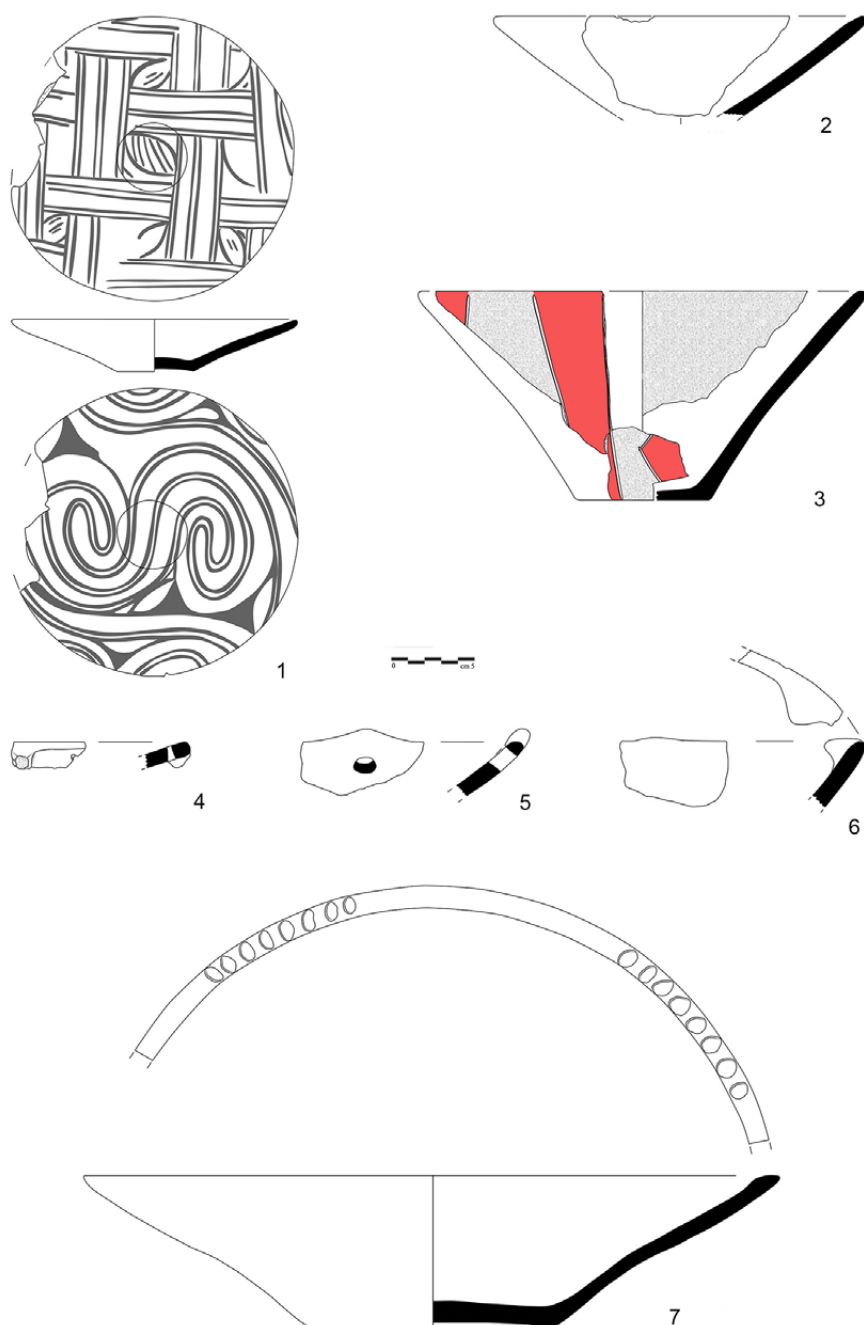


Figure 31. Plates, type 1 (1–6) and 3.D (7). Vessels XIII (1), XXX (2), XLVIII (3) and XX (7).
Image Credit: Tell Yunatsite Project.

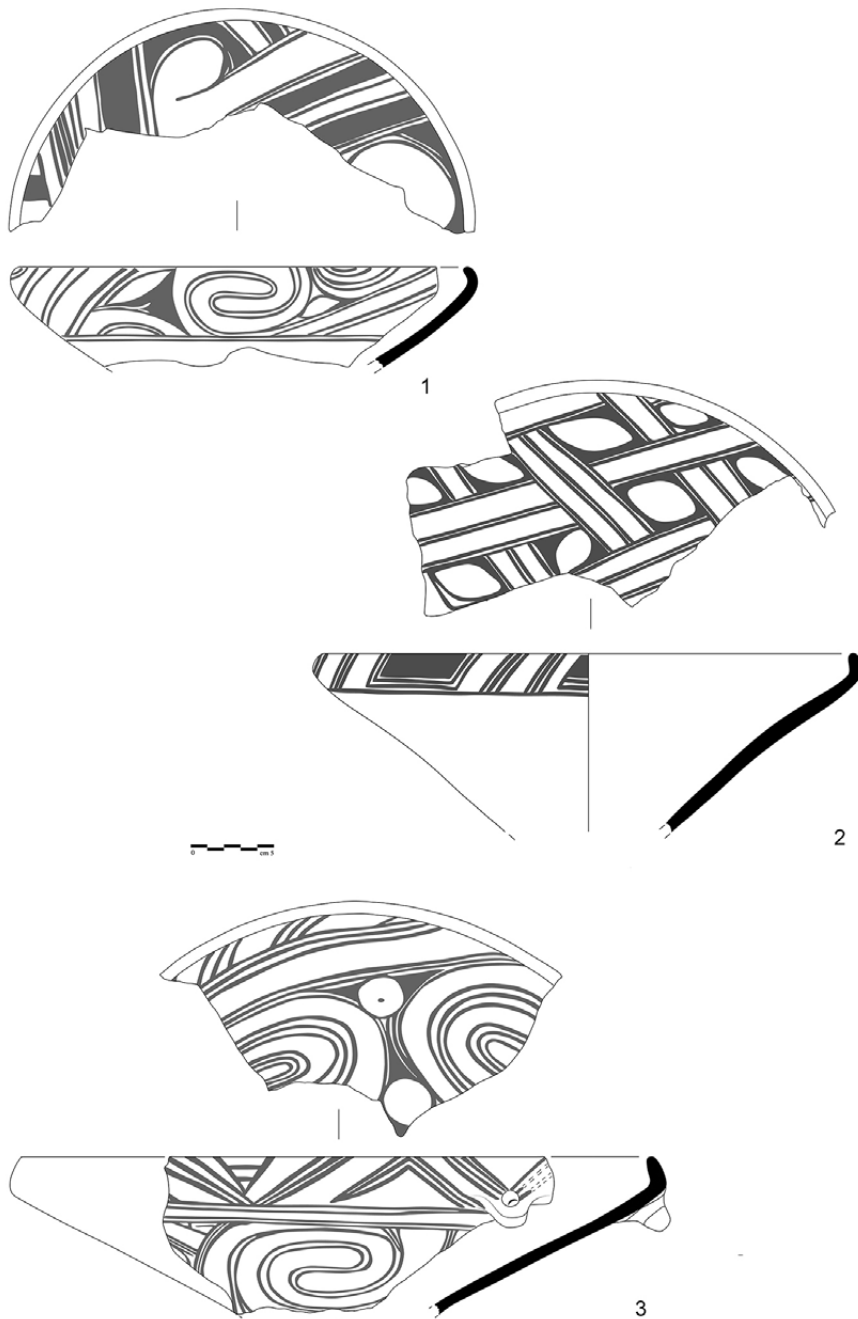


Figure 32. Plates, type 4 and 5. Vessels XI (1) and XLVI (3). Image Credit: Tell Yunatsite Project.

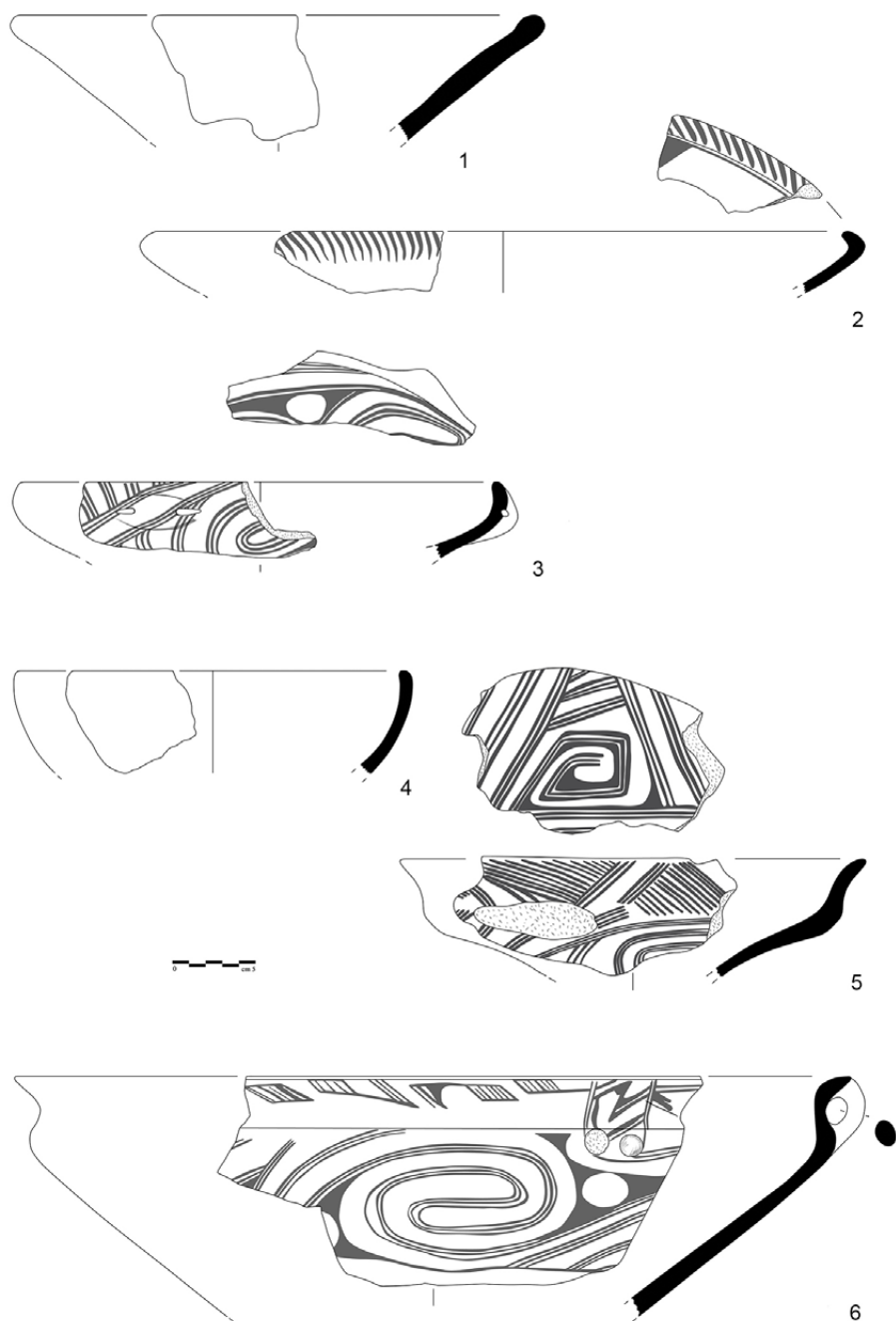


Figure 33. Plates, type 3 (1), 5 (2 and 3) and 6 (4), and plates/bowls, type 1 (5 and 6). Image Credit: Tell Yunatsite Project.

(VIII) Lids. No whole lids were found. The sherds identified as lids have a slightly pronounced conical shape, in one case with a very low cylindrical part. Their distinction from the plates is sometimes uncertain and is based on the rougher treatment of the inner surface.

(IX) 'Strainers'. There are no reconstructible vessels of this kind. This prevents a more detailed morphological division and determination of their function.

(X) Potstands. These are vessels open at both sides, and probably used to place other vessels on top of them. The potstands from the building have an approximately cylindrical shape, but with distinctly concave walls.

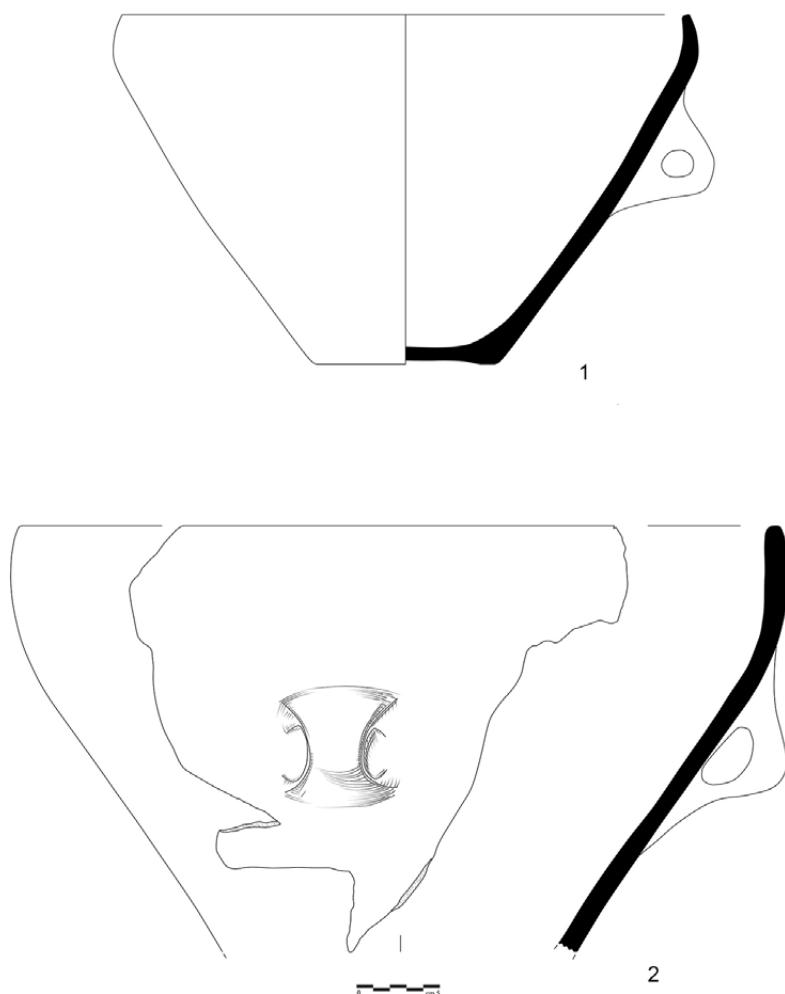


Figure 34. Plates/bowls, type 2. Vessels XXV (1) and XXIV (2). Image Credit: Tell Yunatsite Project.

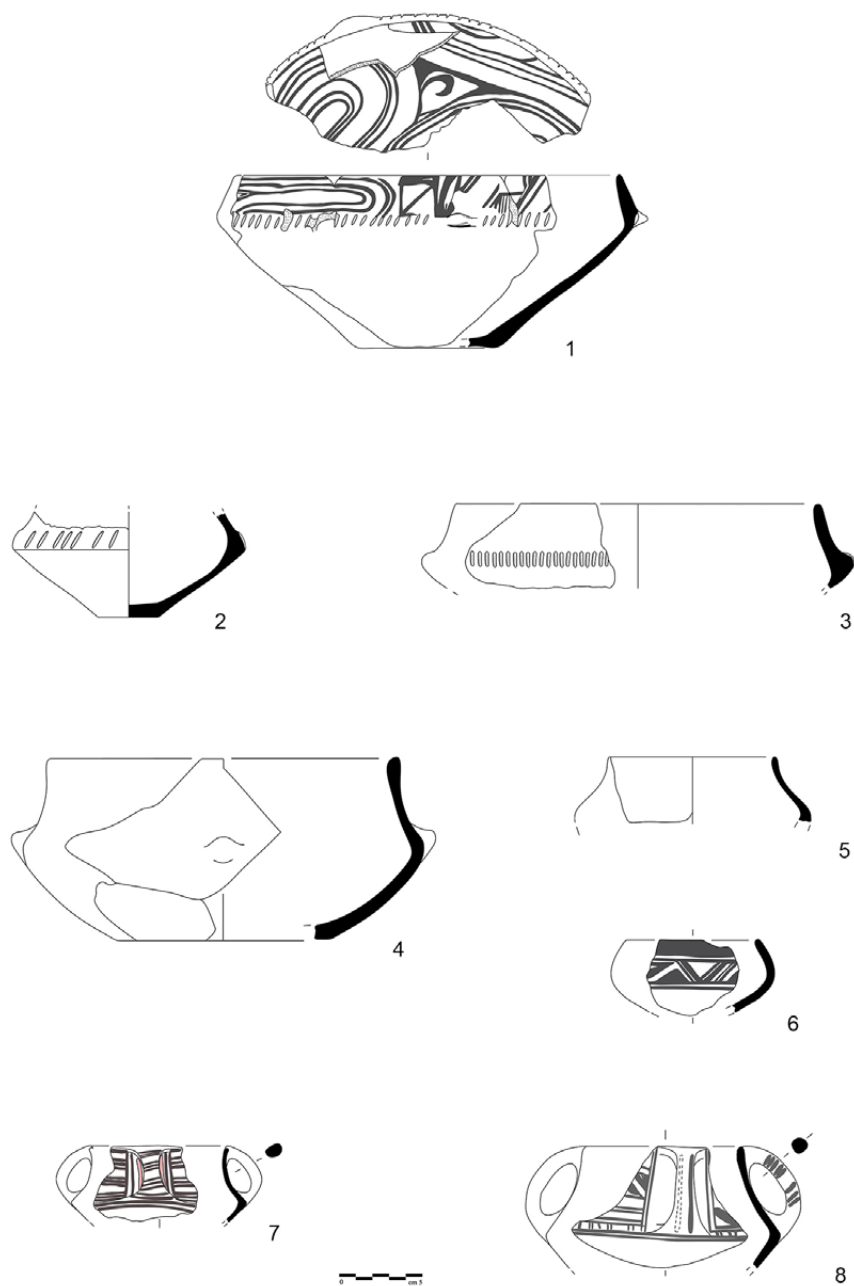


Figure 35. Bowls, type 3. Image Credit: Tell Yunatsite Project.

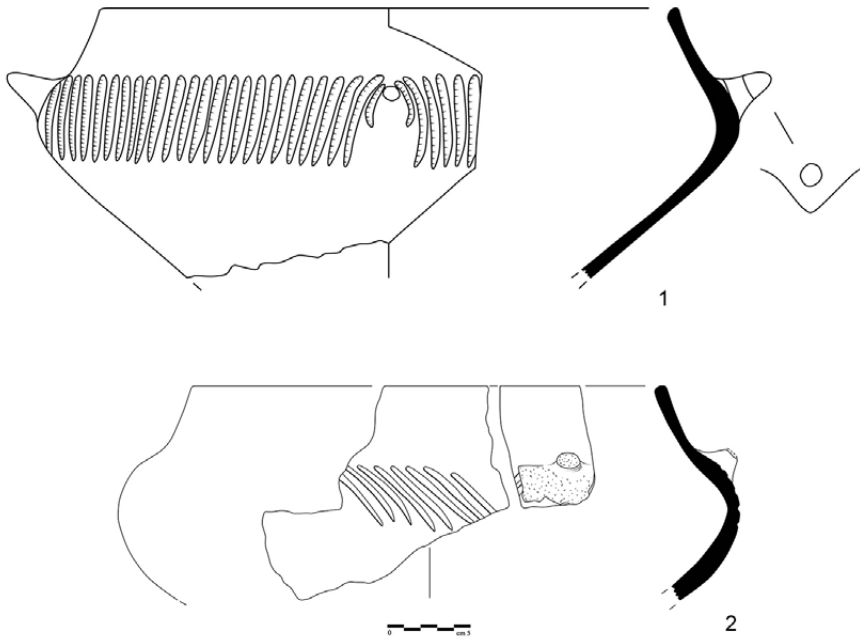


Figure 36. Bowls, type 4.B. Vessel XLVII (1). Image Credit: Tell Yunatsite Project.

