SUREZHA EXCAVATIONS

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Excavations by ISAC at Tell Surezha, on the Erbil Plain in the Kurdistan region of northeast Iraq, investigate the prehistoric roots of the earliest towns and later cities in northern Mesopotamia during the Chalcolithic period from roughly 5500 to 3500 BCE. Surezha is ideal for exploring the chronology, economy, and developmental sequence of the Erbil Plain in this period because the site's high mound is largely prehistoric, with only limited later occupation from the Middle Assyrian period and Iron Age.

Tell Surezha is a mounded settlement of about 22 ha, located approximately 20 km south of the city of Erbil, east of the Tigris River and Nineveh (fig. 1). Situated between the Greater and Lesser Zab Rivers, the Erbil Plain receives sufficient rainfall for the rich agricultural production of cereals, supporting a large population in the city of Erbil—ancient Arbela—and its hinterland.

Positioned at the southwest edge of the modern village of Gund-i Surezha, the ancient site of Surezha has three parts: (1) the high mound, (2) the terrace, and (3) the lower town. The conical high mound and terrace measure approximately 188 m from northwest to southeast and 150 m from southwest to northeast, with an area of approximately 2.8 ha (fig. 2). The high mound rises to a height of 16 m above the terrace. The terrace surrounding the base of the high mound is about 2 m high and slopes gradually down over a distance of approximately 70 m to the lower town, which extends out from the terrace in all directions.

Our work on the high mound has recovered evidence for almost two millennia of continuous occupation in the Chalcolithic period (5300–3400 BCE), starting with its foundation on sterile deposits in the Halaf period and continuing through the Ubaid (the period when the first town-sized settlements developed in Mesopotamia) and the Late Chalcolithic (LC) 1, LC 2, LC 3, and LC 4 periods. The LC 3 and

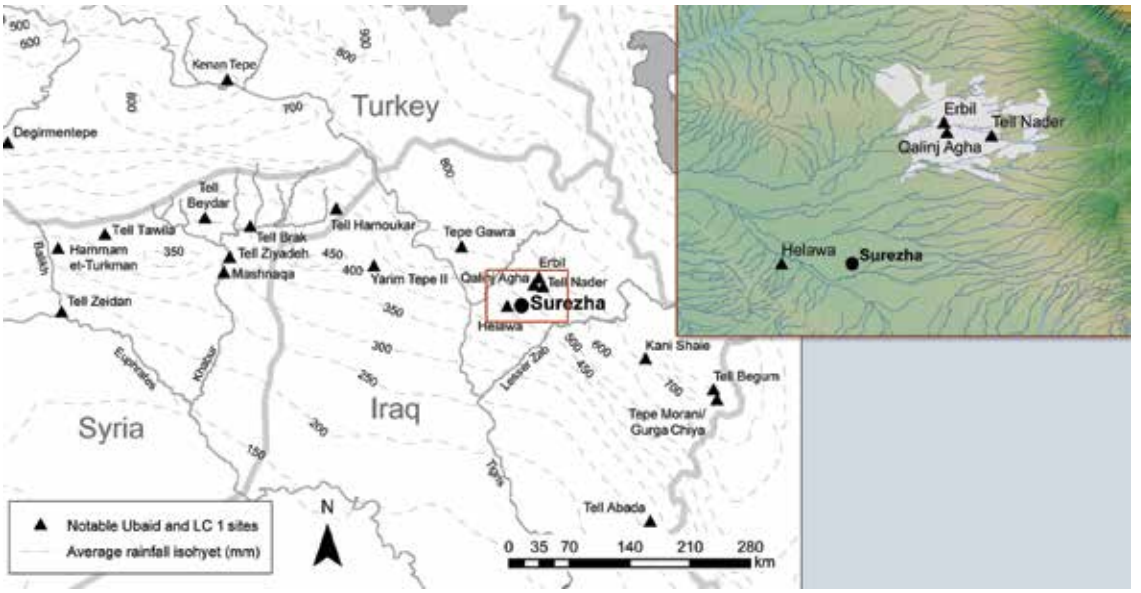

Figure 1. Ubaid/Late Chalcolithic 1 sites in northern Mesopotamia. The insert shows Surezha and other contemporaneous sites on the Erbil Plain in Iraqi Kurdistan. Map by Lucas Proctor.

