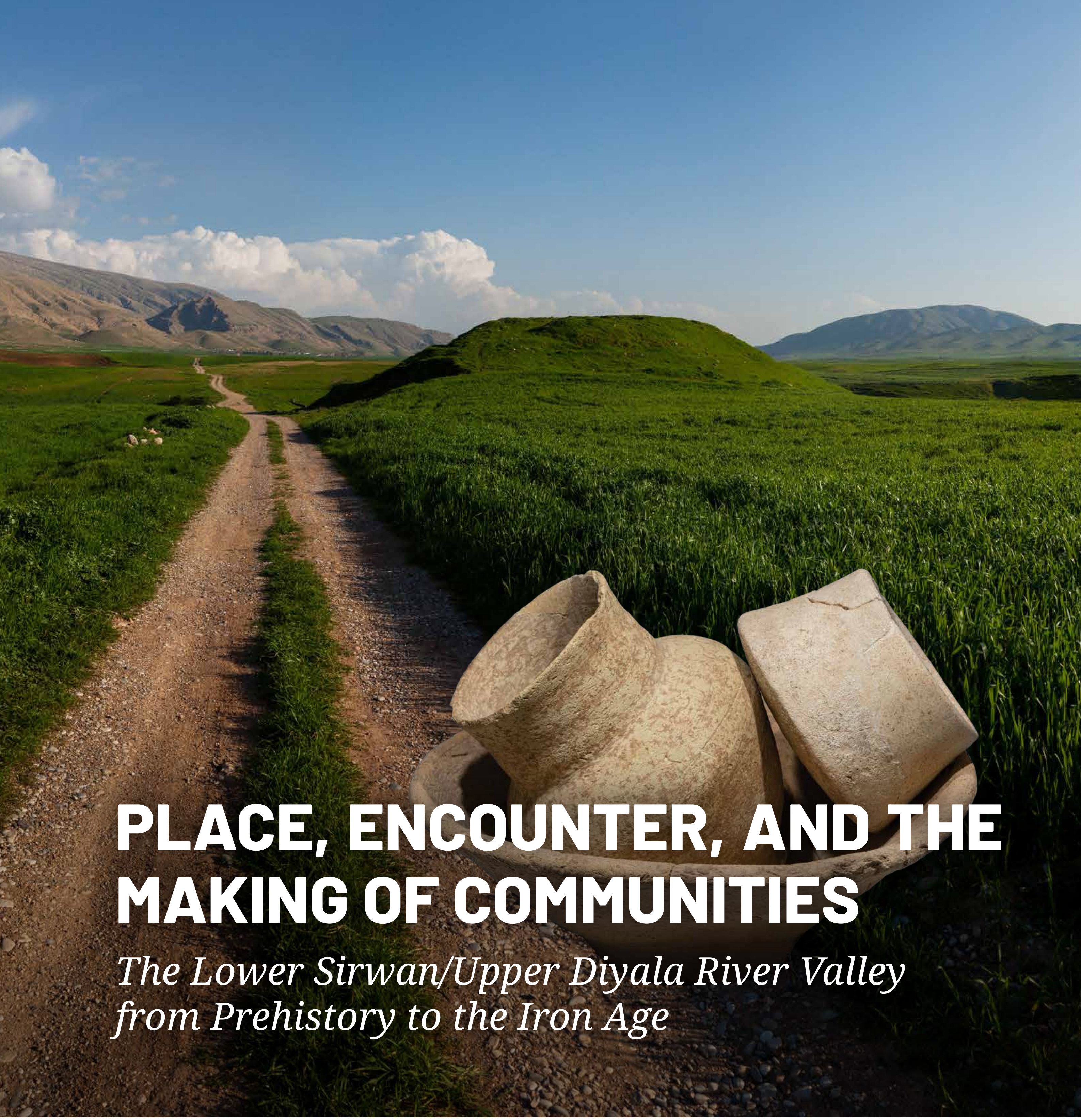

PLACE, ENCOUNTER, AND THE MAKING OF COMMUNITIES

The Lower Sirwan/Upper Diyala River Valley from Prehistory to the Iron Age

AUTHORS: CLAUDIA GLATZ, DANIEL CALDERBANK, FRANCESCA CHELAZZI, SALAH MOHAMMED SAMEEN, NEIL ERSKINE, FRANCESCO DEL BRAVO, NAWZAD ABDULLATIF, METTE MARIE HALD, ADAM E. MIGLIO, ELSA PERRUCHINI, MOHAMMED ALI, SARWAT HAMDAN, APHRODITE SOROTOU, ERIC JENSEN, ARIS PALYVOS, SYNNØVE GRAVDAL HEIMVIK, ROBIN BENDREY, JESSICA PEARSON, JACOB LAUINGER, DANIELE MOSCONE, ANDREA SQUITIERI, EMMA BAYSAL & KATHERYN TWISS