(XI) Miniatures. Ceramic vessels whose size (and especially their volume) is so small that they cannot be used as regular vessels (fig. 43/3). The diameter and the height of the miniatures are less than 4 or 5 cm. Their surfaces are usually roughly treated.

Bowls, plates, and storage vessels slightly dominate among the completely reconstructible vessels, being almost equal in numbers (fig. 50). They are followed by jars, cups, jugs, and plates/bowls, represented by a small number of pots. If we include the upper halves that provide information about the shape of the respective vessels in the analysis, the picture is different: bowls predominate, second come plates, followed by almost equal numbers of plates/bowls, jars, and storage vessels. The situation is relatively similar when all typologically diagnostic sherds are considered. Among them, bowls (35%) and plates (29%) predominate, far behind them are storage vessels (14%), plates/bowls (8%) and jars (4%), while jugs, cups, potstands, 'strainers', lids, and miniatures are represented by one to eight pieces and occupy a total of 10 percent (fig. 51).

However, the majority of the sherds (1395) were not identified typologically during the initial processing. It is possible that a large number of them originated from storage vessels, as well as from jars. The analysis of the restored or recognizable storage vessels shows that they usually have wall thickness of more than 0.8 cm, which is less common among other vessels (fig. 52). Their rim diameter is more than 15 cm, and in most cases exceeds 30 cm, and the angle of the neck to the rim varies between 85° and 115°. Specif-

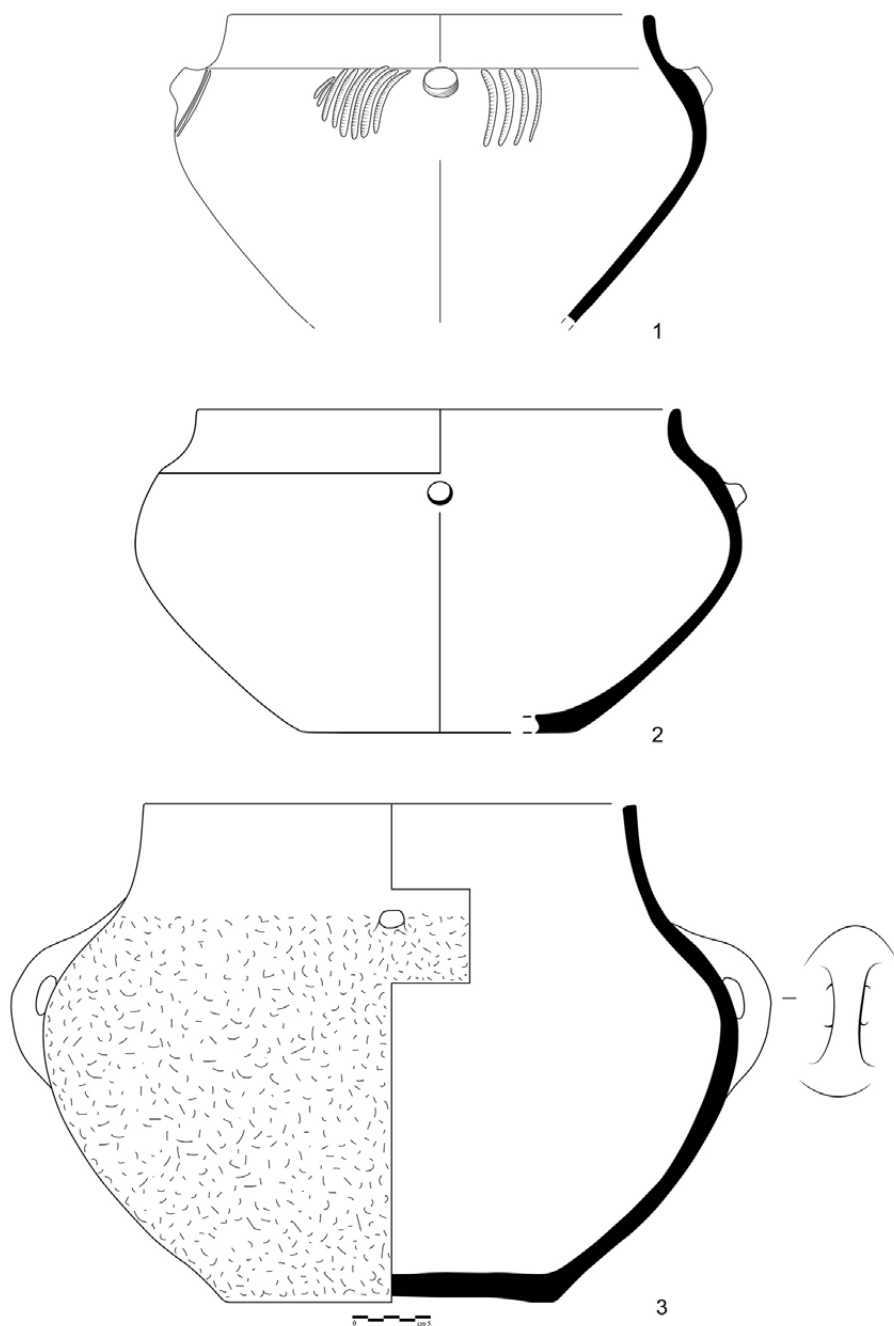


Figure 37. Bowls, type 4 and 5. Vessels XXI (1), VI (2), and XXXVIII (3). Image Credit: Tell Yunatsite Project.

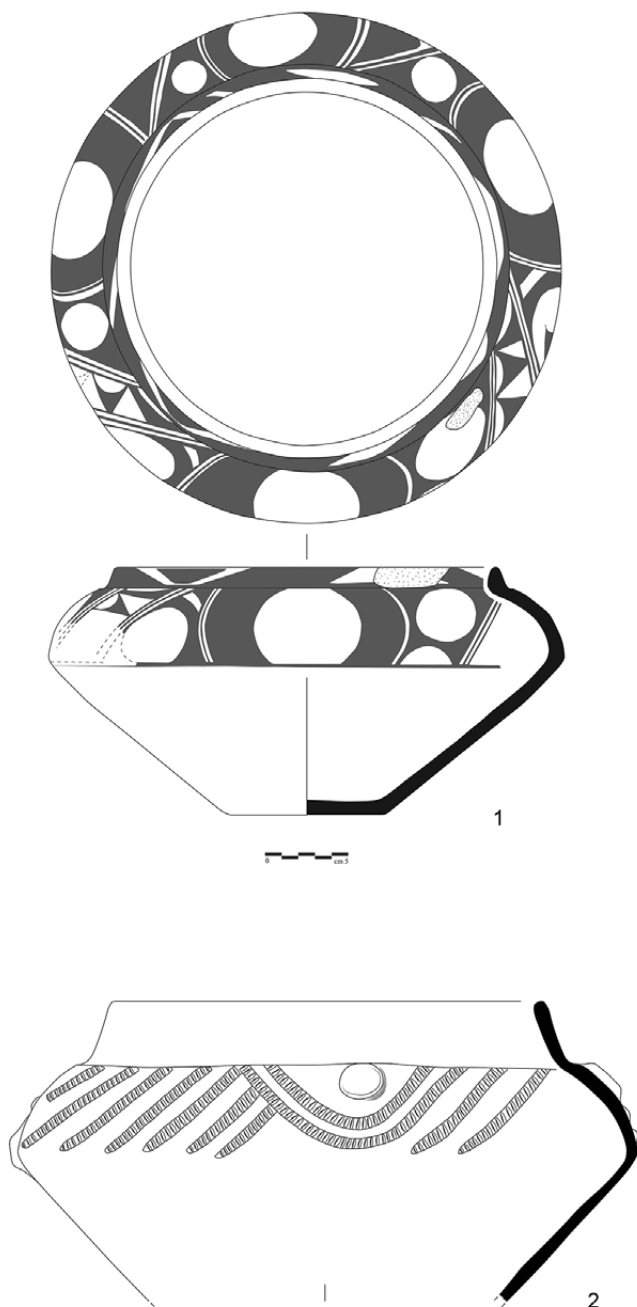


Figure 38. Bowls, type 4.D. Vessels XII (1) and XXVI (2). Image Credit: Tell Yunatsite Project.

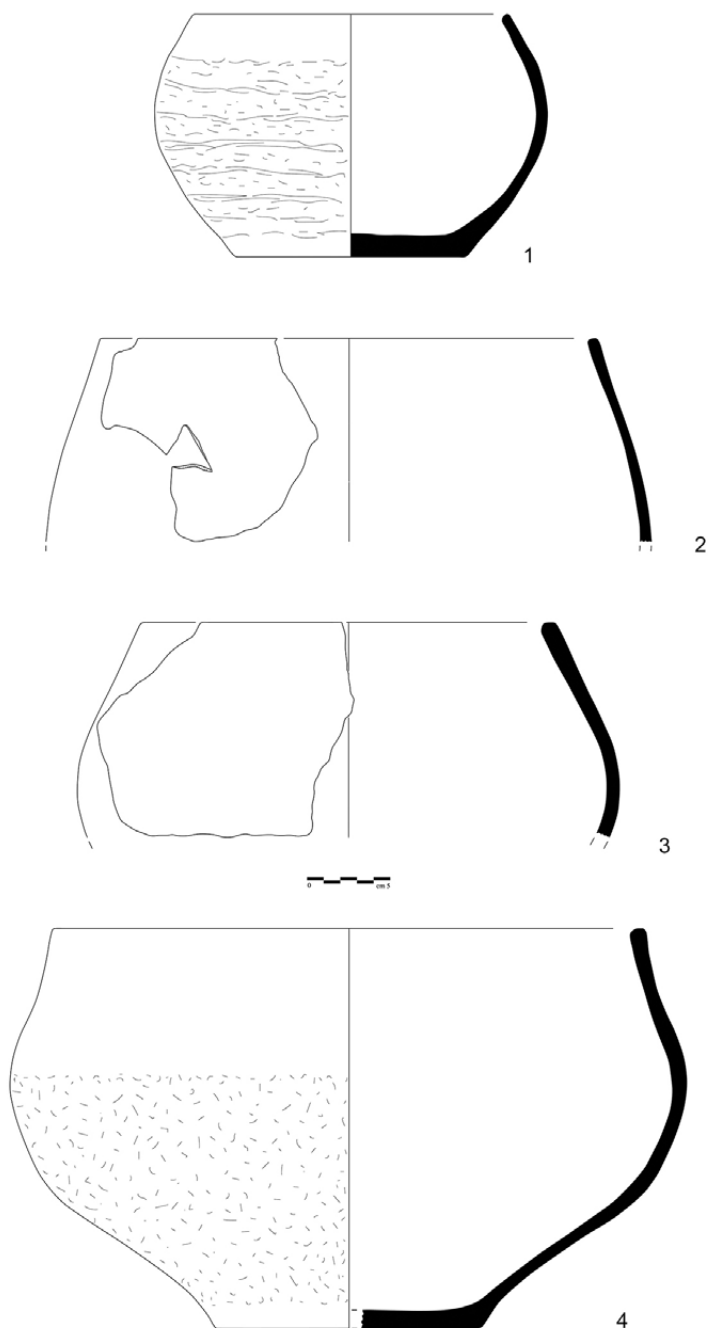


Figure 39. Bowls, type 5. Vessels XXXIX (1), XVI (2), and XLII (4). Image Credit: Tell Yunatsite Project.

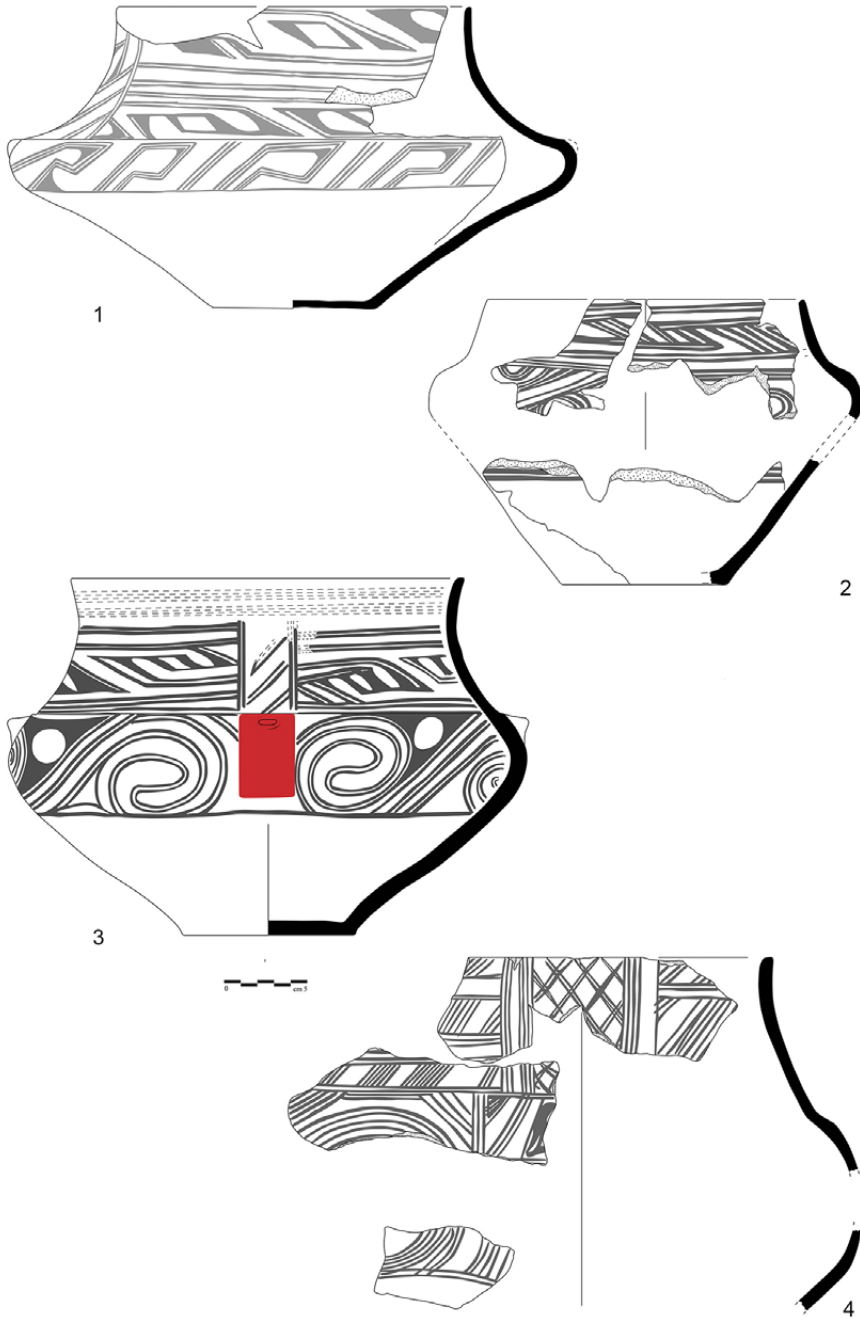


Figure 40. Bowls, type 4.C and 8.D. Vessels IX (1), XXVIII (2), V (3), and XIV (4). Image Credit: Tell Yunatsite Project.

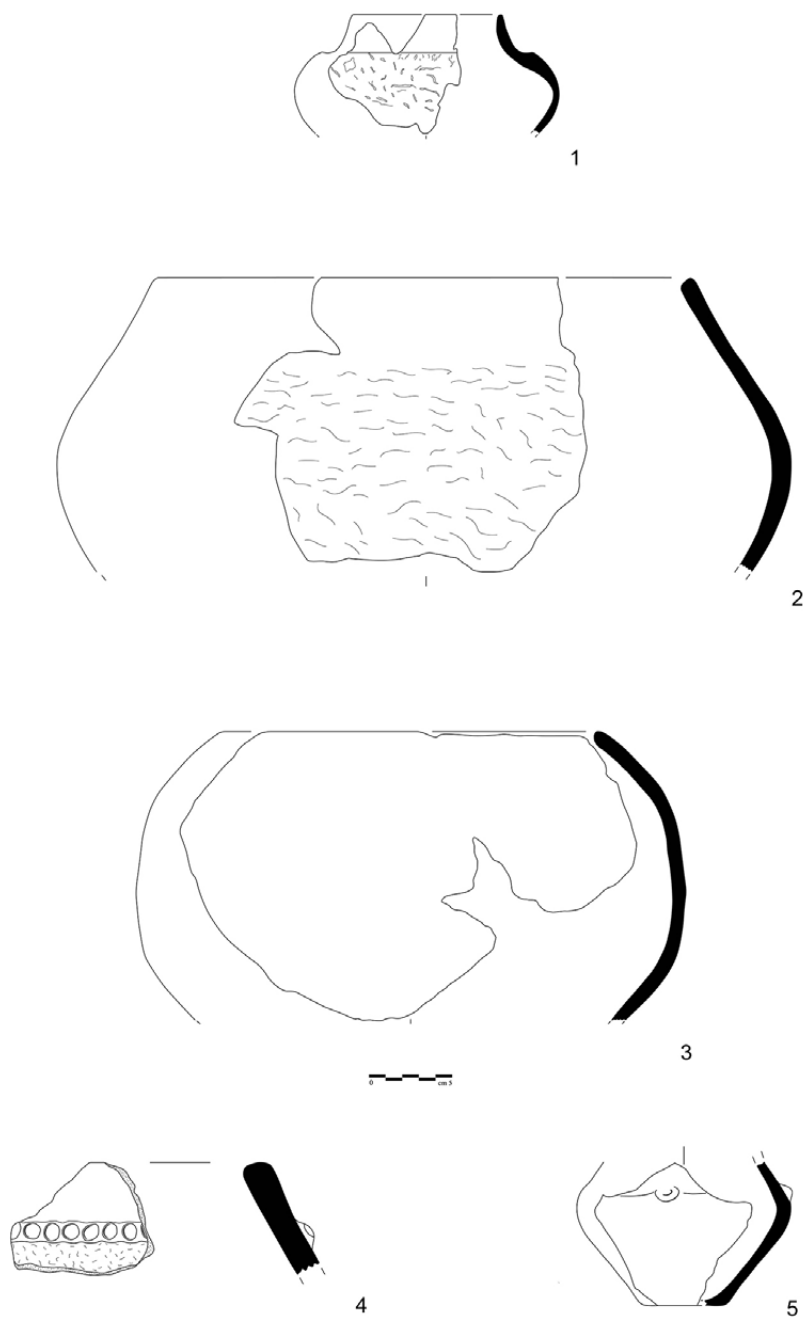


Figure 41. Jars. Image Credit: Tell Yunatsite Project.