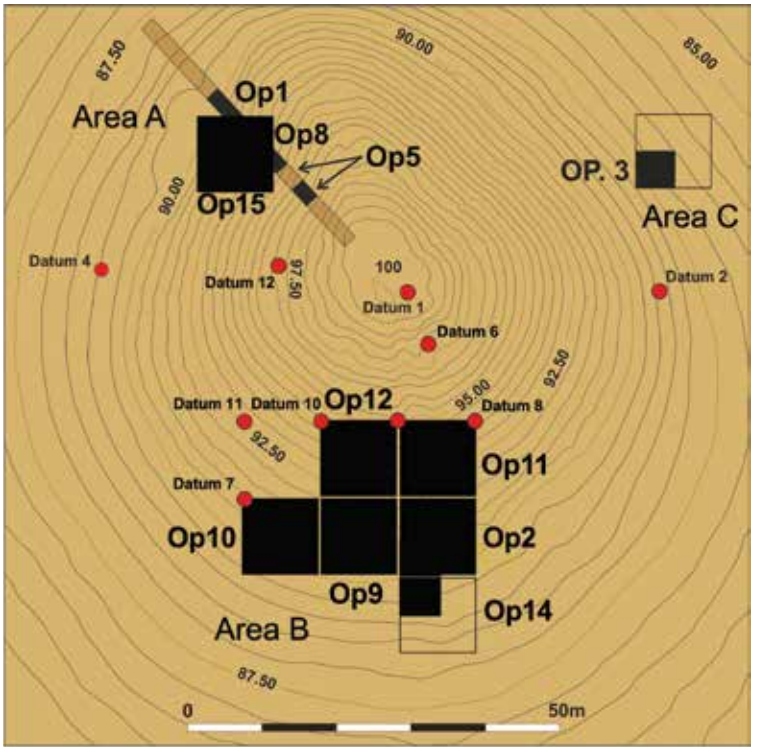

Figure 2. Surezha high mound showing the areas of the 2022 excavations in operations 11, 12, 14, and 15.

LC 4 periods at Surezha are contemporaneous with the Middle Uruk period in southern Mesopotamia. The Chalcolithic period is difficult to investigate because these occupational levels are usually deeply buried beneath 5–30 m of later deposits. However, the abandonment of the Surezha high mound in 3400 BCE, combined with the absence of later occupations there, affords us the rare opportunity to easily reach the building levels of an early town settlement dating back more than 7,000 years.

The 2022 field season took place from September 9 to October 10 and was codirected by Gil Stein and Michael Fisher. Project staff members included Roonak Ahmadinia, John Alden, James Blundell, Adrienne Furniss, Maria Gajewska, Glynnis Maynard, Lucas Proctor, and Sean Reynolds, with Rozhgar Rashid and Nader Babakr serving as our governmental representatives. Site excavations were carried out by twenty-one workers from the Erbil Department of Antiquities and the village of Surezha. We are grateful to the General Director of Antiquities, Mr. Kayfi Ali, and to Mr. Nader Babakr, Director of Antiquities for Erbil Governate, for permission to excavate at Surezha and for the many ways in which they have facilitated our work. The 2022 excavations focused on Area A in the northwest slope of the high mound (operation 15) and Area B at the southern base of the high mound (operations 11, 12, and 14; see fig. 2).

AREA A (NORTHWEST SLOPE OF THE HIGH MOUND)

Operation 1 Step Trench

Initial exploration of Area A took place from 2013 to 2016 with the excavation of the 40 m long, 3 m wide operation 1 step trench by Abbas Alizadeh of ISAC. Operation 1 established Surezha's 1,900-year-long stratigraphic sequence in the Chalcolithic period as extending from the Halaf, Ubaid, and LC 1 through LC 4 periods, with later intrusive pits and burials from the second-millennium BCE Middle Assyrian period. One of the key discoveries came with the exposure of an LC 2 occupation dating to the late fifth to early

fourth millennium BCE, contemporaneous with the Early Uruk period in southern Mesopotamia. The LC 2 deposits at Surezha have calibrated radiocarbon dates that fall mainly between 4250 and 3900 BCE.

The LC 2 strata in operation 1 contained a room with an intact mudbrick wall and a set of complete, restorable ceramic vessels lined up against it. These discoveries suggested that expanding out horizontally from the limited LC 2 exposure in the step trench would allow us to recover well-preserved stratigraphy, architecture, and sufficiently large samples of associated ceramics, animal bones, archaeobotanical remains, and radiocarbon dates to greatly improve our understanding of LC 2 chronology and economy at Surezha. Toward this end, in 2022 we began the excavation of operation 15 in Area A.

Operation 15

Operation 15 is a 10 × 10 m trench in Area A excavated by Lucas Proctor and Roonak Ahmadinia. The trench was laid out to overlap with operation 1 in the area with the LC 2 deposits, thereby ensuring a reliable stratigraphic connection between the two trenches.

Beneath the overlying deposits of the LC 3 period, excavations revealed a complex of LC 2 architecture with at least seven mudbrick rooms whose layout suggests a nondomestic function (fig. 3). These rooms

Figure 3. Operation 15 top plan showing the line of the operation 1 step trench (top right) with the LC 2 nondomestic room complex that spans both operation 1 and operation 15. The area at bottom right shows (unexcavated) portions of overlying LC 3 deposits covering a portion of the LC 2 room complex.

were linked stratigraphically to the well-preserved LC 2 room with storage vessels that had been initially excavated in the operation 1 step trench.