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Sirwan Regional Project

To the people who call the Sirwan region their home,
in the past and today.

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Author Contributions

Claudia Glatz conceptualised, acquired funding, and directed SRP fieldwork. She conceptualised this volume, carried out analyses of survey and excavation data, and produced Chapters 1-6, 8-9, and 11-13.

Daniel Calderbank participated in excavations at Shakhi Kora and Kani Masi, carried out the analysis of the Kani Masi ceramic corpus and produced Chapter 7, he also co-analysed the pottery assemblages of SRP094 and SRP189 presented in Chapter 5, and the surface pottery presented in Chapters 4, 5, and 11, and made contributions to Chapters 8 and 9.

Francesca Chelazzi participated in the regional survey and excavations at Tepe Sirwan, SRP117, Shakhi Kora, and Kani Masi. She curated the SRP's survey data and GIS platform, produced the maps, graphs, and precipitation models for this volume alongside several artefact drawings.

Salah Mohammed Sameen is the director of the Garmian Department of Antiquities, and he provided essential administrative support to the project during all field seasons.

Neil Erskine participated in the regional survey and excavations at Kani Masi and Tepe Qalandari, curated the SRP's data archive, produced the excavation plans in this volume, and provided editorial assistance.

Francesco Del Bravo participated in the Shakhi Kora and Kani Masi excavations and co-analysed the surface and stratified pottery assemblages presented in Chapters 3 and 4.

Nawzad Adullatif provided essential administrative and practical support during field seasons, he carried out remote and on-the-ground damage assessments of known sites, and produced UAV-based aerial images of SRP survey and excavation sites presented in Chapters 2-5 and 11.

Mette Marie Hald oversaw the collection of archaeobotanical data in the field and carried out laboratory analyses on charred plant remains that are presented in Chapters 2, 3, 5 and 8, and summarised in Appendix IV.

Adam E. Miglio participated in the Kani Masi excavations, co-analysed Late Bronze Age sealings and their cuneiform inscriptions, and co-produced Chapter 10.

Elsa Perruchini participated in the Kani Masi excavations and carried out organic residue analysis on pottery from Shakhi Kora and Kani Masi, the results of which are summarised in Chapters 3 and 8.

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Aphrodite Sorotou is a key partner in the *Archaeological Practice and Heritage Protection in the Kurdistan Region of Iraq* project. She co-designed the museum space and engagement strategies presented in Chapter 12.

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Synnøve Gravdal Heimvik co-analysed the zooarchaeological data from Shakhi Kora and Kani Masi, contributed to Chapters 3, 5, 8, and 9, including stable isotope interpretations, and co-produced Appendices VI and VII.

Robin Bendrey co-analysed the zooarchaeological data from Shakhi Kora and Kani Masi, contributed to Chapters 3, 5, 8, and 9, including stable isotope interpretations, and co-produced Appendices VI and VII.

Jessica Pearson analysed the human remains from Kani Masi presented in Chapters 5 and 9, contributed to the text and discussion presented in Chapters 8 and 9, including stable isotope interpretations in Chapters 3 and 8. She also co-produced Appendix VII and produced Appendix VIII.

Jacob Lauinger co-analysed Late Bronze Age sealings and their cuneiform inscriptions from Kani Masi and co-produced Chapter 10.

Daniele Moscone analysed the project's chipped stone assemblages, which are presented in Chapters 2, 3, 4, and 6, with a summary of survey datasets presented in Appendix III.

Andrea Squitieri analysed the ground stone industries of Shakhi Kora and Kani Masi, which are presented in Chapters 3, 5, 8 and 9, and summarised in Appendix V.

Emma Baysal analysed beads and other personal ornaments from Kani Masi presented in Chapters 5 and 9, and summarised in Appendix IX.