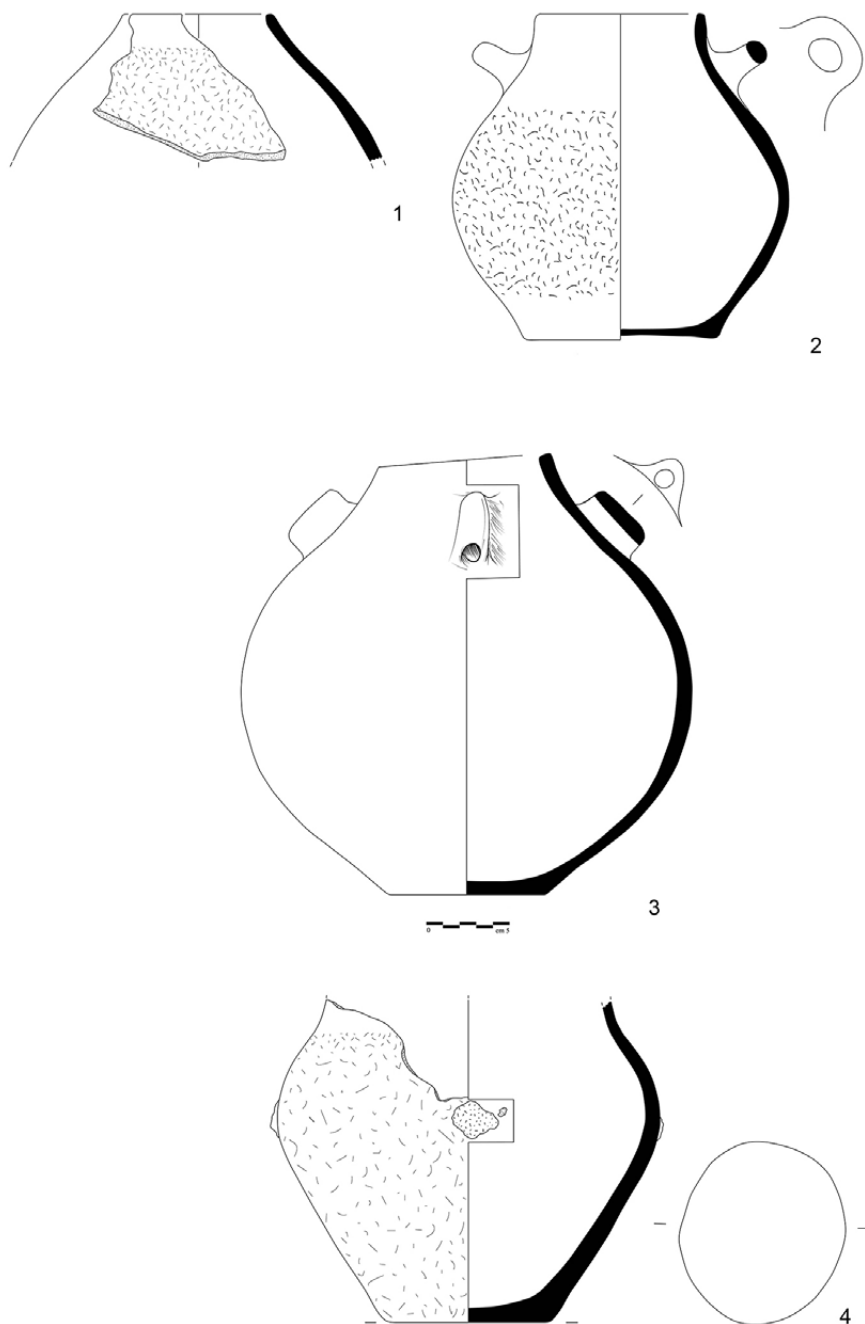


Figure 42. Jars. Vessels VII (2) and VIII (3). Image Credit: Tell Yunatsite Project.

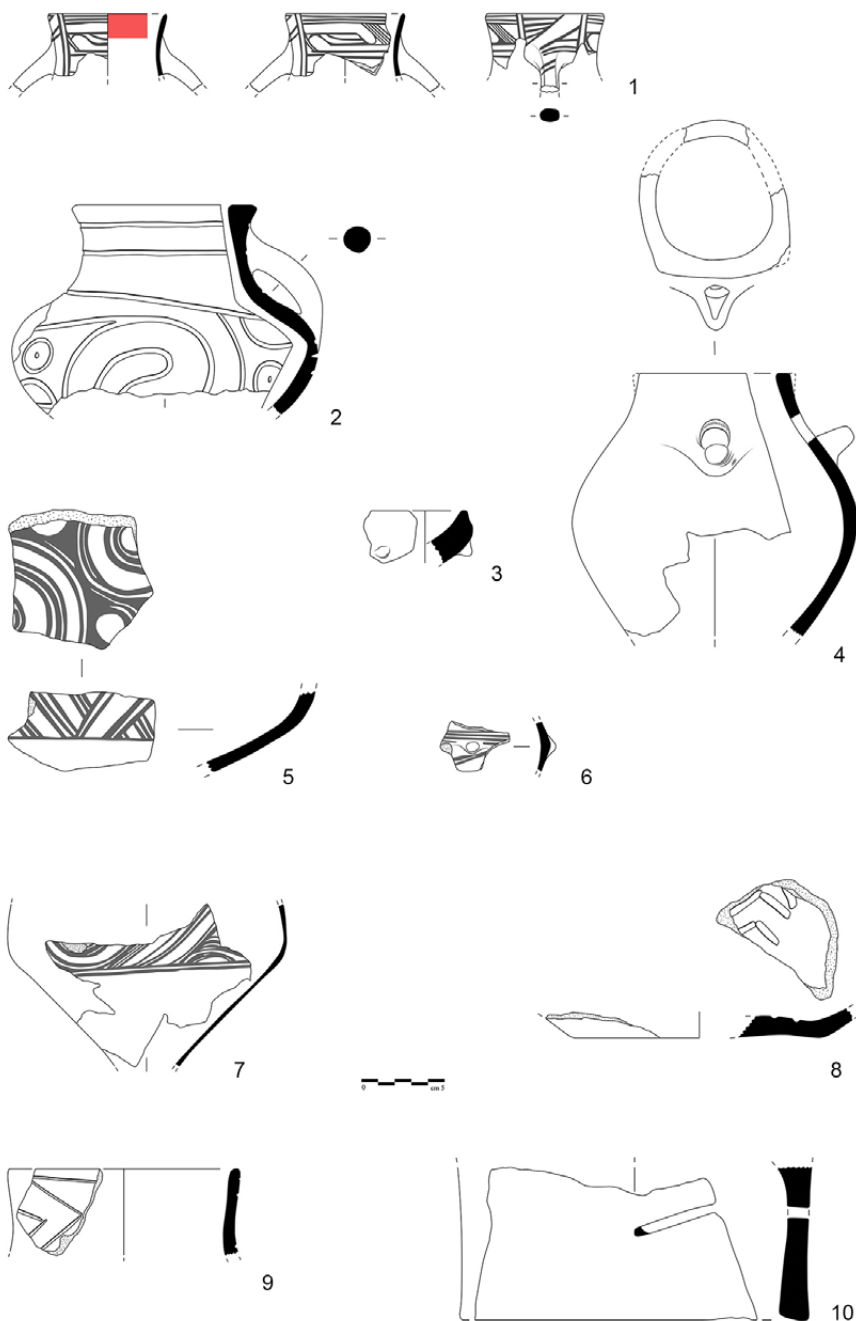


Figure 43. Jugs (1 and 2), miniature (3), spouted vessel (4), bowl sherds (1–7), base with incised decoration (8), potstand (9), and pedestal? (10). Image Credit: Tell Yunatsite Project.

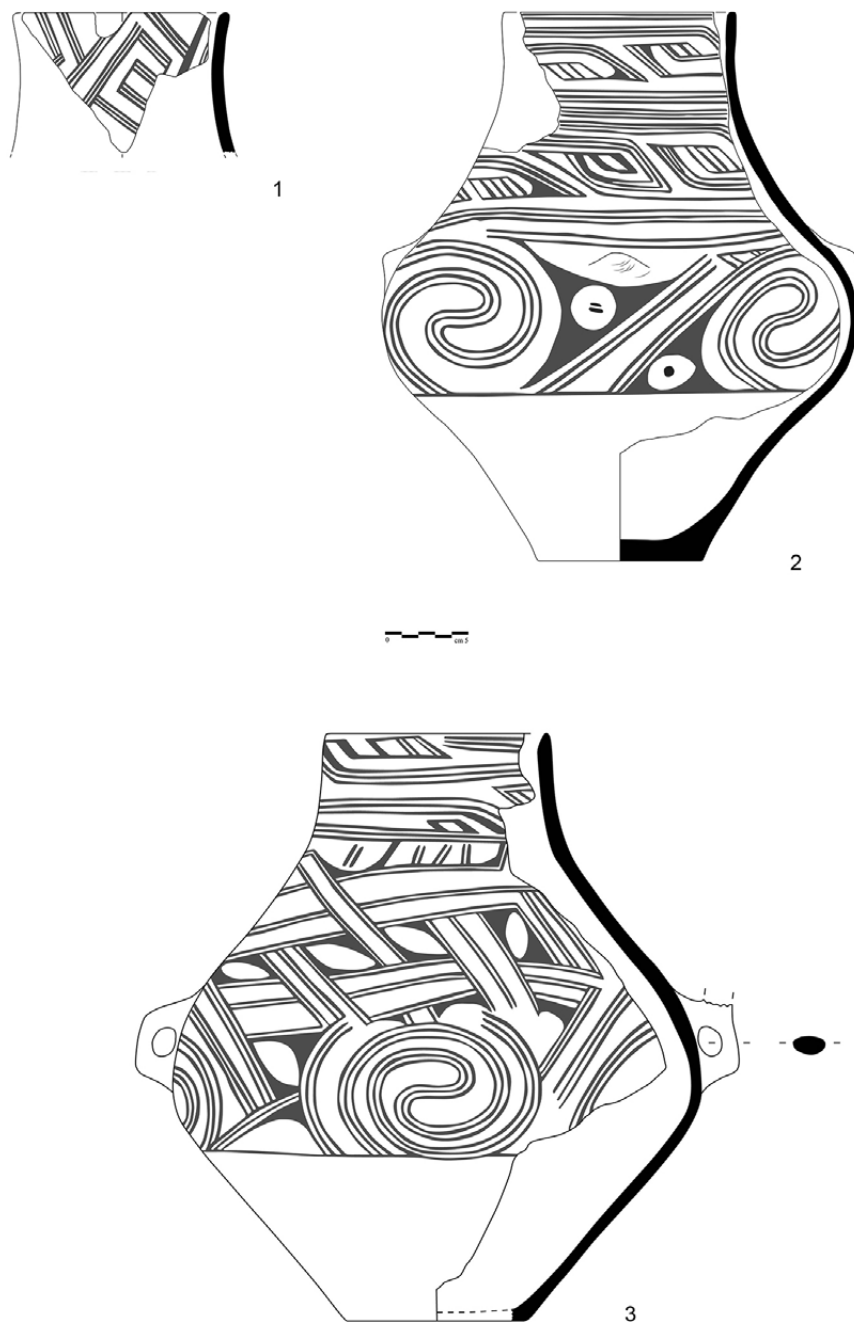


Figure 44. Storage vessels, IV (1) and XLIV (2). Image Credit: Tell Yunatsite Project.



Figure 45. *Storage vessels, XXXV (1) and XXIII (3). Image Credit: Tell Yunatsite Project.*

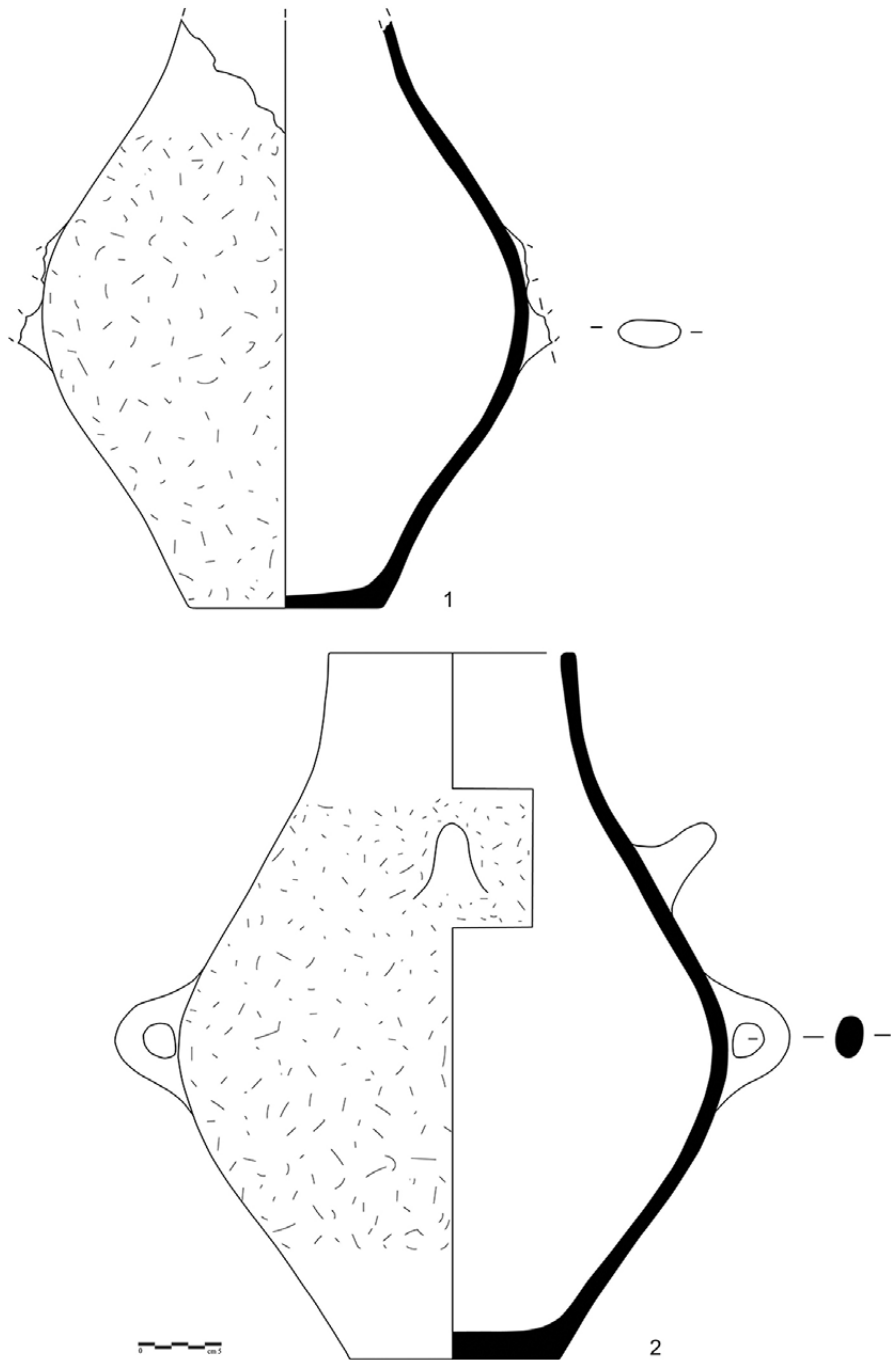


Figure 46. Storage vessels, I (1) and III (2). Image Credit: Tell Yunatsite Project.

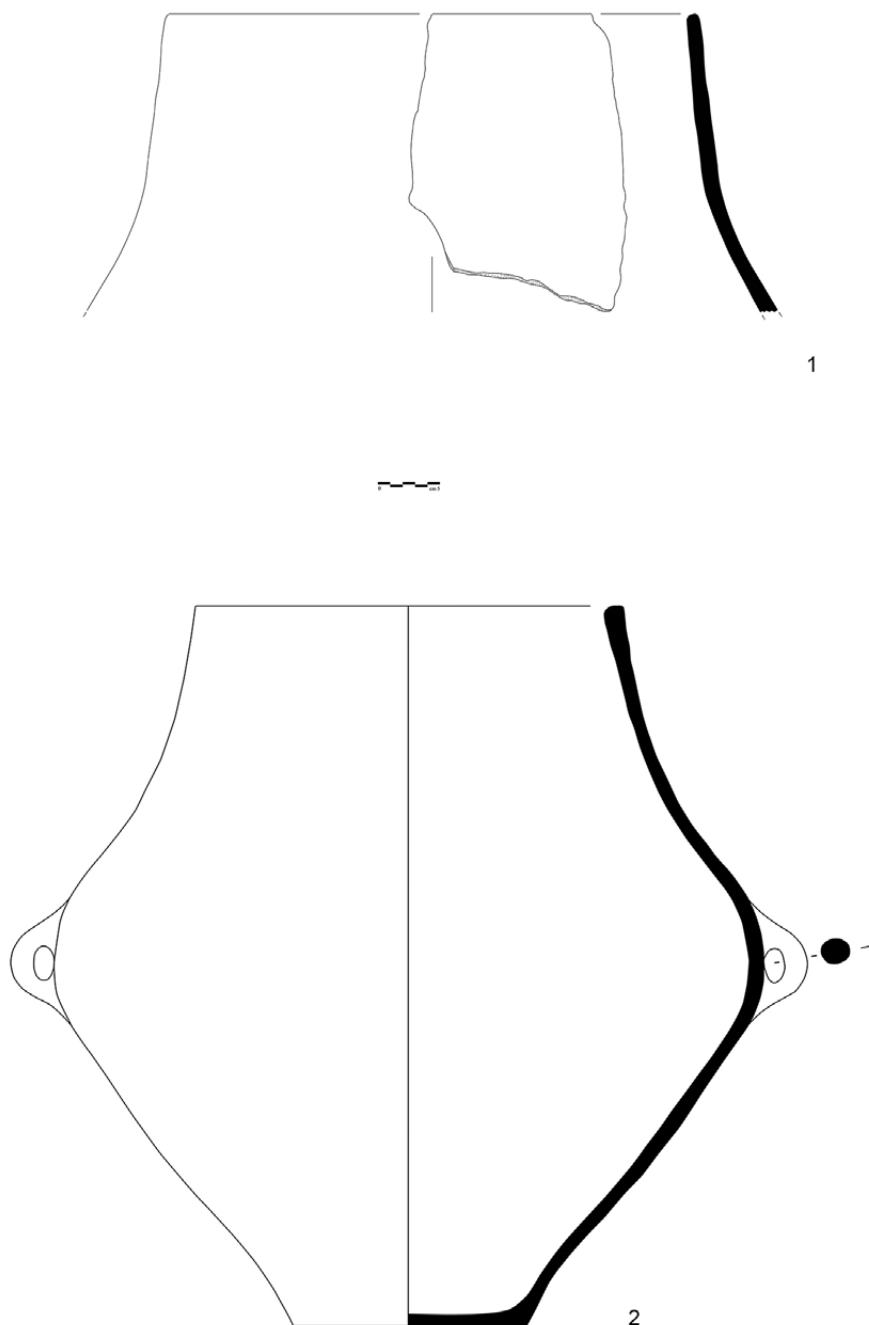


Figure 47. *Storage vessels, II (2). Image Credit: Tell Yunatsite Project.*

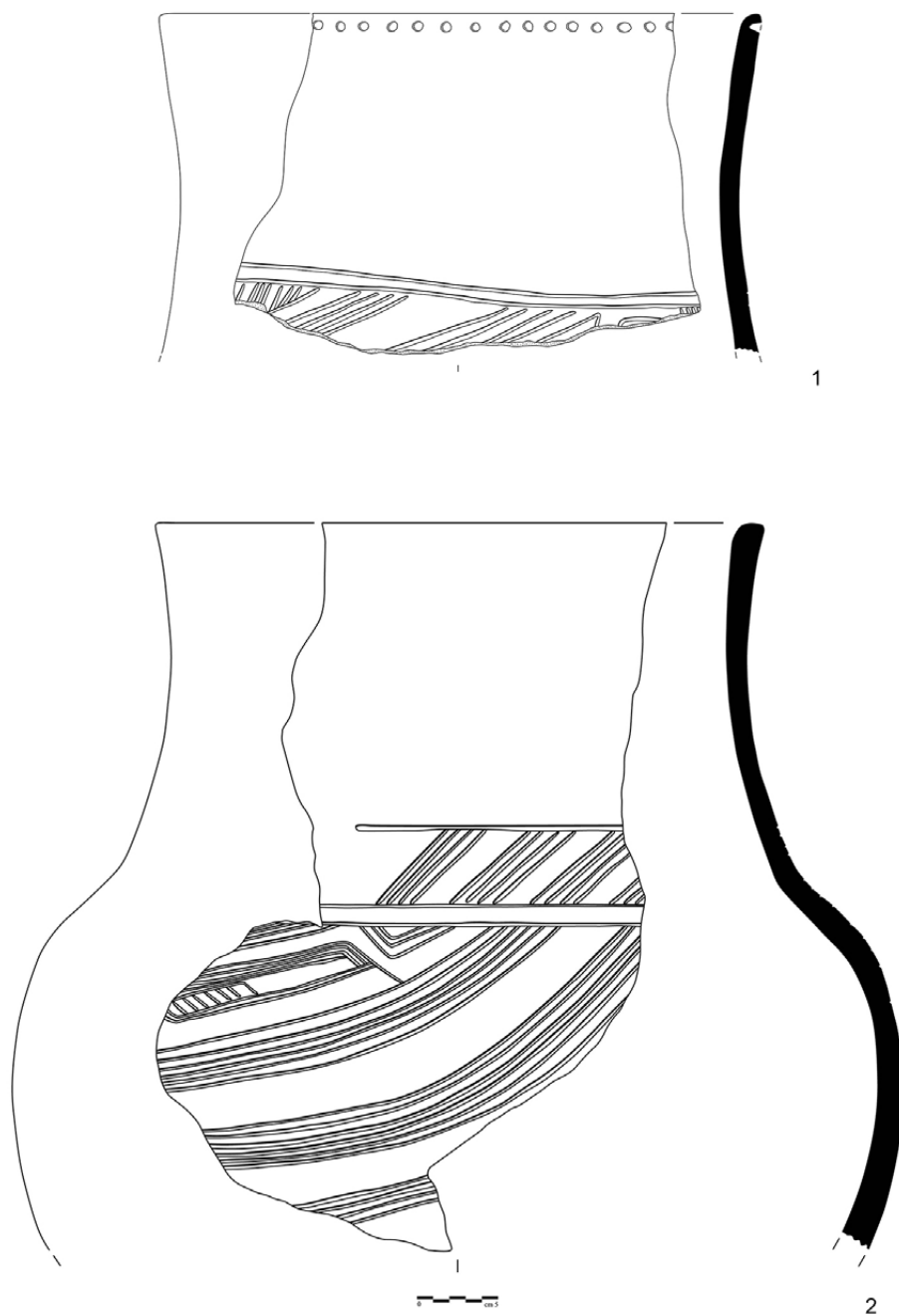


Figure 48. *Storage vessels, XLIII (1) and XLI (2). Image Credit: Tell Yunatsite Project.*