AREA B

In 2022 we began a multiyear effort to expand Area B by opening operations 11 and 12 as two new 10 × 10 m trenches immediately north of operations 2 and 9 (fig. 2).

Operation 11

Operation 11 is a 10 × 10 m trench at the eastern end of Area B and immediately north of operation 2. Excavations there were conducted by Maria Gajewska and Glynnis Maynard. Cleaning of the trench had begun in 2019 with the scraping of about 80 percent of its surface in what appears to have been a mostly open, sloping area in the fifth millennium BCE. In 2022, focused excavations started at the northern end of the trench. Two main architectural features were excavated in this area—room 110008, in the northwest part of operation 11, and kiln 110004, built nearby to the east in an open area along the sloping, fifth-millennium southern surface of the high mound (fig. 4). Both installations apparently date to the LC 2 period.

Kiln 110004 is a two-chambered updraft kiln composed of a lower fuel chamber with a central plastered brick wall that originally supported the floor of an upper (probably domed) chamber where the ceramic vessels would have been placed for firing. Unfortunately, the upper firing chamber no longer survives. The floor separating the two chambers would have been pierced with circular vent holes that allowed the heat from the burning charcoal in the fuel chamber to rise into the upper firing chamber. Kilns with this technologically advanced design first appeared in northern Mesopotamia at the site of Yarim Tepe as early as the 6300 BCE Hassuna period. The kiln's design allowed potters to reach firing temperatures of up to 1,000 degrees Celsius in the oxygen-poor reduction atmosphere inside the closed dome of the firing chamber. Ceramics shrink less and are more stable when fired in the very high temperatures that can be reached in a reducing atmosphere than in the oxidizing atmosphere of an open kiln. The plastered walls of the surviving fuel chamber of kiln 110004 are greenish colored, melted, and vitrified, attesting to the extremely high temperatures attained by the ancient potters at Surezha. The accumulation of sediments and the sequence of superimposed work surfaces built against the outer walls of kiln 110004 suggest that this installation was in use for an extended period of time—perhaps as long as a century—before falling out of use.

Figure 4. Operation 11, with mudbrick room 110008 in the northwest corner of the trench at the rear of the photo and kiln 110004 in the foreground.

Operation 12

Operation 12 is a 10 × 10 m trench located immediately west of operation 11 in Area B and was excavated by Jim Blundell and Adrienne Furniss. Although the two adjacent excavated areas were contemporaneously occupied during the LC 2 period, they seem to have differed markedly in function. In contrast with the largely open area around the operation 11 kiln, the excavated area in the northern (upslope) portion of operation 12 comprises a series of three parallel mudbrick rooms constructed at the top of the slope, opening to the south, and extending into the north baulk (fig. 5). A hearth is located on an outdoor surface immediately west of the block of rooms. The area may have been residential, but this determination is difficult to make because of the low density of artifacts in the structure.

Figure 5. Operation 12, a series of rooms with narrow mudbrick walls, dating apparently to the LC 2 period and contemporaneous with operation 11 to the east.

Operation 14

In Area B, at the southern edge of the high mound, Late Ubaid architecture is accessible only 30 cm beneath the present-day ground surface and lies immediately under LC 1 houses whose orientation closely matches that of the Ubaid house beneath them. This rare situation gave us the opportunity to make broad horizontal exposures of the Ubaid occupation of Surezha, while at the same time studying the Ubaid-to-LC 1 transition. Previous excavations in operation 2 exposed the remains of two intact Ubaid houses with an alleyway running northeast to southwest between them. In 2016, excavations in the rooms and bins of the Ubaid "West House" in operation 2 yielded classic plain ware and painted Ubaid pottery, along with northern Ubaid prestige goods such as a fragmentary stamp seal and a polished-stone palette similar to those known from Ubaid levels at Tepe Gawra in northeastern Iraq and Tell Zeidan in Syria.

Operation 14 was opened in 2022 by Michael Fisher as a 5 × 5 m exposure of the northwest quadrant of operation 14. It is located immediately south of the operation 2 Ubaid houses along the same northeast-to-southwest alleyway that separated the "West House" and the "East House," and it seeks to expand the contiguous exposure of this building level (fig. 6).