Katheryn Twiss analysed the zooarchaeological materials from Tepe Sirwan presented in Chapter 2, and the 2014 Kani Masi test trench data summarised in Appendix VI.6.

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Current and past international team members of the Sirwan Regional Project include experts, research students, illustrators, and photographers from the UK, Germany, Italy, Denmark, Greece, Canada, the USA, and Türkiye. They include, in alphabetic order, Stamos Abatis (Photographer), Giulia Barella (Conservator), Emma Baysal (Bilkent University), Robin Bendrey (University of Edinburgh), Daniel Calderbank (University of Glasgow, SRP associate director since 2022), Jesse Casana (Dartmouth College, SRP co-director 2013-2019), Autumn Cool (University of Arkansas), Francesca Chelazzi (University of Glasgow, SRP associate director since 2022), Francesco Del Bravo (Freie Universität Berlin), Neil Erskine (University of Glasgow), Christopher Fletcher (University of Arkansas), Claudia Glatz (University of Glasgow, SRP co-director 2013-2019, SRP director since 2019), Ronahi Gökdemir (Hacettepe University), Mette Marie Hald (National Museum of Denmark), Synnøve Gravdal Heimvik (University of Edinburgh), Chad Austin Hill (University of Pennsylvania), Elise Jakoby Laugier (Utah State University), Luise Loges (University of Glasgow), Eric Jensen (Concordia University Irvine), Jeff Kerby (Aarhus University), Jacob Lauinger (Johns Hopkins University), Michael Lewis (Universidade de Coimbra), Daniele Moscone (Koç University, University of Kiel), Lorraine McEwan (Illustrator, University of Glasgow), Adam E. Miglio (Wheaton College), Yasaman Nabati Mazloumi (University of Glasgow), Kathleen Nicoll (University of Utah), Tiffany Okaluk (University of Manitoba), Aris Palyvos (University of Glasgow), Mitra Panahipour (NYU), Jessica Pearson (University of Liverpool), Elsa Perruchini (University of Glasgow), T. Emre Şerifoğlu (Bitlis Eren University, SRP co-director 2013-2015), Evrim Şerifoğlu (Illustrator), Aphrodite Sorotou (INHERIT), Andrea Squitieri (Ludwig Maximilian Universität München), Ailbhe Turley (University of Glasgow).

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Some of the material discussed in this volume has been presented in preliminary format in the *Journal of Anthropological Archaeology*, *Iraq*, the *American Journal of Archaeology*, the *Journal of Archaeological Science*, and the *Journal of Archaeological Science: Reports*. Our dating and interpretations have evolved significantly since these preliminary reports. Resulting discrepancies and errors in earlier publications are highlighted in relevant chapters in this volume. The spelling of some, previously published, site names, including that of Kani Masi (SRP046), as well as of local toponyms have been adjusted as advised by our Iraqi co-authors. *Current Anthropology* and *PLOS One* articles present the SRP's cultural heritage initiatives.

Figure 1.1 Pleistocene terraces overlooking the Sirwan river, Lower Folded Zone, and the snow-capped Shakhi Bamu range in the background (photo taken in January 2022).

1

The Sirwan Regional Project: Research Context, Themes, and Approaches

1.1 Introduction

In this book, we sketch the first archaeological history of the lower Sirwan/upper Diyala river valley of northeast Iraq and adjacent landscapes over a period of c. 12,000 years, from the earliest signs of human presence until the mid-first millennium BCE, based on data gathered between 2013 and 2023 by the Sirwan Regional Project (SRP). The SRP is an international archaeological research initiative led by the University of Glasgow in close collaboration with the Garmian Department of Antiquities and the Garmian Civilizations Museum in Kalar under the auspices of the General Directorate of Antiquities of the Kurdistan Region of Iraq (KRI).[1] Below, we introduce the study region beginning with the key material infrastructures and environmental conditions that assemble life in the western Zagros piedmont zone, and with whose constant and more variable affordances past and present communities have had to contend and collaborate. We then reflect on the multitude of ways in which local and regional pasts and presents permeate and collide with each other, as cultural heritage, and in the ways in which ancient textual sources and more recent (geo)political, social, and economic constellations infuse the narration of the region's deeper past. The central research themes and overarching methodology of the SRP, which we developed as a response to these paradigms, are presented in the final part of this chapter.