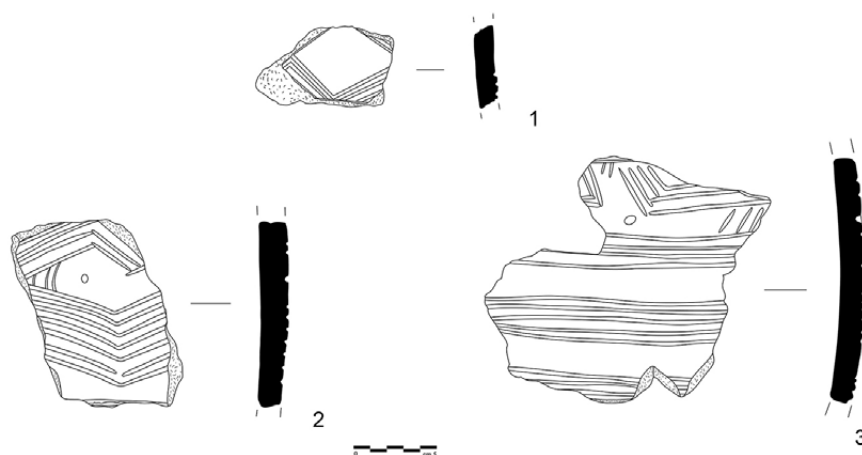


Figure 49. Sherds from storage vessels with incised decoration. Image Credit: Tell Yunatsite Project.

ic incised or graphite decoration is often found (these observations are based on vessels from other buildings at the site, as well). Thirty-five of the unidentified rim sherds meet these conditions. When we consider the wall sherds, 565 are over 0.8 cm and 326 over 1 cm thick; 78 of those that are over 0.8 cm have incised decoration (fig. 49) and 71 have graphite decoration. Considering some other characteristics of these fragments, we could assume that a minimum of 400 (and probably more than 500) of the unidentified sherds originate from about 6 or 8 storage vessels, a large part of which is however missing. It is important to note that some of the restored storage vessels include over 200 sherds.

At the type and subtype level, considerable diversity is observed, particularly among the plates and bowls (figs. 30–48 and 53).¹ Conical plates predominate (type I.1), followed by plates with thickened (I.3), curved (I.5) or inverted rim (I.4), with convex walls (I.6), and finally plates with S-shaped rims (I.2). The angle of the wall to the rim, and the depth of the vessels accordingly, varies significantly: from about 30° to 80°.

Among the bowls, shapes of three morphological parts with a distinct middle part and neck predominate (III.4), followed by biconical (III.3) and rounded vessels (III.5). The more complex type III.8 shapes of three morphological parts and the cylindrical-conical bowls (III.2) are represented by smaller numbers.

The jars are dominated by almost spherical shapes. In some cases, a neck is formed, but the junction with the main body is rounded and not well-emphasized (IV.2.H and

¹ The types and subtypes presented in the figures include only those attested in the ceramic assemblage from building BII-21B. The codes noted follow the general classification developed by the team for Copper Age sites in Upper Thrace. Therefore, a number of codes are missing.

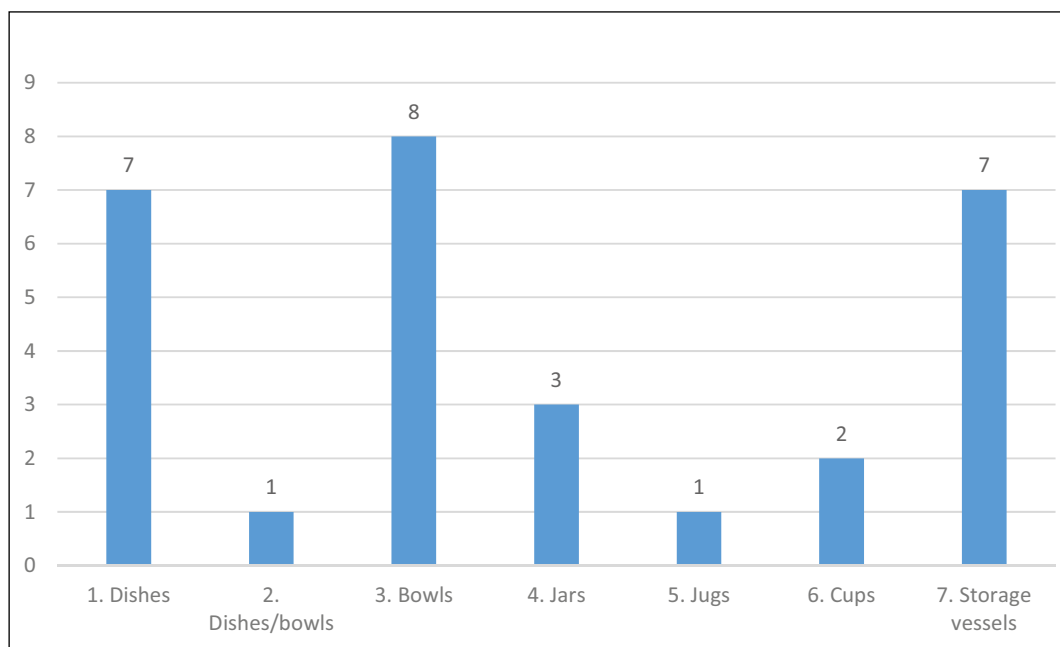


Figure 50. *Distribution of whole vessels by categories (main shapes). Image Credit: Tell Yunatsite Project.*

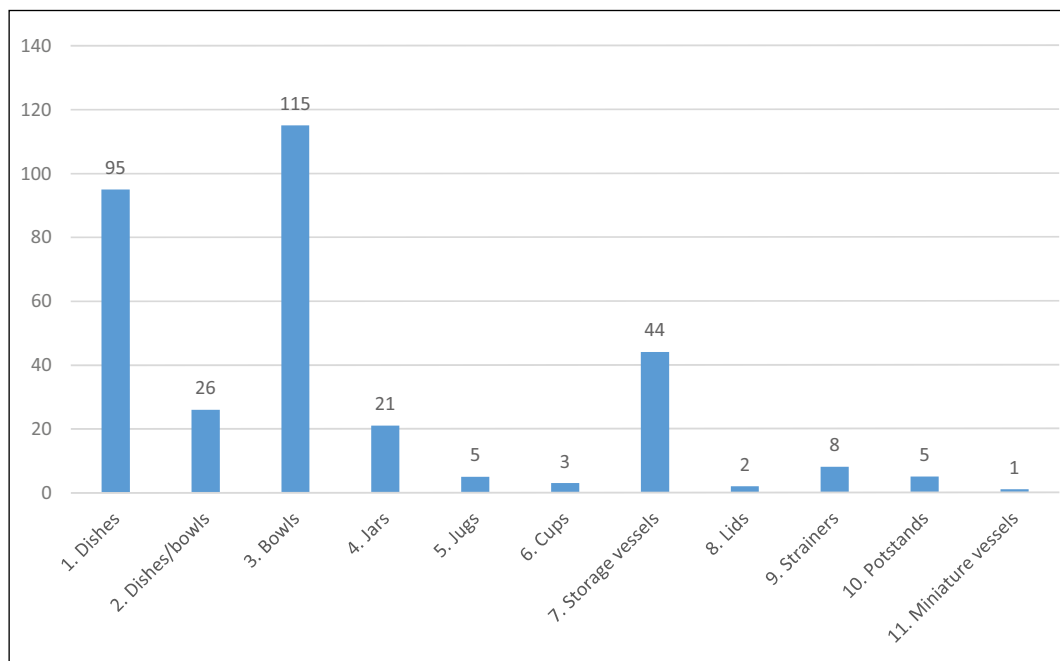


Figure 51. *Distribution of all identified vessels by categories. Image Credit: Tell Yunatsite Project.*

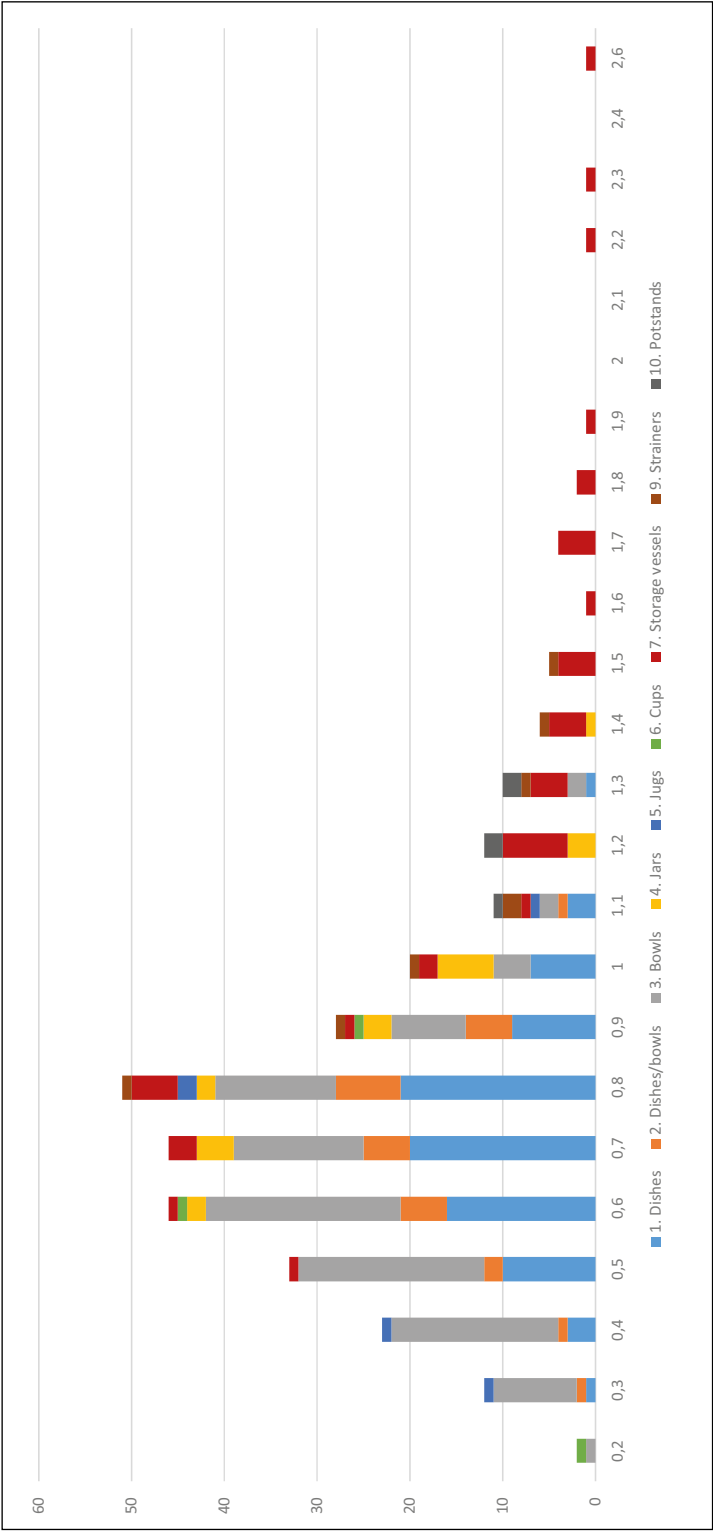


Figure 52. Distribution of wall thickness by categories. Image Credit: Tell Yunatsite Project.

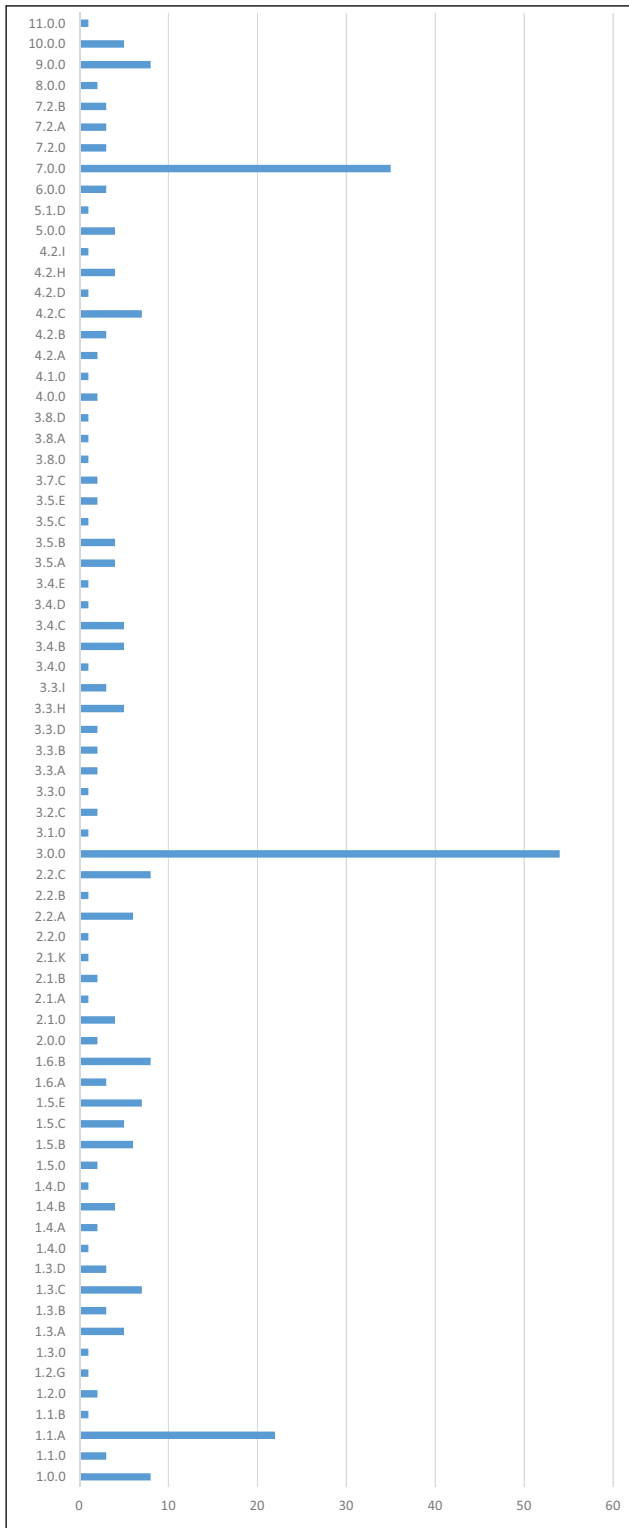


Figure 53. *Distributions of all identified vessels by types and subtypes. Codes match the ones in figures 28–30, the Roman numerals having been replaced by Arabic. Image Credit: Tell Yunatsite Project.*

IV.2.I). One almost spherical jar with two vertical tunnel handles on the neck is worth pointing out (fig. 42/3). Only one jar sherd has a clearly defined neck (type IV.2.D).

The storage vessels have shapes of three morphological parts with a rounded middle part. Based on their proportions (height versus maximum diameter), two types have been distinguished (fig. 32). A significant difference in size is observed in type VII.2.A: between 8 and 70 liters for the whole vessels. Specimens of type VII.2.B fall mainly in the lower part of this range. In both types, some of the vessels have two vertical handles at the maximum diameter (figs. 44/3, 46, and 47/2).

Technology

The technological analysis of the pottery is based both on macroscopic observations and statistical analysis of the characteristics recorded in the database (type and size of temper, fracture, treatment of both surfaces, color), and on microscopic observations performed on 19 thin sections, representing vessels of various sizes, shapes, and decoration techniques.

The macroscopic analysis shows a homogeneity of the fabric used to produce vessels. Small mineral temper significantly dominates, sometimes combined with small organic inclusions or small pieces of grog (*chamotte*). Predominant use of medium-sized (1–2 mm) or large mineral temper is very rare and attested mainly in storage vessels.

Ceramic petrographic analysis of thin sections has been able to distinguish four fabric groups, which are further divided in up to two sub-groups (table 3 and fig. 54). Most of the fabrics contain coarse polycrystalline inclusions composed of feldspar (often plagioclase), quartz and mica with moderate relief and usually diamond shaped or elongated, fractures at 120°, second order interference colors and greenish to neutral colors in Plain Polarised Light (PPL). Many of the mica fragments have been identified as amphibole although some are difficult to distinguish from pyroxene and clinopyroxene. These minerals suggest that the clays contain amphibolite, which is also suggested by the granoblastic texture of the polycrystalline inclusions, indicating these are of metamorphic origin.

No.	Fabrics description	Vessels or sherds (s.) presented
1A	amphibolite temper	XIX, XXXII, XXXVII, s. 44
1B	mica schist	XX, XXXIV, XXXIX
2A	amphibolite and TFs*	XIV, XXIII, XXVII, XXVIII, XLI, s. 42
2B	amphibolite and TFs in ferruginous matrix	s. 43
3	self-tempered fabric	XXXV
4A	amphibolite in fine matrix	XXVI, XXXVI, XLIII
4B	amphibolite in fine matrix with calcareous inclusions	XXXVIII

Table 3. Fabric groups, distinguished by petrographic analysis of thin sections. * TF stands for textural feature.

Most of the fabrics have a bimodal grain size distribution suggesting that crushed amphibolite was added to similar heterogeneous mixed clay, which generally contains similar inclusions as those that constitute amphibolite with the addition of clay pellets and lathy mica, which could be muscovite. The inclusions in fine fraction have the same profile as the amphibolite inclusions, suggesting that we are perhaps dealing with secondary clays deposited through riverine activity in an amphibole-rich geology or that residual clays were used which formed upon amphibolite geology. The first option seems most likely because of the proximity of Tell Yunatsite to riverine clay-beds. The angularity and freshness of the amphibolite fragments further suggests that clay and temper mixing took place, as more rounded and weathered inclusions would be expected in the context of self-tempered fabrics.