Excavations in operation 14 identified the stratigraphic transition between the earliest overlying LC 1 architecture and the Ubaid structure that immediately underlay it. This structure appears to be a multiroom, mudbrick house. The north wall of the house runs along the south wall of the "East House" in the adjacent operation 2 Ubaid exposure along the alleyway. The operation 14 house had eight small, cellular rooms, possibly arrayed around a central courtyard. The presence of a central courtyard is uncertain because a modern Iraqi army pit had cut down through the central portion of the house. Ceramics in the room deposits of this structure were good, southern-Ubaid painted and plain ware forms. Plain wares slightly outnumbered painted wares in the sample excavated in 2022. It should be noted that Ubaid ceramics on the Erbil Plain are chaff tempered with the exception of the Ubaid fine ware bowls and plates, which have fine mineral temper or no visible temper. Polished-stone celt SR10995 was recovered from locus 35 in one of the southernmost rooms in the house and may have been a prestige good.

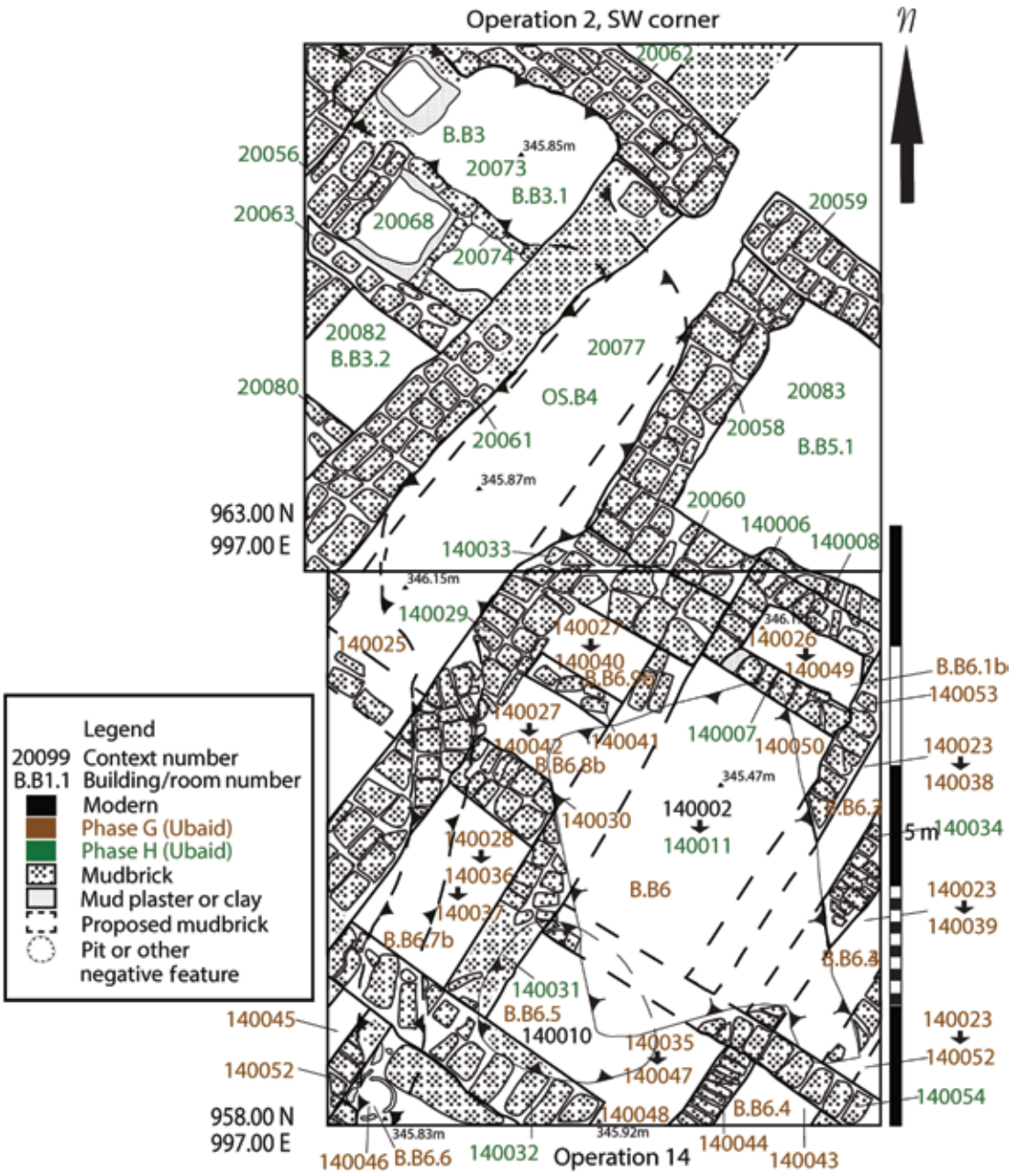

Figure 6. Composite top plan of Late Ubaid domestic architecture in the southwest quadrant of operation 2 (at top) and the northwest quadrant of operation 14 (at bottom).

ZOOARCHAEOLOGY (MAX PRICE)

Analysis of the Surezha animal bone remains is being conducted by project zooarchaeologist Max Price. Faunal remains from six seasons at Tell Surezha (2013, 2016–19, and 2022) were analyzed to reconstruct animal husbandry practices in the Erbil Plain in the Ubaid and Late Chalcolithic periods. This report focuses on the fauna recovered from operations 11, 12, 14, and 15 in 2022.