1.2 Infrastructures of life

Life in the Sirwan region is structured by the deep grammar of the Zagros mountains (Figure 1.1). One of the largest mountain ranges in the world, the Zagros consists of a series of parallel northwest to southeast running chains of mountains whose peaks reach up to 4,400 m in height, and that sweep from the Strait of Hormuz to eastern Türkiye in a great, 1,600-kilometre-long arc. Zagros orogenesis is the result of a fold and thrust belt created by the Arabian plate as it pushes beneath the Eurasian plate, mainly during the Miocene and Pliocene, between c. 50 and 30 million years ago,[2] but earthquakes, as we discuss in Section 1.3 below, are still a frequent occurrence in the region today.

Millennia of erosion in the high Zagros produced the western piedmont zone, which today stretches across western Iran and northeast Iraq, mainly in the Kurdistan Region (Figure 1.2). Streams transported gravel, sand, silt, and clay downslope, depositing their loads in intermontane valleys, and in the areas to the south and west of the highest

1 Earlier project phases included collaborations with Bitlis Eren University (2013-2015) and Dartmouth College (2013-2019).
2 Buringh (1960, 36).

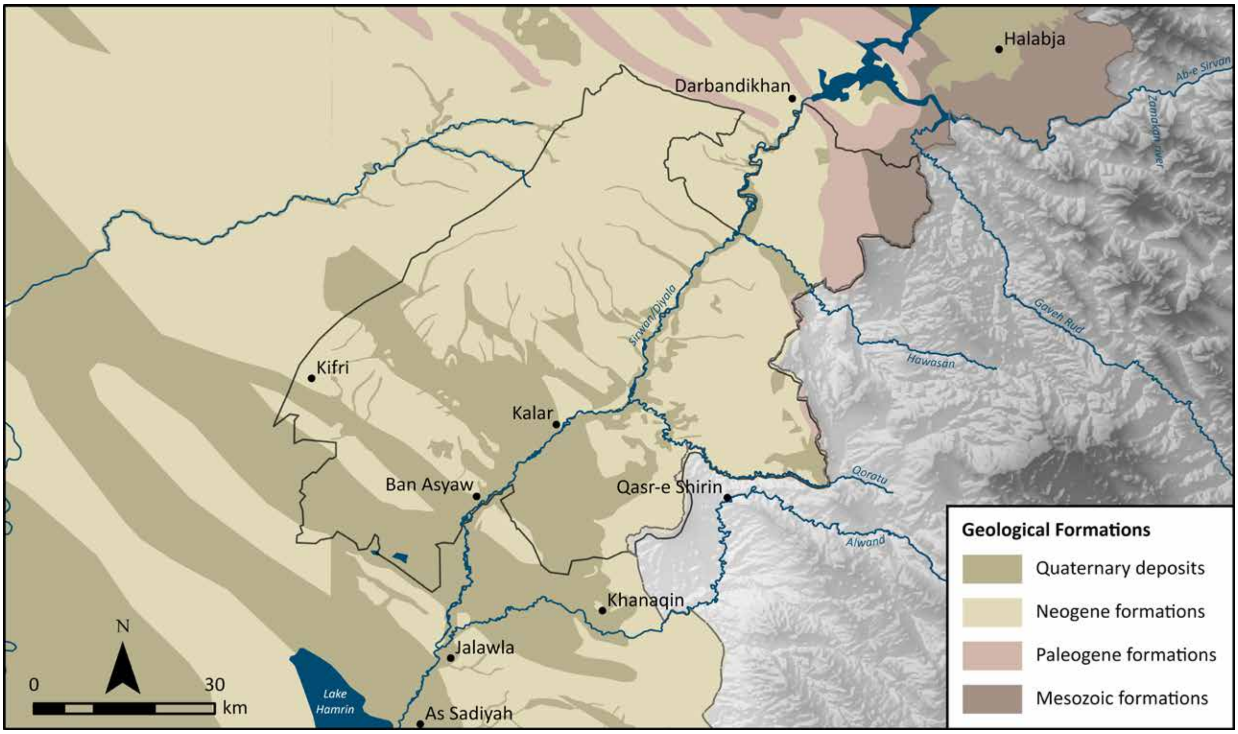


Figure 1.2 Geological map of the lower Sirwan region (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