The matrices of the different sub-groups vary slightly with some samples containing more reddish matrix colors and more abundant ferruginous inclusions (i.e. 2B). Such variation could occur within the same clay bed.

The sample representing fabric 3 contains a clearly unimodal grain size distribution, fewer hornblende, and no coarse amphibolite, suggesting that this clay base was left untempered. As such, this fabric suggests that the base clay used in other samples also could contain abundant fine feldspar and quartz and that the higher abundance of amphibole and coarse polycrystalline fragments is due to tempering.

Samples of fabric 2 are distinguished from the other fabrics through the presence of streaks of dark, ash-like material in the matrix and the occasional presence of burnt out, lentil-shaped organic inclusions (fig. 54/c and d). It has not been possible to confirm if the streaking resulted from the addition of dung, because no spherulites have been identified. The crystalline structure of the particles inside the greyish streaks resembles crystals of ash pseudomorphs which are calcium oxalates from plants that form calcite crystals after exposure to temperatures higher than 450° C (Amicone et al. 2021; Canti & Nicosia 2018).

Samples of fabric 4 have a finer matrix than the other fabrics, suggesting that finer clays were used (fig. 54/g and h). It is likely that variation in the abundance of inclusions in different matrices relates to natural variation in the same secondary clay source. However, samples of this fabric stand out due to the very clear bimodal grain size distribution resulting from the smaller size and lower abundance of minerals in fine fraction. Fabric 4B contains altered calcareous inclusions, which, due to their coarse size, could have been added alongside the crushed amphibolite temper.

The different fabrics identified suggest that a uniform clay procurement strategy was adhered to as well as a common idea of using amphibolite temper in the production of most ceramics. The main variation on this clay recipe is the addition, in samples of fabric 2, of plastic or non-plastic material such as ash or dung, which could have further optimized the plasticity of the vessels during the forming process.

No absolute relationship between certain shapes and sizes of vessels and a specific clay fabric is apparent. However, certain regularities are observed. Fabric 2 is attested

mainly in storage vessels, as well as large deep bowls with graphite decoration. It seems that this recipe was deliberately used for large vessels, probably to achieve better plasticity of the clay. Fabric 1 is mainly attested on smaller vessels (plates, bowls, and small jars), but there is also one storage vessel. Fabric 4 is small in the number of vessels represented, but diverse in the forms made. It includes a bowl, a jar, and a storage vessel. The only sample of fabric 3, without temper, comes from a storage vessel (No XXXV).

Among the ceramics from the building, there is almost no visible evidence of the crafting technology applied to construct the vessels. In a few cases, there are macroscopically discernible traces that coils were used, and this technique is also attested in one of the thin sections (fig. 54/f). Whatever technique was used, it is evident that the potters very skillfully obliterated the joints between the individual coils or parts of vessels. Such traces are rarely seen even along the carinations.

The main piece of evidence about the firing control of the vessels is provided by their fractures. Among them, the three-part fracture is significantly predominant (75% of all cases), followed by the single-part one (18%).

The surfaces of the vessels are usually carefully treated. Polished surfaces (55%) dominate the outer ones, followed by smoothed (29%) and roughened varieties (13%). The remaining types of treatment (including various combinations) are represented by a small number of specimens. Inner surfaces are usually smoothed (70%), and more seldom polished (27%). The carefully treated surfaces had not only aesthetic but also practical function, to reduce the absorption of moisture in the vessel. It is noteworthy that, among the identifiable vessel shapes, roughened and roughly smoothed outer surfaces and the various combinations with their participation (mainly smoothed or polished upper part and roughened middle and lower part) are mainly found on jars (fig. 55). This probably has to do with the potentially hot cookware being easier to grip.

The secondary firing of the vessels during the burning of the building caused significant changes in the color of their surfaces. Radical differences between sherds of the same vessel have been observed. For this reason, color cannot be used as a reliable technological criterion.

The analysis of the ceramic assemblage speaks to a well-mastered and standardized production technology, including all its stages: purposeful use of specific clay sources and temper, extremely skillful shaping of the vessels and treatment of the surfaces, matching the technology with the function of the vessel, good firing control and considerable skill in applying the decoration, especially the painted one. This was obviously the work of a specialist artisan(s).

Decoration

Most of the vessels from building BII-21B were decorated. Decoration is attested on 48 percent of all sherds, but when just the reconstructible shapes ('whole' vessels and upper halves, a total of 76 specimens) are considered, it reaches 74 percent. This number is probably closer to the real situation. The following decoration techniques were iden-

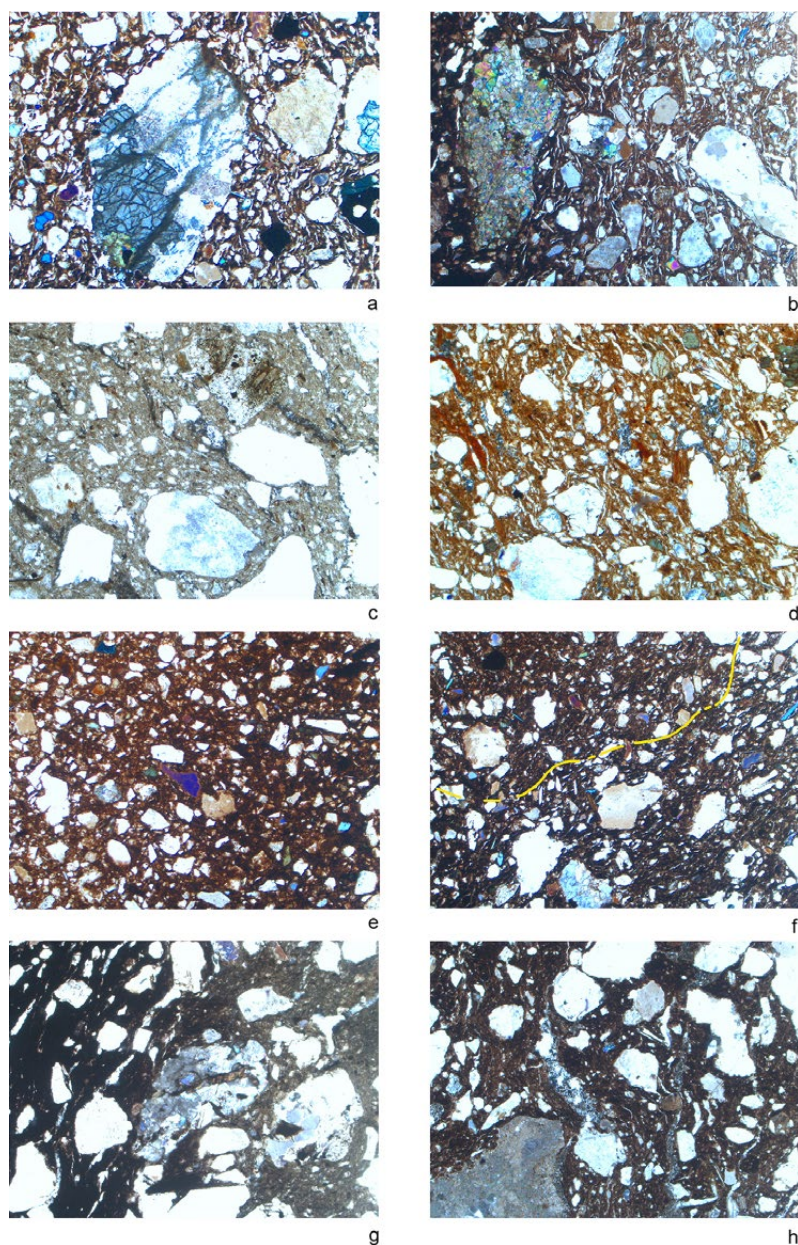


Figure 54. *Fabrics: (a) amphibolite fragment in sample 31 (vessel XXXII). XPL, *field of view = 3.0 mm; (b) mica schist fragments in sample 38 (vessel XXXIX). XPL, field of view = 3.0 mm; (c) streaks of ash-like material in the matrix of sample 42. PPL, **field of view = 3.0 mm; (d) sample 43. PPL, field of view = 3.0 mm; (e) sample 34 (vessel XXXV). XPL, field of view = 3.0 mm; (f) sample 26 (vessel XX) showing border of relic coil of same fabric as sample 34. XPL, field of view = 3.0 mm; (g) bimodal grain size distribution in sample 28 (vessel XXVI). XPL, field of view = 3.0 mm; (h) large calcareous inclusion in bottom left of microphotograph, sample 37 (vessel XXXVIII). XPL, field of view = 3.0 mm. *XPL: Crossed polarized light. **PPL: Plain polarized light.*

tified: painted (graphite and red paint), incised, impressed (made with a shell, tool, or fingernail), fluting, dimples, cordons, and pellets. Barbotine is also included here, though it probably had not just aesthetic but practical function, as well.

The painted decoration slightly predominates over all the others combined (54% versus 46% of all pieces; 50% each in the reconstructible specimens). In terms of particular techniques, however, graphite decoration significantly dominates, with a total of 52 percent of all decorated pieces. It is followed by barbotine (25%), incised lines (12%), and pellets (5%). The remaining techniques are represented by up to 1 percent of the pieces (fig. 56). Indeed, the percentage of the first three techniques in the overall assemblage is probably distorted by their use on large and highly fragmented storage vessels. The analysis of the reconstructible vessels alone also shows a predominance of graphite decoration, but to a lesser extent: 45 percent of the decorated ones. However, the distribution of the other techniques is different: pellets hold the second place (21%), followed by barbotine (12%), fluting (8%), incised lines (7%), cordons and red paint (3%), and impressed decoration (1%). A combination of different decorative elements is often observed on the reconstructible pots (on nearly 25% of the decorated ones), which is difficult to detect in the fragmented material. The combination of graphite and pellets predominates (figs. 44/2 and 45/1), followed by pellets and flutes (figs. 36/1 and 37/1). The other combinations are represented by single examples: graphite, incised lines, and pellets (fig. 35/1); graphite, red paint and pellets (fig. 40/3); graphite, cordons, and pellets; graphite and impressed ornaments; incised lines and paint (fig. 31/3); pellets and cordons (fig. 38/2); pellets and barbotine (fig. 37/3).

The preference for graphite decoration is also evident in the variety of vessels on which it was used. It is the predominant technique on plates, plates/bowls, bowls, and jugs, and is also well represented on storage vessels (fig. 57). It is absent only on jars and potstands. In some cases, it was used in combination with other techniques (most often pellets) or with red paint (figs. 35/1 and 7, 40/3, 43/1, and 44/2). Painted decoration was often used to decorate both the outer and inner surfaces of plates and plates/bowls. Usually, the entire inner surface is covered and only the upper part of the outer surface (figs. 32/1 and 2 and 35/3), but there are also cases where both surfaces are completely painted (figs. 31/1, 32/3, and 35/5). Graphite decoration on both surfaces is also attested on some of the bowls (fig. 35/1).

The analysis of painted motifs and compositions is based mainly on the reconstructible vessels. Characteristic of the storage vessels and large bowls are the groups of lines forming a spiral, as well as rhombuses with an ellipse, rhombus, or group of lines in the middle connected in a meander (figs. 40/1 and 3, 44/2 and 3, and 45/1). These two motifs are often combined: the spirals on the middle part of the vessel and the 'rhomboid meander' above it. Groups of lines forming a spiral, as well as a rhombus with an ellipse or lines in the middle are also common in other categories, such as plates and plates/bowls (figs. 31/1, 32, and 35/6). A swastika-like organization of the composition is attested

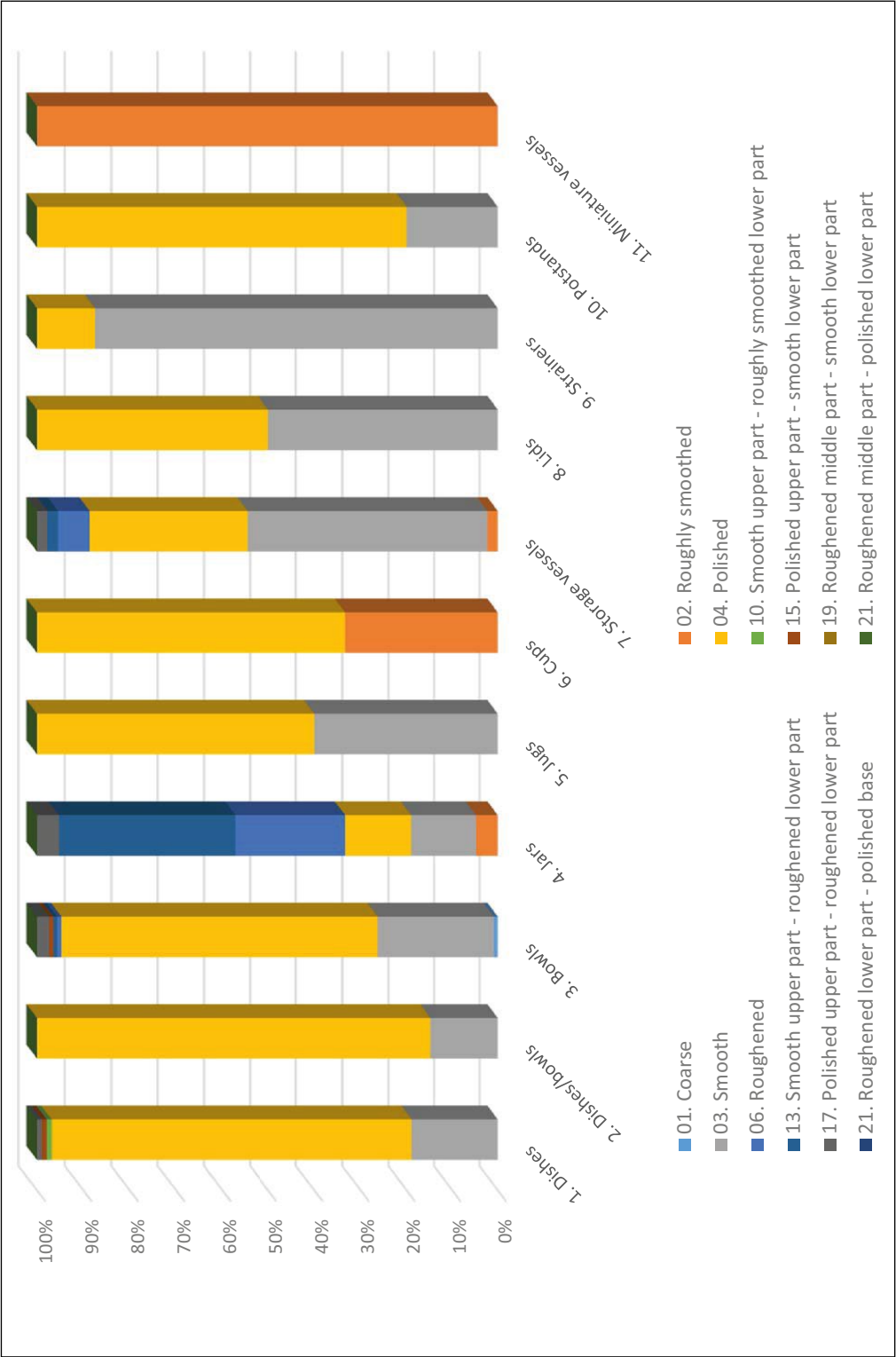


Figure 55. Distribution of outer surface treatment by category. Image Credit: Tell Yunatsite Project.

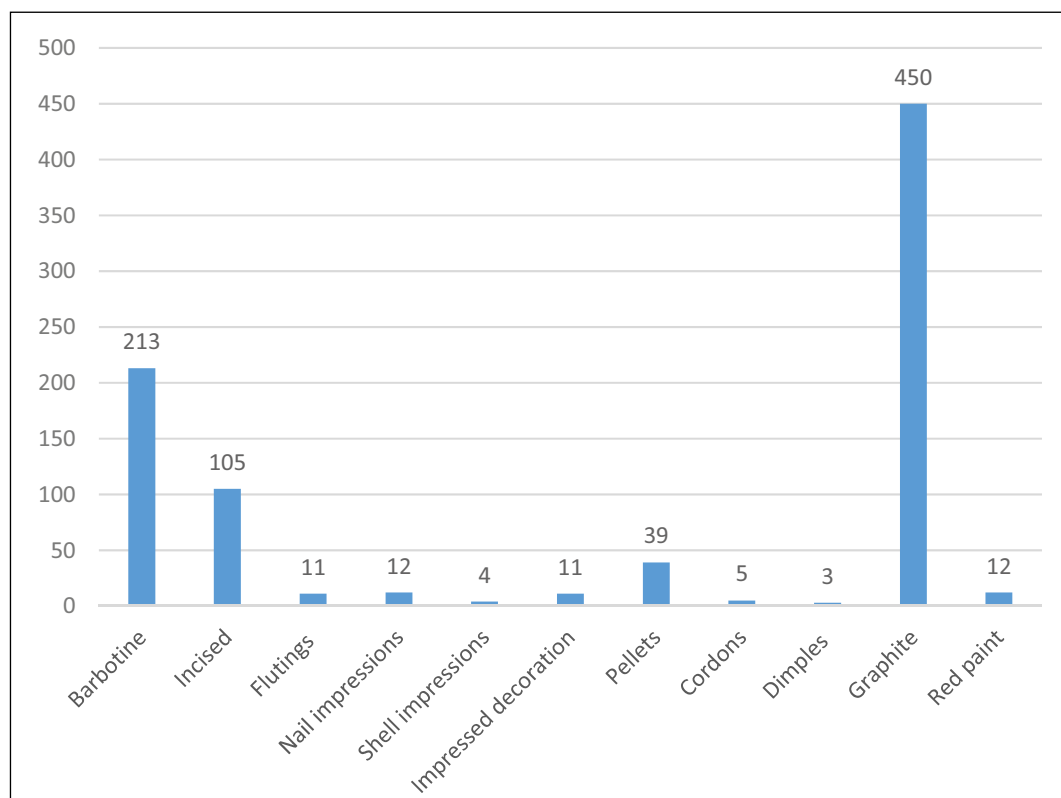


Figure 56. *Distribution of pottery decoration techniques. Image Credit: Tell Yunatsite Project.*

on the inside of some plates (fig. 31/1). The variety of motifs is greater among plates and bowls, but the fragmentary state of most of them does not allow for detailed conclusions.

The other decoration types are used predominantly on the outer surface, usually on the middle part of the vessel. On one base, probably from a plate, a decoration of wide incisions is attested on the inside (fig. 43/8). Several sherds from a large, closed vessel(s), with roughened inner surface and deep wide incisions on it are a notable exception (fig. 58). Similar sherds were found in other contexts from levels BII and BIII at Yunatsite, but no shape has been reconstructed so far. These appear to be specific vessels with a particular function that is unclear at this stage.