Relative Abundance

A total of 976 fragments from the 2022 season were analyzed. A very small number of them were identified as to genus from contexts assigned a phase. These data were added to the existing Tell Surezha database of fauna from all excavation seasons to date (table 1).

ARCHAEOBOTANY (LUCAS PROCTOR)

To date, more than 400 flotation samples have been collected from Surezha, and over 108 of them have been analyzed. In 2022, 51 samples were collected and processed over the course of the campaign, in addition to the backlog of 15 samples from 2019. Analysis of these samples, as well as continued study of materials from previous campaigns, is ongoing.

Analysis of Ubaid and LC 2 Samples from the 2022 Season

Twelve macrobotanical samples collected during the 2022 field campaign were analyzed in 2022–23 (table 2). Six of these samples, representing three loci, originate from the excavation of operation 14 and date to the Ubaid occupation of the site. Meanwhile, another six samples were examined from contemporaneous floor, hearth, and *tannur* deposits associated with the LC 2 occupation of the site in operation 15. More than 850 items were recovered from these samples, with 786 identifiable specimens representing sixty-one categories/taxa (table 3).

Operation 14—Ubaid Results

The operation 14 samples included a trash deposit (locus 140017), an indoor surface (locus 140036), and what appears to be material deposited by the erosion of a gully into the side of the mound immediately postdating the Ubaid period (locus 140025). This context likely represents redeposited materials of Ubaid contexts and therefore presents only a general picture of overall plant use. In total, 470 identifiable items were recovered from these samples, of which 120 were indeterminate cereal grain fragments that were excluded from further analysis so as not to overrepresent cereals statistically. Unfortunately, the fluvial deposit was also the richest context in the operation 14 samples in terms of identifiable remains. Among its plentiful cereals, pulses, and grasses, it contained higher proportions of wheat (61 percent) compared to barley (30 percent) and abundant lentils (*Lens culinaris*) and small wild grasses. The remaining four samples from trash-bin fill and an indoor surface yielded substantially fewer preserved remains. Barley was identified in both contexts, whereas wheat was not. Relatively few wild and weedy seeds were recovered from these contexts compared to the fluvial deposit.

Operation 15—LC 2 Results

The examined LC 2 samples from the 2022 field season were derived from contemporaneous contexts dated to phase D (later LC 2) of operation 15. They included an open hearth (150023) and oven/*tannur* (150026), as well as nearby surface deposits. Smashed-pottery fragments and grinding stones were recovered from this level, and remnants of a pebble surface suggest it may have been an exterior area at the time of occupation. In total, 257 items were identified in the LC 2 samples, though 140 of them were indeterminate fragments of cereals. Excluding these fragments, intact cereal grains made up 36.8 percent of the charred assemblage. Both the hearth and the *tannur* contained barley and hulled-wheat remains as well as late-stage processing debris, including glume bases and awn fragments. At 8.5 percent, pulses were relatively common in the LC 2 samples; most were found in the hearth. A single flax seed (*Linum usitatissimum*) was found in the *tannur* sample. Wild and weedy seeds (36.5 percent) were encountered in each of the LC 2 samples, though the hearth sample had by far the richest deposit of them. Unlike the operation 14 samples, where small wild-grass seeds were

Table 1. Surezha animal bone remains (all field seasons), categorized by period.

Identified taxa	Halaf	Halaf-Ubaid	Ubaid	Ubaid–LC 1	LC 1	LC 1–2	LC 1 or 2	LC 2	LC 2–3	LC 3	Middle Assyrian	Islamic
Ovis/Capra, of which:		20	52	28	487	308	1	40	89	94	64	2
Ovis			4	3	69	29		2		9	5	
Capra		1	2	2	22	43		17		2		
Ovis/Capra/Gazella		2	7	4	50	6	1	6	7	9	2	1
Sus		7	36	35	351	42		1	10	80	10	1
Bos		12	15	9	172	31		2	16	23	7	
Canis		2	2		98	6				1		1
Vulpes					1	1		7				
Equus					1?							
Dama/Cervus					2				1			
Capreolus					1							
Mustelid (cf. *Mustela)*					1						1	
Gazella	1		1		31	3		13	2	1	6	
Bivalve (Unionida)		1			12	5		6	2	6	1	
Potomon sp.					2							
Bird			5	2	7			43		1	3	
Fish					1							
Total	**1**	**44**	**118**	**78**	**1,216**	**402**	**2**	**75**	**127**	**215**	**94**	**5**

Table 2. Contextual information for 2022 archaeobotanical samples examined.