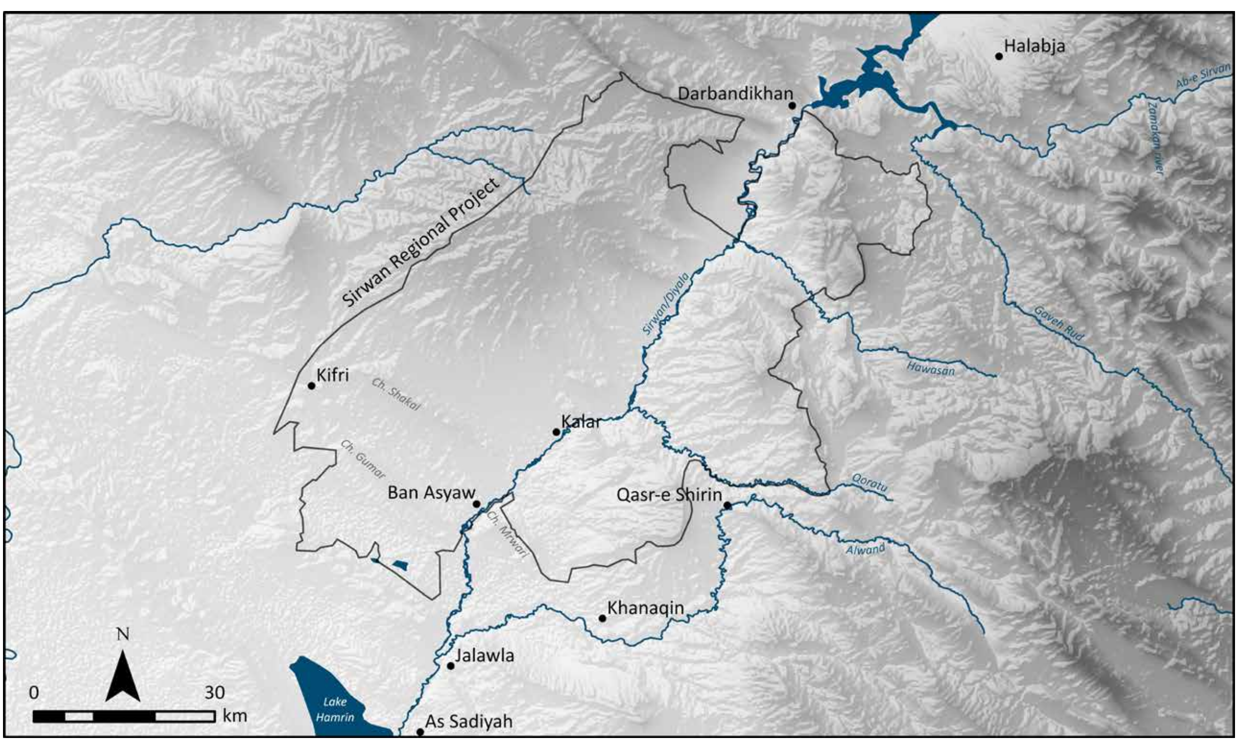


Figure 1.3 Map of the Sirwan Regional Project research region (DEM GTOPO30 ©USGS).

mountain ranges. Less intense subsequent folding created the low parallel hill ridges so characteristic of the landscapes surrounding the Sirwan.[3] The equally characteristic terraces that line the course of the Sirwan and other main rivers, which today are heavily mined for gravel, are the result of intermittent interruptions in these depositional processes, especially during the Pleistocene (c. 2.5 million to c. 11,700 years ago).[4] As a result of these *longue durée* processes, the geological anatomy of the lower Sirwan region is heterogenous,[5] producing in turn a topographically and ecologically diverse mosaic of landscapes that varyingly enable and constrain human practices of settlement, subsistence, and communication.

The near-vertical cretaceous sedimentary formations of the Qara Dagh and Shakhi Bamu ranges present the southernmost outliers of the Zagros High Folded Zone and make for a formidable physical boundary that separates the upland Shahrizor plain and the lower Sirwan valley. The southern slopes of these mountains form the northern limits of the SRP's research area, which measures c. 4000 km^2 (Figure 1.3). Today, the Darbandikhan tunnel provides easy passage through these mountains. In the past, only a handful of passes such as at Paikuli, and narrow river gorges at Horen and Darband-i Belula channelled movement between the Shahrizor plain, the Hawasan river valley, western Iran, and the lower-lying plains around Kalar and the Hamrin to the south, whence the Sirwan (Kurdish) at its confluence with the Alwand transforms into the Diyala (Arabic).