Some preferences are observed in the use of certain decoration techniques on certain vessel categories (fig. 59). Incised decoration was mainly used on storage vessels (figs. 48 and 49). The motifs attested include bundles of parallel lines: horizontal, arc-shaped, forming rhombuses or meanders, and spirals. Sometimes incrustation with white paste is visible. In contrast to the incised decoration, barbotine was used mostly on jars, less often on storage vessels and only in single cases on other vessel types (figs. 37/3, 39/1 and 4, 41/1 and 2, 44/1, 2, and 4, and 46). Pellets are attested mostly on the middle part of bowls (types 4.B, 5.E, 8.D; figs. 35/1 and 4, 36, 37, 38/2, and 40/3), less often on pots

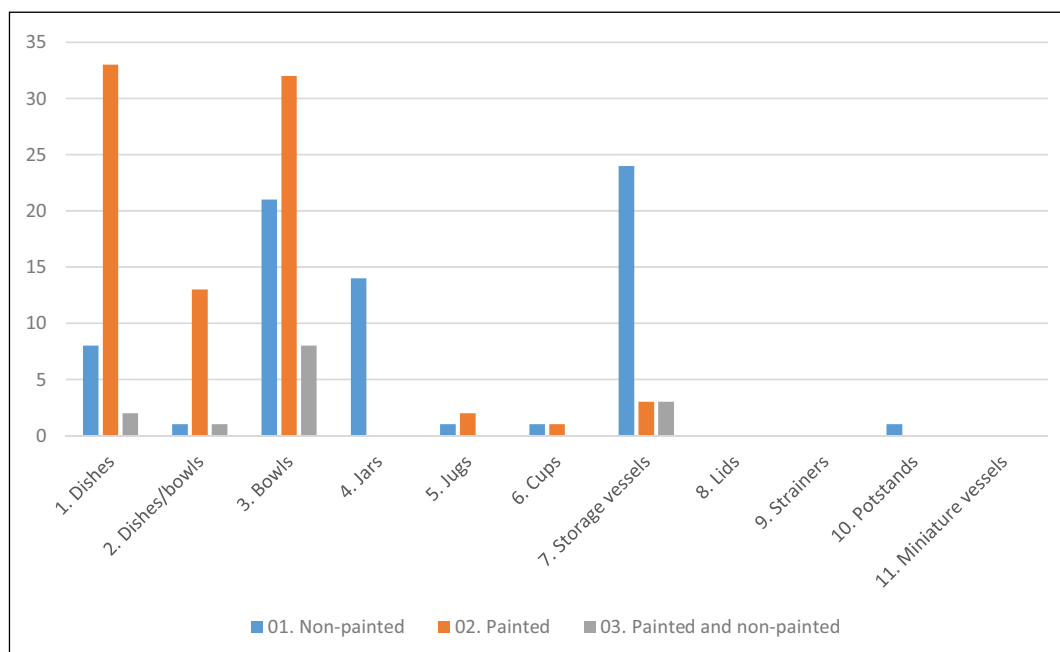


Figure 57. *Distribution of painted and non-painted decoration by category. Image Credit: Tell Yunatsite Project.*

and storage vessels (fig. 44/2); cordons, on bowls, pots, and storage vessels (figs. 38/2 and 41/4); and fluting, mainly on the middle part of bowls (types 3.H, 4.B and 5.E, sometimes together with pellets; figs. 36/1 and 37/1) and on the rims of plates (in two cases, on thickened rims). Most sherds with impressed decoration cannot be reliably associated with specific vessel shapes and types. Shell impressions are an exception. They are found only on the middle part of four bowls. Circular impressions are attested on storage vessels combined with incised decoration (as part of complex motifs), or as a horizontal row below the rim (fig. 48/1).

Function

The study of the function of ceramic vessels is often left out of the analyses of pre-historic ceramic assemblages, and the formal definitions of plates, bowls, jars, jugs, and storage vessels have a purely morphometric meaning. In attempt to overcome this problem, we addressed three different sources of information: a detailed analysis of the ceramic assemblage from building BII-21B in order to establish certain relationships between shape, decoration, and surface treatment of the vessels; analysis of the context of discovery and relationship between vessels and plant remains; and residue analyzes of sherds from some of the vessels.

Shape, decoration, and surface treatment

The morphological categories of plates, plates/bowls and bowls show the greatest typological diversity as well as the most lavish and most varied decoration. A greater va-



Figure 58. *Sherds from a large closed vessel/vessels (?), with roughened inner surface and deep wide incisions on it. Image Credit: Tell Yunatsite Project.*

riety of overall dimensions and wall thickness is observed in them (fig. 52). Plates range from 10 to 50 cm in diameter. Almost 80 percent of them are concentrated in the 20 to 37 cm range. The inclination of the wall to the rim varies from 25° to 70°, suggesting vessels of varying depth. Only seven plates were reconstructed and their height is between 3.4 and 12 cm. Forty percent of the plates have decoration on the inner surface. Presumably, plates were used for serving food. It is possible that the metrical differences observed, as well as the presence or absence of decoration, are related to the type of food served, the age of those using them (i.e., the existence of dishes for children), and perhaps the occasion for their use: the exquisitely decorated dishes may have not been intended for everyday use, but for special occasions. Typological differences in plates affect the rim and in most cases are related to its curving or thickening towards the interior (figs. 32 and 35). This shaping may have had a purely practical purpose: to prevent spillage of the contents.

The most significant differences are observed among the bowls. The maximum diameter of all analyzed pieces varies between 9 and 59 cm, and of the reconstructed bowls, between 24 and 38 cm. The height of the reconstructed bowls varies between 10.4 and 24 cm. Certain relations are visible when we compare different types of bowls. Biconical bowls (type 3) generally have smaller dimensions: the maximum diameter varies between 9 and 18 cm in five out of eight cases (fig. 35/2–8). Polished outer surfaces predominate. They are often decorated with graphite, pellets, or short incisions along the carination.

Bowls of type 4 (figs. 36–38) show certain differences compared to type 3. The maximum diameter is attested for six of them and it varies between 39 and 52 cm. The rim diameter was measurable in 15 cases, and in 14 of them, it was between 20 and 39 cm. Polished and smoothed outer surfaces are represented almost equally, and two vessels have a roughened lower part. Graphite decoration is attested in five cases, and six others have

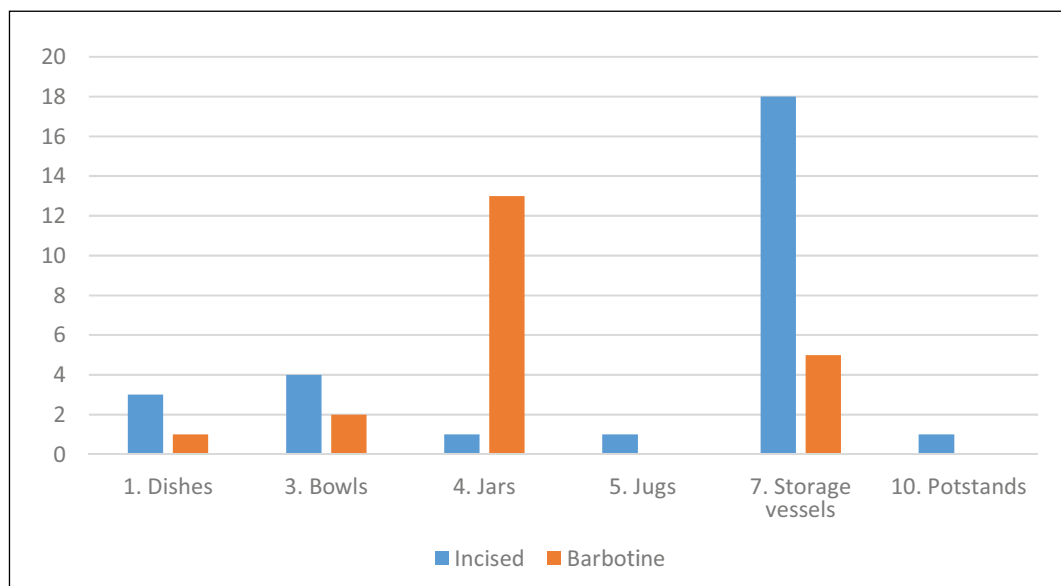


Figure 59. *Distribution of incised decoration and barbotine by category. Image Credit: Tell Yunat-site Project.*

pellets and flutes, pellets and cordons, or barbotine; in two cases there is a combination of graphite and pellets. It is noteworthy that non-painted decoration, as well as smoothed and roughened surfaces are mainly found in vessels of subtype 4.B.

The maximum diameter of type 5 bowls (fig. 39) varies between 18 and 38 cm (five cases, four of which are over 24 cm). The rim diameter was recorded in nine cases and varied between 16 and 40 cm, in seven of them, over 26 cm. The polished outer surfaces predominate, in two cases combined with a roughened lower part. Only non-painted decoration was used, mainly pellets and barbotine.

The bowls that have been certainly designated as types 7 and 8, are too few to draw definite conclusions (two of each type) but are distinguished by their large size and the presence of graphite decoration (in three of four cases). In type 8 vessels, the ornamentation is similar to the graphite-painted storage vessels in terms of position and motifs (fig. 40/1 and 2). A couple of bowls with intermediate shape between type 8.D and 4.C are very close to them (fig. 40/3 and 4).

The sizes of jars are also within a wide range, but some grouping into two ranges is evident (figs. 41 and 42). The maximum diameter of most vessels is between 27 and 45 cm, and the rim diameter is between 22 and 36 cm. Four pieces are of much smaller size: maximum diameter between 17 and 20 cm and rim diameter between 8 and 10 cm. Subtype 2.B prevails among them. A characteristic feature of the jars of both metric groups is the treatment of the outer surface: in most cases roughened/barbotined or a combination between a polished/smoothed upper part and a roughened lower one (figs. 41/1,

2, and 4; and 42/1, 2, and 4). Decoration of pellets is observed in three cases. Jars were presumably used for cooking. Their 'decoration' – barbotine and pellets – probably had a functional role in gripping their hot surfaces. One of the jars (fig. 42/3) has a specific shape, with an oblique rim and two lugs on the neck, which suggests that it might have had different function: for storing and pouring liquids.

The observations made suggest that the category of bowls, identified based on metric and morphological characteristics, probably includes vessels with different functions. A number of them, mainly vessels of type 3 and some of type 4, were probably used for serving (liquid?) food. Vessels of type 5 and subtype 4.B, whose morphometric characteristics, as well as surface treatment and decoration, are quite similar to those of jars, may have been used for cooking food. Bowls of types 7 and 8, as well as some of type 4 (subtypes D and E), which often have a relatively large volume (7–9 liters) and purely aesthetic decoration (mostly graphite) may have been used for storage. Some of the smallest bowls, mainly of subtype 3.I, with two vertical handles suitable for gripping (fig. 35/7 and 8), may have been used as cups (cf. Todorova & Matsanova 2000, 337).

Vessel context

The context for each vessel was analyzed to establish the potential relationship between certain vessels and charred plant remains, as well as possible differences between the pottery in both rooms.

In the north room, a certain distribution pattern of the plant remains was identified; in its western part, in the area of vessels I-IV (figs. 13 and 14), barley and wheat predominate, and lentils predominate in the eastern part. Barley was recorded on some sherds of vessel III, and a mixture of barley and lentils was uncovered among the sherds of vessel V. Grape seeds were concentrated in the NE corner of grid square O4, close to sherds of vessels II, III, IV, and VII. However, we were not able to establish a more specific relationship. Charred remains of bread or porridge were found on part of the outer surface of vessel XVIII; lentil seeds were uncovered below and above the vessel sherds. The shape of this vessel suggests that it was used for cooking, but it is not sure whether the porridge-like substance discovered is related to it.

The distribution analysis of the ceramic assemblage shows no significant differences between the rooms. The number of sherds from the southern room slightly exceeds that from the north room. However, the north room exceeds the southern as a concentration of sherds per area. In terms of shapes attested, the situation in both rooms is similar. Plates, bowls, and storage vessels slightly predominate in the southern room, while jars slightly predominate in the northern room, if the percentage of sherds in each of them is regarded (fig. 60). In the case of 'whole' vessels, however, plates and bowls are equal in number, storage vessels slightly predominate in the northern room, and jars in the southern room (fig. 61). On this basis, differences in the ceramic assemblages of the two rooms cannot be established. In terms of the types and subtypes represented, a greater diversity is evident in the southern room, especially in the fine ware categories: plates and bowls

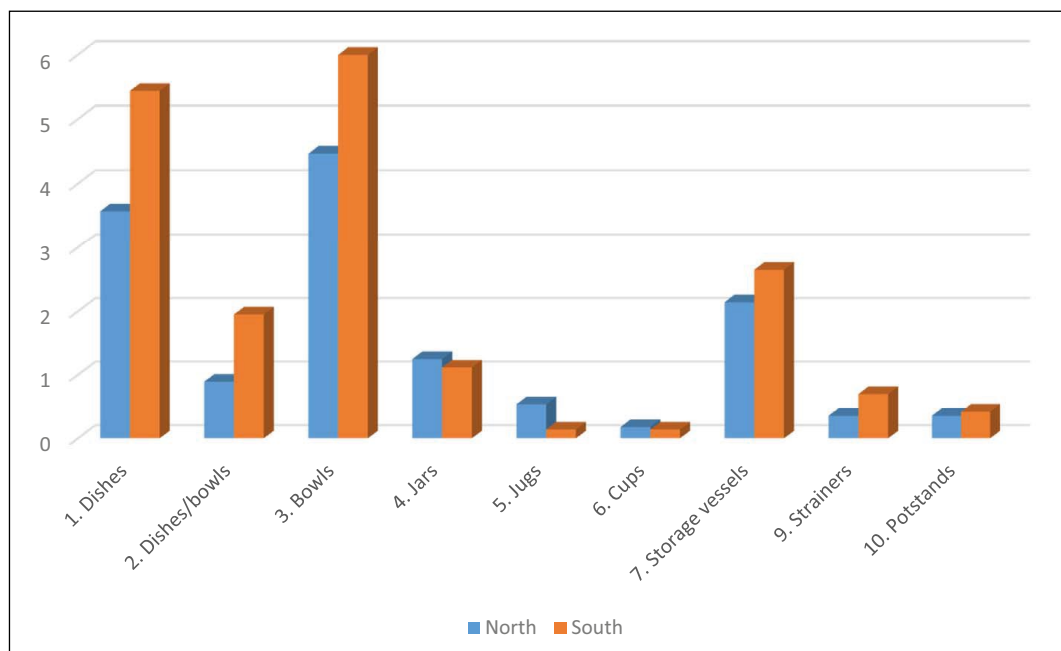


Figure 60. *Distribution of vessel categories by rooms in building BII-21B (all identified pieces). Image Credit: Tell Yunatsite Project.*

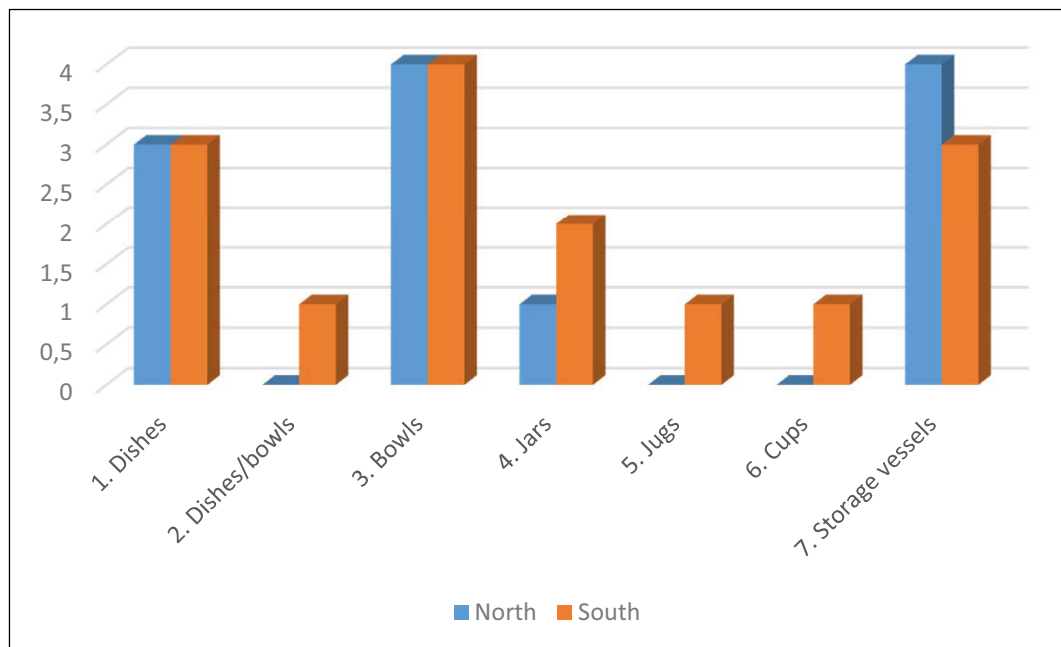


Figure 61. *Distribution of vessel categories by rooms in building BII-21B ('whole' vessels). Image Credit: Tell Yunatsite Project.*

The Late Copper Age building BII-21B at Tell Yunatsite, south central Bulgaria

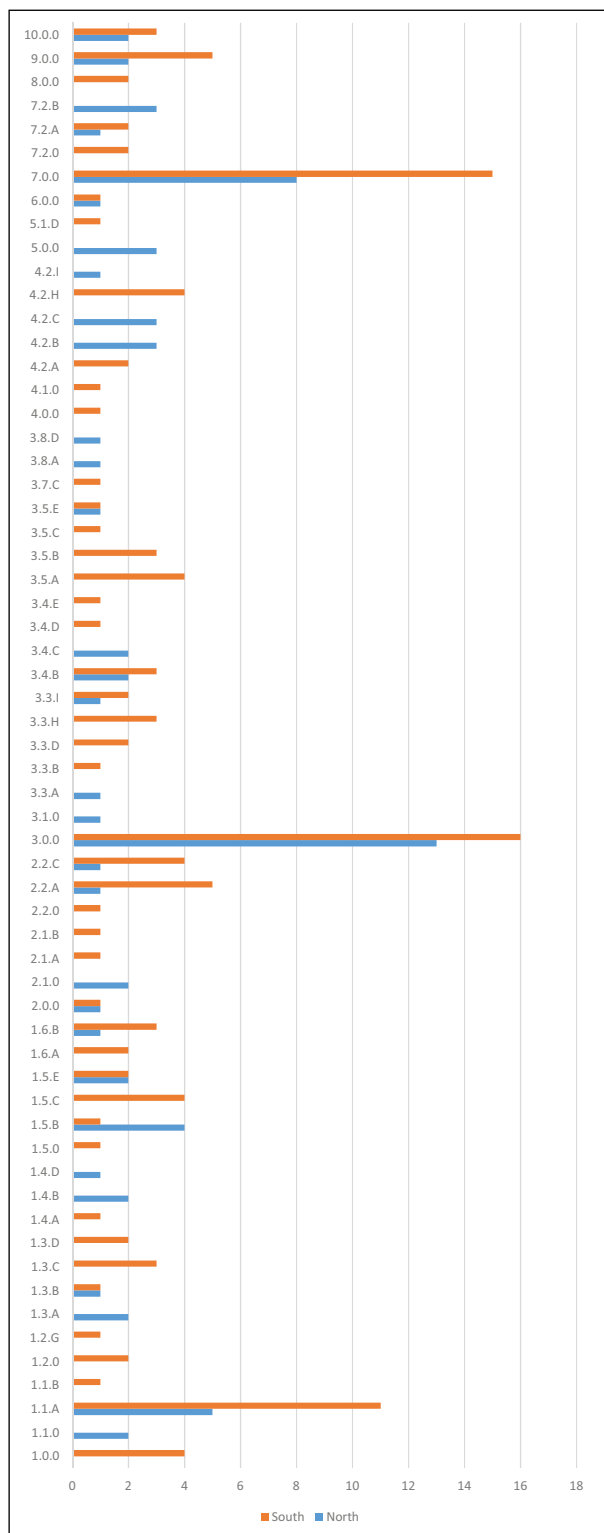


Figure 62. *Distribution of types and subtypes of vessels by room in building BII-21B (all identified pieces). Codes match the ones in figures 28–30, the Roman numerals having been replaced by Arabic. Image Credit: Tell Yunatsite Project.*

(fig. 62). In the northern room, relatively large bowls predominate, having rim diameter over 20 cm and maximum diameter over 30 cm.

Residue analyses

In order to establish the relationship between certain vessels and the plant remains found, as well as the function of the vessels, 16 sherds were selected for phytolith and starch remains analysis. They include various groups of vessels from both rooms: bowls, deep plate/bowls, jars, and storage vessels.