Surezha registration number	Operation	Locus	Phase	Deposit class	Deposit type	Flotation volume (L)
11210	14	17	Ubaid F	Secondary	Trash deposit (bin)	2
11212	14	17	Ubaid F	Secondary	Trash deposit (bin)	2
11214	14	17	Ubaid F	Secondary	Trash deposit (bin)	2
11218	14	25	Post-Ubaid B	Tertiary	Fluvial deposit	4
11222	14	25	Post-Ubaid B	Tertiary	Fluvial deposit	4
11216	14	36	Ubaid G	Primary	Floor/indoor Surface	2
10677	15	15	LC 2 D	Primary	Surface	6
11208	15	15	LC 2 D	Primary	Surface	3
10680	15	21	LC 2 D	Primary	Surface	2
10696	15	23	LC 2 D	Primary	Hearth	4
10688	15	25	LC 2 D	Primary	Surface	2
11220	15	26	LC 2 D	Primary	*Tannur*	3

Table 3. Taxonomic data from the 2022 samples.

	Taxon	11210	11212	11214	11218	11222	11216	10677	11208	10680	10696	10688	11220
Cereal grains	*Triticum dicoccum*				10	3				2	7		2
	Triticum monococcum				3	1							
	Triticum durum/aestivum					3							
	Triticum sp.				10	21		3		1	5	1	3
	Triticum sp. (tail grain)				5	4						1	
	Triticum sp. (sprouted)										1		
	Hordeum sp.			2	12	10	4	1	1	2	3	2	4
	Hordeum sp. (twisted)				2			1		2			
	Cereal indet. (whole)	1			8		1				1		
	Cereal indet. (fragments)	1	2	4	50	51	12	27	17	22	25	8	41
Crop-processing debris	Hulled wheat spikelet forks				6								
	Hulled wheat glume bases				10	14	1	1			10		2
	Hordeum sp. rachis				1		1						
	Cereal glume (fragments)							1					
	Cereal rachis indet.											1	
	Basal rachis indet.									1			
	Basal culm (>2 mm)						1						
	Cereal embryo					5				1			
	Awn (fragments)				xxx	xxx					xxx		
Pulses	*Lathyrus/Vicia* type*					2					2		
	*Vicia ervilia**					2							
	*Lens culinaris**					27					3	2	
	Lens sp.*				10								
	Large legume indet.*			`	4	1					2	1	
Other crops	*Linum* sp.					1							
	Linum usitatissimum												1
	Nut shell							1					

Wild and weedy taxa	POACEAE indet.		1	1	3	20	3			3	1			
	Agrostis capillaris type					10								
	Hordeum, wild spp.				4	3								4
	Lolium rigidum type				8		1							
	Lolium/Festuca spp.				32	47		2						
	Phalaris sp.				1	1								
	Phleum sp.				1	1								
	APIACEAE indet.										1			2
	Anthemis sp.					1								
	Arnebia cf. *decumbens*										2			
	Brassica sp.													1
	Gypsophila/Cerastium type								1					
	Vaccaria hispanica								1					
	Chenopodium sp.										2			
	Astragalus sp.								1		3	1		
	Medicago sp.											1		
	Trifolium/Melilotus type				1	5								
	Trigonella sp.			1		1					3			
	Trigonella astroites										1			
	LAMIACEAE indet.					1								
	Malva ssp.	6	2	1					2		3	2		
	Glaucium sp.										1			
	Fumaria sp.						1							
	Rumex sp.				1						1			
	Adonis sp.					1								
	Asperula sp.					2								
	Galium sp.										1			
	Bellevalia sp.										1			
	Plantago type					2					1			1
	Valerianella sp.		1								1			
	Scrophularia sp.								1					
Other	Land snail	1			3	4	1				6			2
	Dung fragments									1				2
	Indet. dung/bread material				8	13	1		5		10	2		

Notes: * = counted by cotlydon; xxx = massive quantities of small, white awn fragments.

most commonly recovered, the wild/weedy seeds from the LC 2 are indicative of herbaceous species commonly found in the open steppe (including *Bellevalia*, *Valerianella*, and *Plantago*), in addition to small legumes (*Trigonella*, *Astragalus*, etc.) commonly found in both steppe and field contexts across northern Mesopotamia.

The addition of new Ubaid and LC 2 archaeobotanical samples to the Surezha assemblage contributes to an emerging and nearly continuous sequence of data on prehistoric agropastoralism on the Erbil Plain. Continued analysis of samples from the site promises to shed further light on plant use and agropastoral activities during these important time periods.

CERAMIC ANALYSES (JOHN ALDEN AND GIL STEIN)

Preliminary analyses done in the field of the Surezha ceramics recovered during the 2022 season were conducted by John Alden and Gil Stein, while archaeometric analyses using instrumental neutron activation analysis (INAA) and thin-section petrography were conducted by Leah Minc (Oregon State University) assisted by Savanna Buehlman-Barbeau (University of Toronto). The 316 excavated pottery lots processed contained 7,356 sherds, of which 2,474 were diagnostic forms—rims, bases, or sherds with surface treatment such as painting, incision, or impressed decoration (table 4). Typological analyses focused mainly on LC 3 diagnostic ceramics and secondarily on LC 2 forms.