South of the Qara Dagh and Shakhi Bamu ranges, hilly landscapes predominate, giving way to a series of low parallel Miocene sand and claystone hill ridges, the Chiaye Shakal, Gumar, and Mrwari, through which the Sirwan cuts its path. Between these low rises on either side of the river stretch out several plains – Pliocene sandstone, claystone, and siltstone formations – interspersed with Quaternary terraces and fluvial and erosional sedimentary deposits, which represent the southern limits of the SRP's study area. A fluid internal political situation in Iraq has seen the effective limits of the administrative unit of Garmian fluctuate several times during the lifetime of the project, especially following the advance of Daesh in 2014, and the KRI's Independence Referendum in 2017.

Modern settlement as well as the majority of recorded archaeological sites cluster in these southern plains, where the best agricultural soils in the region are concentrated. In the northern valleys, medium and shallow brown soils overlie Bakhtiari gravel, which are of more limited agricultural potential.[6] Soils are the product of the interplay of geology, climate, and organic matter, and much of the Sirwan region is characterised by shallow soils, which overlie gypsum, mud, and sandstone, as well as limestone and gravel terraces. These soils tend to have comparatively low organic matter, and are therefore limited in terms of their fertility, even if regularly left fallow, used for pasture, or leguminous fodder crops.[7] Soil salinity and poor soil structure, caused by rain water and irrigation, though not as bad as in central and southern Iraq, were issues noted as affecting the region's agricultural potential in the middle of the last century.[8] In sum, even with modern fertilisers and irrigation, the agricultural potential of the lower Sirwan region, including the southern plains, is comparatively limited,[9] and presents one environmental variable to consider in the reconstruction of the region's long-term social and political histories.

A hot, semi-arid climate prevails in the region today, which sits just above the north-eastern boundary of the area classified as hot desert.[10] This translates into hot, and sometimes very hot summers, reaching temperatures of 45°C and more, and warm to cool winters with temperatures dropping to around 5°C in January. The majority of rain falls in winter, between November and March, with January usually the rainiest month, and no rainfall from June to September. In the north of the research region, precipitation is somewhat higher and weather patterns are subject to the orographic effect of the Zagros mountains.

On the southern perimeter of the study region, average annual precipitation between 1984-2014 measured by the weather station at Khanaqin amounted to 266 mm. Darbandikhan received 532 mm (1979-2013 records), and Sulaymaniyah in the Shahrizor plain 713 mm.[11] Precipitation rates can fluctuate quite significantly, both annually and over longer periods of time. Average precipitation rates between 1984 and 1994, for instance, place Khanaqin above the 300 mm isohyet, while the 1995 to 2014 data sees it coincide with the 250 mm line.[12] Sandwiched between the 180 to 300 mm isohyets, the minimum annual rainfall required for rain-fed agriculture, much of the SRP research region today falls into the so-called 'zone of uncertainty'.[13] Rain-fed cereal cultivation is possible in optimal years, but interannual precipitation rates are prone to significant fluctuations, which put dry-farming at a high risk of regular failure. As a result of this variability between years as well as between

3 Ibid., 37.
4 Jassim and Goff (2006, 341).
5 Barwary and Slaiwa (2014).
6 Buringh (1957).
7 Buringh (1960, 294).
8 Mitchell and Naylor (1960, 470).
9 Buringh (1960, 224, 253); Mahmoud (2019).
10 Beck *et al.* (2018).
11 Al-Tamimi and Gamel (2016); Yenigun and Ibrahim (2019).
12 Al-Tamimi and Gamel (2016, Fig. 6).
13 Wilkinson (2000).