Sampling, processing, and analysis of microbotanical remains took place at the Bio-GeoPal Laboratory, IMF-CSIC (Barcelona, Spain) following the protocols described in García-Granero et al. (2017). Residue recovery from the inner wall of the vessels consisted of a two-step process in which the outer layer of sediment was first dry brushed from the inner surface of the vessel (dry sample), and then the inner layer of sediment was brushed with deionised water (wet sample; Hart 2011). Once the outer layer of sediment is removed, the chances of contamination from the surrounding archaeological matrix decrease considerably (Hart 2011); for this reason, the analysis focused on the wet samples. Additionally, two sediment control samples from the contexts where the vessels were embedded were collected to further check against contamination from the archaeological matrix (table 4; for the detailed protocol, cf. García-Granero et al. 2017).

Sample No	Square	Context	Type of sample and vessel No	Weight (g)
1	O4	385	wall – vessel I	<0.0010
2	O4	385	wall – vessel V	0.0033
3	O4	385	base – vessel XII	0.0080
4	O4	385	wall – vessel III	0.0030
5	O4	385	wall – vessel XVIII	<0.0010
6	Π5	580A	base – vessel XXVI	0.0023
7	Π5	528	rim – vessel XXV	0.0036
8	Π5	580A	base – vessel XXVIII	0.0190
9	Π5	580A	base – vessel XLV	0.0148
10	Π5	528	base – vessel XXIX	0.0044
11	Π5	528	base – vessel XXXII	0.0197
12	Π5	580A	vessel XXXVIII	0.0022
13	O4	385	control sample	6.6401
17	O4	385	base, not connected to whole vessel	0.0097
18	O4	385	base, not connected to whole vessel	<0.0010
19	Π5	580A	middle part, not connected to whole vessel	0.0564
20	Π5	528	base, not connected to whole vessel	0.0082
21	Π5	528	control sample (samples 6-12, 19-20)	3.5758

Table 4. *Samples analyzed for starch and phytoliths remains.*

Starch grains and phytoliths were analyzed using a Zeiss Axioplan and an Olympus BX51 microscopes equipped with plain and cross-polarized transmitted light and Zeiss Axiocam 208 color cameras for microphotography connected to computers running Zeiss Zen Blue 3.4 software for capturing images and measuring microbotanical remains. Starch slides containing 50 percent of the starch residue were wholly scanned at x200 magnifications and all grains were photographed at x400 magnifications for posterior analysis, whereas phytolith slides containing c. 1 mg of the phytolith residue were scanned at x400 magnifications until 250 individual phytoliths had been identified or until 10 percent of the slide had been scanned. Starch grain and phytolith identification relied on comparison with the modern reference collections housed at the BioGeoPal Laboratory. Starch nomenclature follows the recommendations of the International Code for Starch Nomenclature (ICSN 2011), whereas phytolith nomenclature generally follows the recommendations of the International Code for Phytolith Nomenclature 1.0 (Madella et al. 2005).

Starch grains were scarce in all samples from pottery vessels (0–6 grains per sample) and absent from the sediment control samples (table 5). The most commonly observed morphotype (n=24) is polyhedral and medium/large-sized (fig. 63/a), a morphotype commonly associated with certain taxa within the Panicoideae subfamily (Poaceae, grass family), in particular large-seeded panicoid grasses such as maize (*Zea mays*), Job's tears (*Coix lacryma-jobi*), sorghum (*Sorghum bicolor*) and finger millet (*Pennisetum galucum*) (Madella et al. 2016), none of which are native to Southeast Europe. Panicoid grasses na-

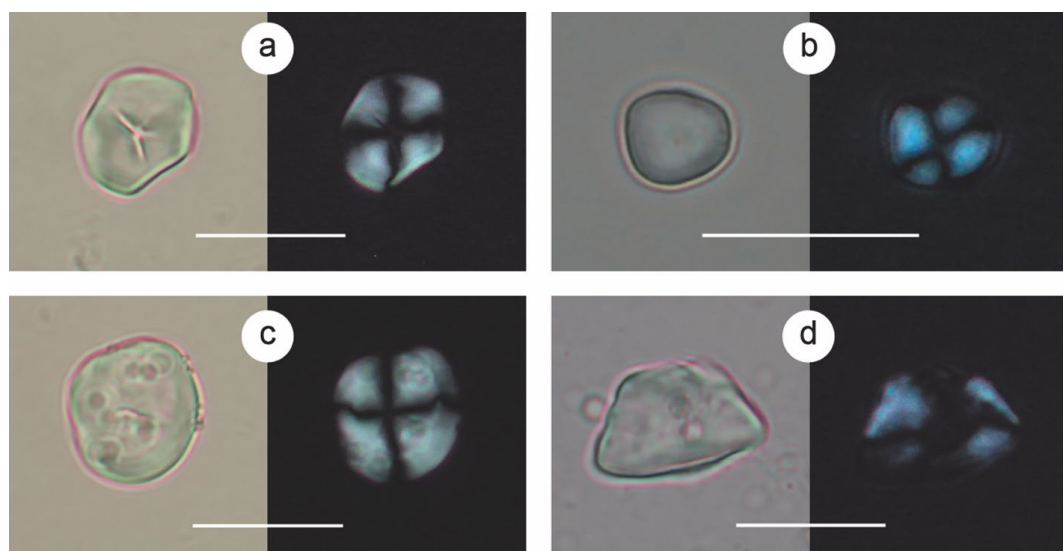


Figure 63. Starch morphotypes identified in pottery vessels from building BII-21B: (a) *Panicoideae* starch grain from sample Y5; (b) type 1 (undiagnostic) starch grain from sample Y3; (c) type 2 (unidentified) starch grain from sample Y5; and (d) type 3 (unidentified) starch grain from sample Y18. Scale bar: 20 μm . Image Credit: J.J. García-Granero & M. Jovanović.

tive to this region (e.g., bristly foxtail, *Setaria verticillata*) produce morphologically similar but smaller starch grains (Madella et al. 2016; Yang et al. 2012). Starch grains from panicoid grasses often become enlarged when ground (Li et al. 2020; Ma et al. 2019); it might then be argued that the Panicoideae starch grains from Yunatsite could belong to a native wild/weedy grass that had been subjected to grinding (or other processing technique resulting in the enlargement of the starch grains) before been trapped and preserved in the pottery vessels. However, panicoid grasses are a very minor component of the phytolith assemblage from Yunatsite, suggesting that the Panicoideae starch grains did not enter the pottery vessels as a result of their use but as a result of modern contamination. Maize is the most common source of modern starch contamination, as maize starch is used in a variety of industries, including the manufacture of gloves and other laboratory consumables (Crowther et al. 2014); therefore, the Panicoideae starch grains from Yunatsite probably entered the vessels during their collection, sampling or processing and should not be considered archaeological. Beyond maize, the most common sources of modern starch contamination are from wheat types and, to a lesser extent, potato (Crowther et al. 2014). Therefore, all other starch morphotypes found are likely the result of vessel use and not modern contamination.

Sample No	1	2	3	4	5	6	7	8	9	10	11	12	13	17	18	19	20	21
Type of sample	v	v	v	v	v	v	v	v	v	v	v	v	c	v	v	v	v	c
Panicoideae	0	2	1	0	4	0	1	3	1	1	2	0	0	0	3	0	5	0
Type 1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0
Type 2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Type 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total starch grains	0	2	2	0	5	0	2	3	1	1	3	0	0	0	4	0	6	0

Table 5. Results of the starch grain analyses; v: pottery vessel; c: control sample.

The starch assemblage from Yunatsite (excluding the Panicoideae grains) is poor. All samples from pottery vessels had very low weights (<0.1 g, and occasionally <1 mg), which may have impacted the likelihood of recovering starch grains. Moreover, starch deposition and preservation in artefacts depends on a series of variables, ranging from the force that causes starches to being trapped in an artefact to the artefact's porosity. In general, the higher the force and the bigger the porosity, the more starches are preserved. In particular, within pottery vessels starch grains are more abundant in rough cooking vessels, in which food is subjected to mechanical forces that aid starch release, than in fine storage/serving vessels, in which foodstuffs are not subjected to any mechanical or physical processes (García-Granero et al. 2021). Therefore, the starch assemblage from Yunatsite suggests that the vessels analyzed were mostly used for storing food and not preparing it.

Phytoliths were generally scarce in pottery vessels but abundant in control samples (table 6). Most identified phytoliths belong to the Poaceae family; samples from pottery vessels further include a few phytoliths from the *Cyperaceae* family (sedges) and dicotyledonous (woody) plants, as well as non-diagnostic (indetermined) phytoliths – morphotypes present in several plant taxa (fig. 64). Within the grasses, most short cells (which can be attributed to different grass subfamilies) belong to the *Pooideae* subfamily (rondels and different types of trapeziforms), which includes wheat and barley, with a minor presence of morphotypes characteristic of the *Panicoideae* (bilobates, trilobates and crosses) and *Chloridoideae* (saddles) subfamilies, which in this area indicate the presence of wild/weedy species. Anatomically, most grass phytoliths come from leaves and culms (~60–85%, including all the grass phytoliths that can be ascribed to leaves and/or culms: elongate psilates, elongate sinuates and bulliform cuneiforms), with a comparatively lower presence of phytoliths from grass inflorescences (~15–40%, including elongate echinates, elongate dendritics and papillae). Some of the observed grass inflorescence phytoliths show features (overall breadth and shape of the protuberances) characteristic of domestic wheat and/or barley (for example, the elongate dendritic phytolith shown in Figure 64/k resembles phytoliths documented in modern *Hordeum vulgare* inflorescences; see e.g., Portillo et al. 2017, fig. 3a).

Sample No	1	2	3	4	5	6	7	8	9	10	11	12	13	17	18	19	20	21
Type of sample	v	v	v	v	v	v	v	v	v	v	v	v	c	v	v	v	v	c
Poaceae (grasses)																		
Elongate psilate	42	5	10	0	2	3	23	3	42	30	77	1	44	74	1	1	82	53
Elongate sinuate	6	2	2	0	1	0	3	0	7	6	15	0	11	6	0	0	7	6
Elongate echinate	8	4	4	0	0	0	10	0	7	13	24	1	32	26	0	0	15	25
Elongate dendritic	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	3	6
Saddle	3	1	1	0	0	0	1	0	2	5	8	0	8	5	0	0	8	13
Bilobate	0	0	5	0	0	0	7	0	4	3	7	1	12	9	0	0	10	11
Trilobate	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cross	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Trapeziform sinuate	0	0	0	0	0	0	1	0	4	2	13	0	6	10	0	0	5	15
Trapeziform polylobate	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Trapeziform ovate	7	1	4	0	0	0	8	1	9	5	15	1	19	21	0	0	32	25
Trapeziform elongate	0	0	0	0	0	0	0	0	0	2	1	0	3	1	0	0	4	4

Sample No	1	2	3	4	5	6	7	8	9	10	11	12	13	17	18	19	20	21
Rondel	10	5	24	0	0	3	19	0	21	22	49	4	51	48	1	0	77	31
Trapeziform	3	4	3	0	0	0	5	0	5	6	32	0	25	27	0	0	16	19
Trapeziform bilobate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Cork cell	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Bulliform cuneiform	0	0	4	0	0	0	0	0	4	1	2	0	7	3	0	0	5	4
Trichome	2	2	5	1	2	1	5	0	7	5	23	2	15	17	0	1	27	25
Trichome base	5	3	0	0	1	1	3	0	5	3	16	1	11	5	0	0	14	13
Papilla	2	0	0	0	0	0	1	0	2	0	0	0	1	0	0	0	0	2
Cyperaceae (sedges)																		
Tabular cone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Dicotyledonous (woody) plants																		
Globular psilate	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Globular granular	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indetermined phytoliths																		
Parallelepipedal	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0
Plate	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0
Tracheid	0	0	0	0	0	0	2	0	1	0	2	0	0	0	0	0	0	0
Total identified phytoliths	90	27	65	1	6	8	89	4	123	106	285	11	256	254	2	2	312	254
Phytolith concentration (in M per gram of AIF)	–	–	–	–	–	–	–	–	–	–	–	–	1.1	–	–	–	–	4.1

Table 6. Results of the phytolith analyses. *v*: pottery vessel; *c*: control sample. Phytolith concentration calculated per gram of Acid Insoluble Fraction (AIF) following the formula proposed by Albert & Weiner (2001).

Among the plant taxa identified in the macrobotanical assemblage recovered from building BII-21B only the cereals produce phytoliths in abundance; all other taxa either do not produce phytoliths or produce limited amounts of taxonomically non-diagnostic phytoliths (e.g., grapes; Tyree 1994). It is, therefore, not surprising that the phytolith assemblage is dominated by cereal taxa, mostly comprising morphotypes found in pooids (including wheat and barley). The macrobotanical wheat and barley remains found were

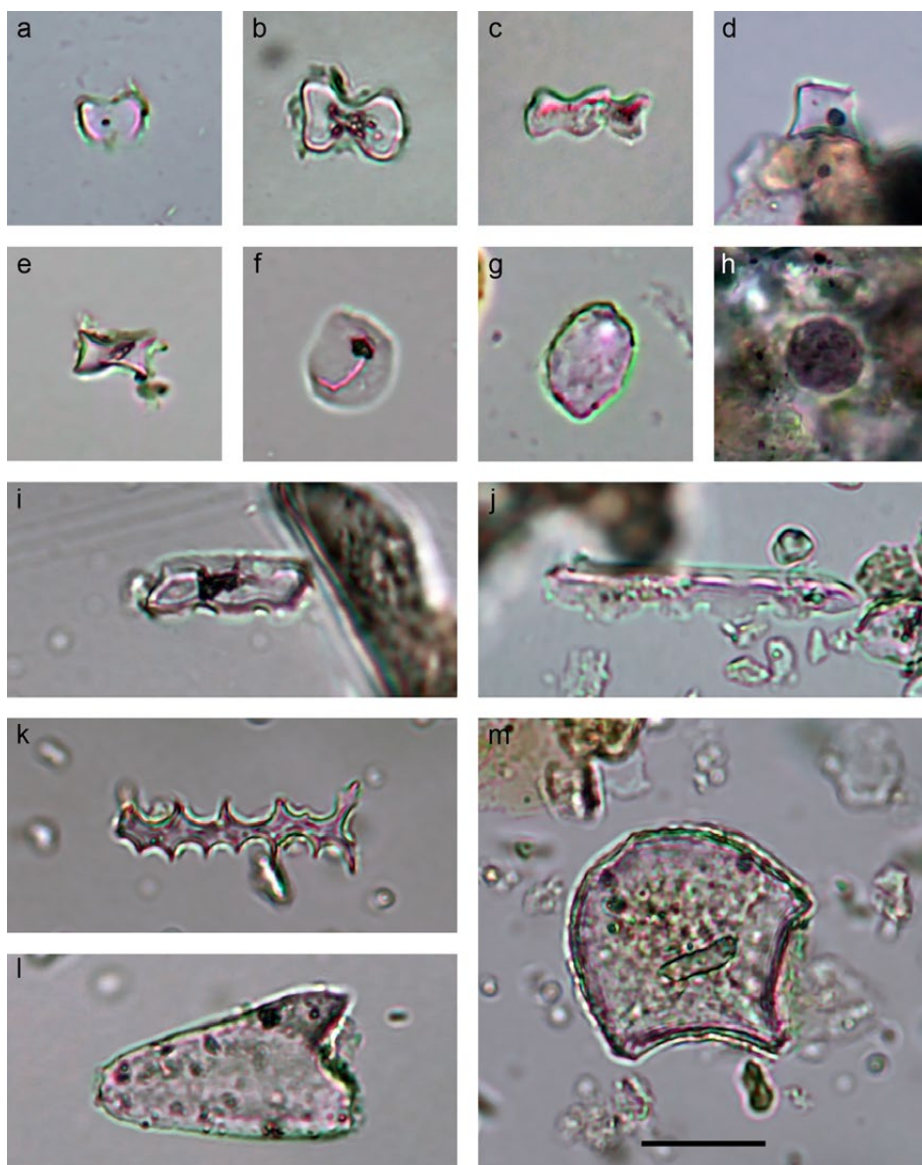


Figure 64. Phytolith morphotypes from grasses (a–g and i–m) and woody plants (h) identified in pottery vessels and control samples from building BII-21B: (a) saddle (*Chloridoideae*) from sample Y1; (b) bilobate (*Panicoideae*) from sample Y9; (c) trilobate (*Panicoideae*) from sample Y3; (d) rondel (*Pooideae*) from sample Y1; (e) trapeziform (*Pooideae*) from sample Y3; (f) trapeziform ovate (*Pooideae*) from sample Y7; (g) papilla (*Poaceae* inflorescence) from sample Y1; (h) globular granular (*Dicotyledonous* plant) from sample Y3; (i) trapeziform sinuate (*Pooideae*) from sample Y10; (j) trapeziform polylobate (*Pooideae*) from sample Y21; (k) elongate dendritic (*Poaceae* inflorescence, *Hordeum*-type) from sample Y13; (l) trichome (*Poaceae*) from sample Y9; and (m) bulliform cuneiform (*Poaceae* leaf) from sample Y21. Scale bar in (m) is 20 μ m and applies to all the photographs. Image Credit: J.J. García-Granero & M. Jovanović.

quite clean; the widespread presence of *Pooideae* phytoliths in pottery vessels and control samples may thus come as a surprise. However, it must be noted that cereals produce millions of phytoliths per gram of plant material, and that phytoliths remain attached to ‘clean’ cereal samples even after dehusking has taken place (Portillo et al. 2017). In the same vein, the minor presence of sedges and panicoid and chloridoid grasses in the vessels is not surprising; they are common weeds in Southeast Europe and likely represent a small amount of weeds still present in the clean crop product after processing. Finally, the woody phytoliths found in the pottery vessels but, importantly, not in the control samples, could represent vegetation ‘background noise’ or could represent the remains of the food stored in the vessels (e.g., Saul et al. 2013), but their small number precludes any further interpretation.

To conclude, the starch and phytolith assemblages from the pottery vessels from building BII-21B indicate that they were probably used to store unprocessed food, including (but likely not limited to) cereal crops.

Function of vessels – conclusions

Although none of the presented analyzes alone provides definite results about the function of the vessels, a complex look at them allows for certain conclusions. Some of the large pots, determined *a priori* as storage vessels, were found together with a concentration of charred cereal plants (barley and wheat), mainly in the western part of the north room: vessels I, II and III (figs. 13, 46, and 47/2). Residue analysis of fragments from two of the large vessels (I and XLV) support their use for grain storage. Similar evidence is available for three more sherds, which may have originated from storage vessels (samples 10, 17, and 20). Phytoliths were not recorded only in vessel III, which was found among a concentration of barley. The volume of these vessels varies between 12 and 20 l. Among the reconstructed pots, only vessel II (fig. 47/2) stands out by significantly larger dimensions: ca. 70 l. However, some of the sherds also suggest similar or even larger sizes, e.g., vessels XLI and XLIII (fig. 48).

Phytolith remains of cereals, although in low concentration, were also found in some of the analyzed sherds from large, deep bowls, of types 4.D-E and 8, often decorated with graphite: vessels V, XII, XXVI, and XXVIII (figs. 39 and 42/2 and 3). The archaeological context suggests a possible connection of vessel V with a mixture of barley and lentils. The volume of these vessels varies between 4 and 9 l. The available evidence suggests that they were used to store grain. It is likely that the large vessels were used for long-term storage, and the bowls for short-term storage, including grain in some initial stage of the preparation of bread or food (the attested mixing of cereals with lentils, as well as ground barley in the form of bulgur). This is also supported by the archaeobotanical observations of grain stocks in various degrees of processing, from raw to prepared for cooking. The similar motifs of graphite decoration on these two groups of vessels also support similar functional relationship and seem to have certain meaning possibly related to the protection of the harvest.

The discovery of phytolith remains on a deep plate/bowl (vessel XXV; fig. 34/1) of similar volume (ca. 7 l) suggests that such vessels may have also been used for food storage.