Table 4. Summary of ceramic counts and weights from the 2022 field season excavations in operations 11, 12, 14, and 15.

Operation	Total sherds	Total diagnostics	Percentage diagnostics	Percentage painted	Total rims	Total bases	Total painted rim	Total painted body	Total incised	Total other dignostics
11	683	300	43.92	6.59	206	6	10	35	18	25
12	3,017	468	15.51	2.12	335	25	21	43	20	24
14	601	161	26.79	11.15	81	4	24	43	3	6
15	3,055	1,545	50.57	1.44	493	31	13	31	22	26
Total	**7,356**	**2,474**	**33.63**	**2.99**	**1,115**	**66**	**68**	**152**	**63**	**81**

INSTRUMENTAL NEUTRON ACTIVATION ANALYSES OF SUREZHA CHALCOLITHIC CERAMICS (LEAH MINC AND SAVANNA BUEHLMAN-BARBEAU)

As a result of the ongoing trace-element and mineralogical analysis of ceramics from Surezha, our database now totals 299 artifacts analyzed via INAA, including 267 ceramic vessels, 22 ring scrapers, and 10 pieces of unfired clay (table 5).

We can distinguish two composition groups clearly linked to local resources (Surezha-1 and Surezha-2) and identify distinctive compositions that may represent nonlocal sources or foreign imports (the Surezha high-arsenic group). Further, we were able to determine that ceramics that appear foreign (i.e., the Dalma wares) were in fact products of local manufacture matching local chemical signatures (Alden et al. 2021; Buelhman-Barbeau 2020). For this latest set of analyses, we focused on three main research questions.

Table 5. Distribution of the current ceramic INAA sample from Surezha by ware and time period.

Ware/object	Ubaid	Ubaid/ LC 1	LC 1	LC 2	LC 2 or 3	LC 3	Unknown	Total
Blister ware	0	0	0	1	0	1	1	3
Burnished black ware	0	0	0	1	0	1	1	3
Fine paste ware	11	0	0	5	1	26	0	43
Dalma ware	0	32	0	0	0	0	0	32
Chaff-tempered buff	1	0	7	3	0	1	0	12
Grit-tempered buff	13	2	1	0	0	0	0	16
Cooking pot ware	0	0	0	4	0	0	0	4
LC gray ware	0	0	0	0	5	38	0	43
Surezha local ware	0	3	11	26	4	55	0	99
Ring scraper	0	0	0	0	0	0	22	22
Other clay object	0	0	0	0	0	0	10	10
Waster	0	0	0	2	0	2	8	12
Total	**25**	**37**	**19**	**42**	**10**	**124**	**42**	**299**

1. How do our existing chemical groups differ in terms of mineralogical and paste characteristics?
Our prior chemical analyses identified two abundant, presumably local, ceramic groups, labeled Surezha-1 and Surezha-2, based on sharp bimodalities in the trace metals as well as most of the alkali and rare-earth elements. Multivariate refinement based on principal component scores confirmed two distinct, robust groups, one with higher concentrations of most elements (Surezha-1), and one with generally lower concentrations (Surezha-2). The normalized profile plots of these two groups suggest a classic dilution pattern, in which the increased concentration of some major element (possibly introduced as temper) reduces the concentrations of other minor and trace elements.

In addition, our prior analyses identified a high-arsenic group that is clearly distinct from the Surezha reference groups based on arsenic and vanadium; absent these two elements, the group's normalized profile closely tracks that of Surezha-2, indicating that some distinct type of inclusion accounts for the higher concentrations of these elements. One likely candidate in this area is black (organic-rich) oil shale, which is known to host both arsenic and vanadium.

Petrographic analyses of samples falling within the Surezha-1, Surezha-2, and Surezha high-arsenic groups indicate that the same general suite of minerals is found in all of them. The dominant inclusions are quartz and carbonates (as either crystalline calcite or amorphous grains of micrite), along with feldspar, chert, and mica. In the high-arsenic group, carbonate grains outweigh quartz, and the presence of sedimentary rock fragments is notable. One likely source of arsenic and vanadium in sedimentary rock environments is carbonaceous shale, which could potentially burn out during firing and leave little to see in thin section. Some of the linear voids in these sherds appear to have a reddish mineral residue, possibly representing shale inclusions responsible for higher arsenic and vanadium content (fig. 7).

Figure 7. Microphotographs (100×) of high-arsenic sherds taken under incident light. Note the platey rock fragments circled in the image on the right.

2. How well do ceramic wares or types that are both distinctive and relatively rare at Surezha fit within our current composition groups for Surezha—or do they represent imports?

In this round of analyses, several additional types presumed to be nonlocal were submitted for analysis (table 6). They included the distinctive blister ware ($N = 3$), burnished black ware ($N = 3$), and fine paste ware ($N = 42$).

The Surezha local ware as a group fits poorly within the main composition groups previously defined for the site. Fewer than half of the samples for this ware can be securely linked to a specific composition group; they often fall at the margins of group clusters or show affiliations with more than one group, suggesting that paste recipes were variable and poorly controlled. The fine paste wares show a similar pattern: some samples can be clearly linked to our Surezha-1, Surezha-2, or high-arsenic groups, but a majority cannot—they neither form a chemically distinct group on their own nor fall securely within previously recognized groups. None of the blister ware is of local manufacture, but based on preliminary analyses, two of three pieces of burnished black ware appear to be local.

Table 6. Percentage distribution of ceramic wares, by chemical composition group.

Ware/object	Count	Surezha-1	Surezha-2	Surezha high-arsenic	Surezha high cesium-to-rubidium ratio	Unclear	Outlier
Surezha local ware	98	7.1	9.2	11.2	7.1	57.1	8.2
LC gray ware	43	27.9	32.6	27.9	0.0	11.6	0.0
Cooking pot ware	4	0.0	0.0	0.0	0.0	50.0	50.0
Chaff-tempered buff	12	50.0	33.3	8.3	0.0	0.0	8.3
Grit-tempered buff	16	31.3	0.0	6.3	12.5	50.0	0.0
Blister ware	3	0.0	0.0	0.0	0.0	66.7	33.3
Burnished black ware	3	0.0	66.7	0.0	0.0	33.3	0.0
Dalma ware	31	41.9	58.1	0.0	0.0	0.0	0.0
Fine paste ware	42	31.0	2.4	4.8	2.4	57.1	2.4
Ring scraper	22	40.9	18.2	9.1	22.7	4.6	4.6
Waster	12	33.3	0.0	0.0	41.7	16.7	8.3
Other clay object	4	75.0	0.0	0.0	0.0	25.0	0.0

Table 7. Percentage distribution of chemical composition groups, by phase/time period.

Period	Count	Surezha-1	Surezha-2	Surezha high-arsenic	Surezha high cesium-to-rubidium ratio	Unclear	Outlier
Ubaid	25	48.0	4.0	4.0	12.0	32.0	0.0
Ubaid/LC 1	36	36.1	50.0	0.0	2.8	11.1	0.0
LC 1	18	38.9	22.2	0.0	16.7	22.2	0.0
LC 2	41	9.8	12.2	7.3	7.3	46.3	17.1
LC 2/3	10	0.0	0.0	10.0	0.0	80.0	10.0
LC 3	124	16.1	15.3	17.7	0.8	46.0	4.0

3. How well do our ceramic composition groups persist through time?

Table 7 shows the percentage of sherds from each time period that can be securely assigned to a composition group. Several trends are of interest here. First, group representation varies chronologically: Surezha-1 and the small Surezha high cesium-to-rubidium groups are more common earlier in the sequence, while the Surezha high-arsenic group is best represented during the LC 2 and LC 3 periods. Second, the number of sherds that cannot be assigned to a local group (the "unclear" and "outlier" categories) increases through time from the Ubaid to the LC 2–3 and then drops again in the LC 3. As a working hypothesis, we suggest this trend indicates an expanding range of clay resources or access to markets through time, as the inhabitants of Surezha communicated more broadly within the Erbil Plain. In the LC 3, that trend was truncated, perhaps through the reorganization of production and the establishment of local pottery workshops, leading to a greater focus on local resources. We do not, however, see an increased standardization of production within local groups across this time.

To date, we have identified two closely related chemical groups at Surezha—Surezha-1 and Surezha-2—whose patterns of chemical and mineralogical variability indicate pastes made using locally available resources. In contrast, we can now tentatively link the chemical and mineralogical signature of the Surezha high-arsenic group to the ridge of oil shales to the south, the result of access to nonlocal resources or markets at the edge of the Erbil Plain. Although our analyses linking chemical, temporal, and formal variability are still at a very preliminary stage, the results to date indicate that significant changes in the spatial scale of resource acquisition and in organization or production may be documented at Surezha.

CONCLUSIONS

The 2022 field season at Surezha enhanced our understanding of the economic and social organization of the site. New excavation areas such as operations 12, 14 and 15, together with continuing excavations in operation 11, broadened our understanding of the Ubaid occupation of the site, while shedding light on the poorly known LC 2 and LC 3 periods. The data collected contribute to our broader goal of developing an archaeologically based history of the evolution of agropastoral systems on the Erbil Plain and its relation to the development of complex societies in the region.

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