The function of the jars with roughened surface and similar bowls of types 5 and 4.B remains questionable. The specific surface treatment suggests an association with a specific function, possibly cooking. The discovery of a fragment of bread/porridge together with fragments of such a vessel (XVIII; fig. 41/3) could be used as evidence in this direction. In two analyzed sherds from such vessels (XVIII and XXXVIII; fig. 37/3), phytolith remains were found, but in a very low concentration.

The storage of food products in pottery vessels also implies their closure, in order to protect against moisture and rodents. In the analyzed assemblage, however, lids are almost absent. Various hypothetical explanations are possible. On the one hand, some of the sherds (especially of smaller sizes) identified as plates may originate from objects used as lids. On the other hand, it is possible that wooden covers were used. Theoretically, the issue of covering the vessels could have been solved by arranging them and placing smaller vessels on top of the larger ones.

From a functional point of view, the structure of the analyzed ceramic assemblage poses another problem, namely the small number of vessels for storing, pouring and consuming liquids (jugs and cups). The identified jugs are also notable for their small size (fig. 43/1 and 2), i.e., they were used for pouring rather than storage. It is probable that some of the storage vessels were used to store liquids, especially the water needed for drinking and household activities: probably those of smaller sizes and equipped with handles. One specific vessel is of interest: a deep 'pot' with a spout, with a white coating on the inner surface (fig. 43/4). The coating has not been analyzed yet, but it looks like scale. The vessel was probably used for boiling water. In the entire assemblage from the building just one more spout was found, on a bowl sherd (vessel XXXII). The residue analysis attested abundance of phytoliths on it, which suggests that it was not (only) used to contain water but rather some cereal-based beverage.

Bearing in mind the botanical evidence suggesting the storage of grapes for the preparation of a drink, the question arises in what vessel they were stored. Regarding the concentration of grapes in the northwest part of grid square O4, the possible 'candidates' are vessels I, II, III, IV, VII and XIV. Given the presence of phytoliths from cereals in vessel I, it should be excluded, as well as probably vessels VII and XIV in view of their smaller sizes. At this stage, however, it cannot be answered which of the others, and whether any of them, were used for this purpose.

Small finds

The small finds from building BII-21B are relatively few. Flint artifacts predominate, numbering 16 in total. They were found mainly in the southern room, with no apparent concentration. Most (if not all) of these are tools: five scrapers (fig. 65/12–16), four blade fragments with a distinctive polish (fig. 65/1–4), probably elements of composite tools such as sickles, one retouched flake (fig. 65/11), and six blade fragments (fig.

65/5–10). Their visual characteristics suggest the use of both imported ‘Ludogorie flint’ from northeast Bulgaria, and ‘local’ Rhodope raw materials.

Stone, bone, and antler tools include a stone mortar (fig. 15), four fragments of grindstones, a small stone grinder (?) (fig. 65/23) and a stone polisher (fig. 65/22), two fragmented bone tools, probably awls (fig. 65/17 and 18), and a highly fragmented antler tool. It is possible that one awl was an unfinished blank. Bone artifacts include also two astragali with smoothed sides and a bone ‘ring’ of unclear function (fig. 65/19–21).

Two ceramic items were discovered: a pyramidal object with a smooth surface and a roughly shaped ceramic disk (fig. 66/7 and 8).

Artifacts that may be related to the beliefs and rituals of the inhabitants are represented by a ceramic model of an oven (fig. 66/11), a fragment of a ceramic anthropomorphic figurine (fig. 66/10), and a fragment of a flat bone anthropomorphic figurine (fig. 66/9). The first two objects were found next to each other in the southwestern corner of the building. The oven model was scattered in few pieces among the burnt debris and probably fell from some height. Small part of it is missing.

The ornaments include three beads made of *Spondylus* and *Dentalium* shells and two fragments of *Spondylus* bracelets (fig. 66/1–3, 5, and 6). They come from different parts of the building. A particularly unexpected and impressive find is a golden ring-idol found among the debris of the building in the NE part of the southern room (fig. 66/4).

Relative and absolute chronology

The main pieces of evidence for clarifying the chronological position of building BII-21B are its stratigraphic position, the available radiocarbon dates, and the specifics of the ceramic assemblage.

As it was pointed out, the building belongs to an early stage of level BII. It was destroyed by fire earlier than the neighboring building BII-20, which continued to be used. It precedes the last Chalcolithic settlement of the tell (level BI), the destruction of which is associated with the end of the Copper Age in Upper Thrace (Boyadzhiev et al. 2021, 4f; Boyadzhiev & Boyadzhiev 2022, 18ff and references therein).

Two radiocarbon dates from building BII-21B have been made in two different laboratories, both obtained from charred grains: Poz-109086: 5590 ± 40 BP and SU-ERC-102500: 5614 ± 26 BP. They correlate well with each other. Two more ^{14}C dates are available for level BII: Poz-108890: 5620 ± 40 BP from BII-21A, above the debris of BII-21B, and Poz-108910: 5660 ± 40 BP from building BII-20. The three dates from the Poznan laboratory are part of a series of 16 ^{14}C dates from 11 successive Early to Late Chalcolithic levels in the tell (Boyadzhiev et al. 2021). The series provides grounds to follow the development of the Chalcolithic dates in Yunatsite on the basis of a secure stratigraphic sequence. The dates from level BVIIIId to level BVI develop according to the stratigraphic sequence, from 5860 ± 40 BP to 5630 ± 40 BP. However, the dates for levels BV and BIII ‘drop back’ and their values are slightly higher than those for levels BVII and BVI, and are close to BVIIIa. The Poznan dates are also confirmed by the three most



Figure 65. Small finds from building BII-21B: flint blade fragments with a distinctive polish (1–4); flint blade fragments (5–10); retouched flake (11); flint scrapers (12–16); bone awls (17 and 18); astragali with smoothed sides (19 and 20); bone 'ring' (21); stone polisher (22), and small stone grinder? (23). Image Credit: V. Petrovska-Takieva (drawings); P. Panchov and K. Boyadzhiev (photos).

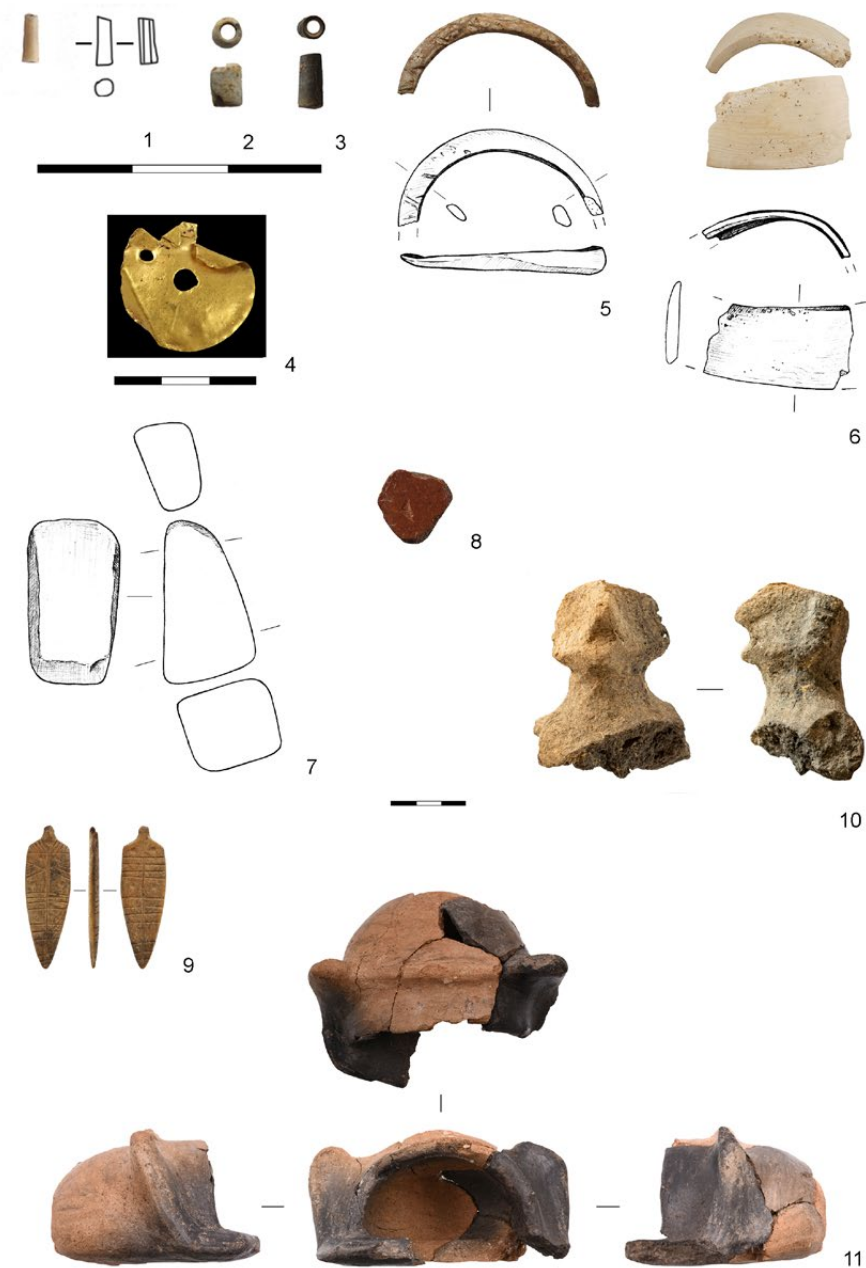


Figure 65. Small finds from building BII-21B: *Spondylus* and *Dentalium* beads (1–3); gold ring-idol (4); *Spondylus* bracelets (5 and 6); pyramidal clay object (7); chipped disk (8); bone anthropomorphic figurine (9); ceramic anthropomorphic figurine (10); and ceramic model of an oven (11). Nos. 1–3 are in 2:1 scale; No. 4 is in 1:1 scale; Nos. 6–11 are in 1:2 scale. Image Credit: V. Petrovska-Takieva (drawings); P. Panchov, K. Georgiev, and K. Boyadzhiev (photos).

recent dates: SUERC-102500: 5614 ± 26 BP from building BII-21B; SUERC-102501: 5673 ± 28 BP from building BIII-1 of level BIII; SUERC-102502 5768 ± 23 BP from building BV-1 of level BV.

Similar 'drop-back' is witnessed at all dated sites from the end of the Early and Middle Chalcolithic in Bulgaria. In most cases the radiocarbon dates reach significantly higher values, up to 5950–5900 BP. The earlier studies on the topic are confirmed by the new AMS dates on human bones from Middle Chalcolithic graves at the Durankulak and Varna II cemeteries (Boyadzhiev 1995, 168f; Honch et al. 2013, table 2; Krauß et al. 2017, 284). As a result of this anomaly, the dates from the Late Chalcolithic, without those from its final stage, overlap with the dates from the Early Chalcolithic. For this reason, the calibration of Late Chalcolithic dates from the region is imprecise. Dates with values close to those of building BII-21B (between 5700 and 5600 BP) can be found throughout most of the Late Chalcolithic. They are slightly earlier than the dates for the end of the Karanovo VI culture at Tell Yunatsite.

Bearing in mind this problem, the specifics of the ceramic assemblage of building BII-21B is also important in determining its chronological position. A detailed analysis of the development of the pottery during the Copper Age at Yunatsite is not yet possible due to the smaller amount of material from the earlier levels (especially those under BIII) and its ongoing processing. However, some initial observations can be made. Some elements of both shapes and decoration had a long lifespan and continued to exist since the Early Chalcolithic (at least from level BVI onwards). These include plates and plates/bowls with a smoothly incurved rim (types I.5.B, I.6, II.2), plates/bowls with a smooth S-shaped profile (type II.1), storage vessels with spherical middle part and graphite or incised decoration, the rich graphite decoration that often covers both surfaces of plates and plates/bowls, some of the motifs of painted and incised decoration (spirals, angular meander, rhombuses, etc.). Other elements are first attested in the transitional phase between the Early and Late Chalcolithic (level BIV) and develop during the Late Chalcolithic, e.g., biconical bowls with a pronounced middle part (type III.3.H). A number of vessels seem to appear in level BIII, including plates with a thickened and with inverted rim (types I.3 and I.4), some types of biconical bowls and bowls with three morphological parts (Boyadzhiev & Boyadzhiev 2022).

At the same time, some of the vessels from building BII-21B have no predecessors in the earlier levels, like biconical bowls/cups with two handles (type III.3.I), bowls III.4.D, III.4.E and III.8.

The ceramic assemblage of the uppermost level BI (excavated over 1/3 of the tell's area), is the only one more comprehensively studied and published (Todorova & Mazanova 2000; Todorova 2003). The pottery from building BII-21B shows significant similarities to it. The new shapes identified in the building continued to develop. Gradually, some of the shapes characteristic of the earlier levels died out, such as plates and plates/bowls with a smoothly incurved rim and graphite decoration on both surfaces

(types I.5.B, I.6, II.2), and bowls of type III.2. At the same time, some elements are present in BI that are currently missing in the earlier settlements, like the rich impressed nail decoration on jars consisting of three morphological parts (cf. Todorova 2003, 293f), bowls A.VIII.3 in Todorova & Mazanova 2000, askoi, etc. In general, the pottery repertoire of level BI is more varied than the one studied here, but this is probably due not so much to chronological reasons as to the significantly larger area and amount of pottery from it.

The researchers of the pottery from level BI have dated it to the end of the Chalcolithic in Upper Thrace (Todorova & Matsanova 2000, 341; Petrova 2004, 427). They have also pointed out the symbiosis of features characteristic of both the Karanovo VI culture to the east and the Krivodol culture to the west. Tell Yunatsite and the western parts of the Upper Thracian Lowland are thus defined as a contact zone between the two cultures (Todorova & Matsanova 2000, 341; Petrova 2009, 233f; Georgieva 2012, 179).

At the same time, Petya Georgieva pointed out parallels of certain elements of the complex with earlier (including Early Chalcolithic) assemblages in western Bulgaria, on the one hand suggesting the presence of earlier materials among the published assemblage from the last Chalcolithic level of Yunatsite, and on the other hand synchronizing it with the first phase of the Krivodol culture (Georgieva 2012, 170, 179, and 182). On this basis, she questioned the synchronization between the two cultures.

Indeed, some elements from both level BI and building BII-21B find good parallels even in the last levels of the Early Chalcolithic site of Slatino, Kyustendil region. A vivid example are the tall, elongated storage vessels with lavish graphite decoration, including rhombuses and spirals (cf. fig. 44/2 and 3, and Chohadzhiev 2006, 193, fig. 123/1). However, as we pointed out, a number of elements at Yunatsite show long-lasting continuity and existed throughout several levels. Using them for general conclusions and synchronizations could be misleading.

The comparative review with sites to the east shows that the ceramic assemblage of building BII-21B generally fits into the characteristics of phases IIIa–b of the Late Chalcolithic in Thrace, Karanovo VI culture, according to the periodization proposed by Viktoria Petrova (Petrova 2004). However, some features of the Karanovo VI assemblage are missing at Yunatsite, BII-21B, including the characteristic sharp carination of the biconical bowls, the bowls of three morphological parts with a profiled carination, the specific cylindrical-conical bowls, and the vessels on *Fussboden*. On the other hand, pot-stands with incised decoration and biconical bowls with two vertical handles are present. According to Petrova, the latter are characteristic of the end of the Copper Age in Thrace (Petrova 2008, 172). There are also differences in the graphite decoration. The most important one concerns the ornament of a rhombus with an inscribed circle or ellipse, often associated with a meander, characteristic of storage vessels and deep bowls at tell Yunatsite. According to Margarita Popova, it is missing in the main territory of the Karanovo VI culture (Popova 2015, 26).

At the same time, both the specified elements missing in the area of Karanovo VI, as well as a large part of the other shapes from building BII-21B find parallels in the Krivodol culture.

At this stage of research, building BII-21B should be assigned to a developed but not final stage of the Late Chalcolithic in Upper Thrace. For a more precise synchronization with cultural phenomena in the eastern and western direction, however, a more comprehensive study of the lower levels at Tell Yunatsite itself is needed, as well as the accumulation of a larger database of fully published Late Chalcolithic ceramic assemblages from successive levels from sites in both Thrace and Western Bulgaria.

Conclusions

The complex analysis of building BII-21B at Tell Yunatsite and the remains found in it allows for a number of observations.

In terms of settlement patterns, ongoing research in this part of the tell shows an almost identical position and orientation of buildings in levels BII and BIII. At the same time, certain differences are observed between levels BII and BI, expressed in the displacement of buildings to the east and south and the digging of a large cut feature in the east central part of the tell, which truncated the northwest part of building BII-21 and the northeast part of building BII-20.

The excavations of building BII-21B provided evidence on the interior and the use of living space, which is almost absent for the last Chalcolithic settlement, despite the considerable excavated area (see Matsanova & Mishina 2018, 128). At least two rooms were uncovered, one of which was used for different household activities and the other had mainly storage function. There is also evidence of storing vessels in an attic or second floor (?). At the same time, the excavation of other buildings from levels BII and BIII illustrated a different division and use of space. It is likely that individual households had personal approach to the internal layout and functional distribution of the buildings, not necessarily following a common pattern.

Analysis of the vessels and plant remains provided valuable insights into food storage practices. For this purpose, special storage containers were used in the building. Evidence is available on the use of vessels for long- and short-term storage. The total volume of reconstructible vessels that may have been used for storage (storage vessels and bowls with a volume of more than 3 l) is about 240 liters. Remains of several more (at least 4, possibly 7 or 8) large storage vessels were found, at least part of them having volume of over 60 l. It is possible that there were more storage vessels in the missing northwest part of the building, which could have been part of the storage room uncovered in the north-eastern part of the house. On the other hand, some of them were probably used for liquids. Despite these problems, it seems likely that the total volume of stored food supplies was over 500 l.

Certain spatial differences in the storage of main products were ascertained: wheat mainly in the southern room, barley in the western part of the north room, lentils in the eastern part of the north room.

Another important finding is the presence of certain symbols (spirals and rhombuses connected by an angular meander), which appear to have been closely associated with storage vessels and deep bowls. Obviously, they had certain meaning for the Copper Age people.

Archaeozoological and archaeobotanical evidence testifies for a diverse diet. Although few, the animal remains are quite varied and demonstrate both advanced animal husbandry and hunting. The animal remains from the building obviously do not reflect the volume of meat consumed, since most bones were not left in the houses. The plant remains are much more numerous in quantity and also diverse (cereals and legumes, fruits, nuts, flax). They testify to the well-developed agriculture and gathering. Of particular interest is the data on purposeful gathering of grapes for producing a drink, perhaps wine. It fits well in the evidence from the tell site of Dikili Tash (Vallamoti et al. 2007) and suggests an early spread of wine production in a wider area, including Upper Thrace and the north Aegean coast.

Among the small finds, the absence of items related to spinning and weaving (loom weights and spindle whorls) should be noted. It is likely that these activities were not carried out by every household.

The almost complete absence of artifacts traditionally associated with the beliefs and rituals of the population – e.g., anthropomorphic and zoomorphic figurines, ‘altars’, etc. – is also worth noting. However, it is possible that this is also due to ‘missing parts’ of the building due to later disturbances. At the same time, the close position of two of these objects in the southwestern corner of the building suggests the presence of a ‘domestic altar’ there.

Tell Yunatsite is especially instructive because of its geographic position, as well; it’s situated on the routes connecting Upper Thrace with the Struma and Iskar River valleys, and the Aegean coast with the Danube River valley. Long-distance trade with flint from NE Bulgaria and *Spondylus* shell from the Aegean coast has been identified (cf. Boyadzhiev & Boyadzhiev 2022, 40f), while the ceramic assemblage provides grounds to trace contacts between the Karanovo VI culture to the east and the Krivodol culture to the west.

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