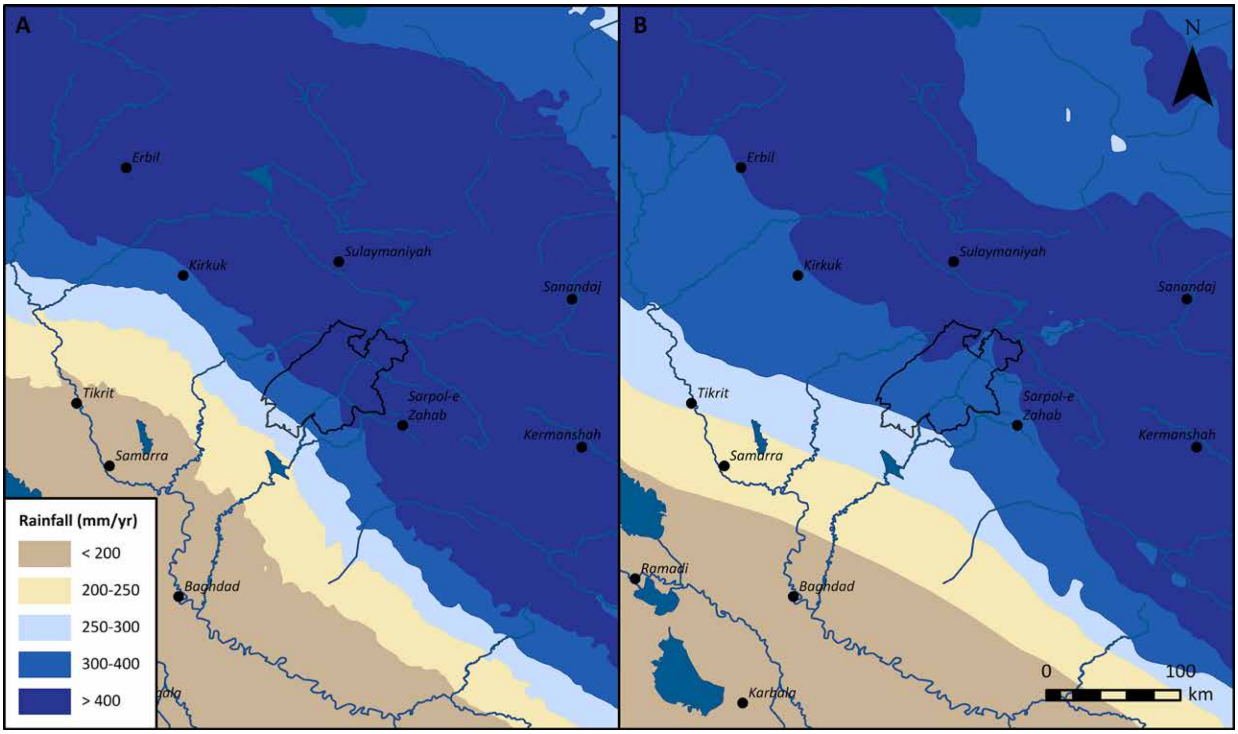


Figure 1.4 Maps showing the cubic interpolation of current precipitation rates in the research region: A) WorldClim2 data (Fick and Hijmans 2017) and B) CLIMAT station data (Hewett *et al.* 2022).

Figure 1.5 The Sirwan riparian environment south of Kalar.

longer wet and dry phases, this geography of risk can significantly shift southwards and northwards, sometimes by several hundred kilometres. As recent models have shown, even minor fluctuations in rainfall can have a significant effect on the distribution of available moisture (Figure 1.4; see also discussions in subsequent chapters).[14]

Prevailing soil and climatic conditions support an Irano-Turanian phytogeography. Moist steppe zone vegetation grows along the Sirwan and other perennial streams, and a forest zone characterises the northern and eastern uplands.[15] In the steppe zone, grasslands dominate, interspersed with shrubs. Dominant species are bulbous blue grass (*Poa bulbosa* s.l.), sedge (*Carex stenophylla*), and Persian buttercup (*Ranunculus asiaticus)*. Perennial shrub white wormwood (*Artemisia herba-alba*), and the yarrow (*Achillea conferta)*, *Astragalus mossulensis ulophyllum*, sword-lily (*Gladiolus segetum)*, *Bellevalia* spp. and *Muscari longipes*, are also present. In uncultivated areas, bulbous blue grass (*Poa bulbosa* s.l.), bulbous barley (*Hordeum bulbosum*), and *Aegilops speltoides*, another edible grass, as well as herbs such as *Anemone coronaria*, the thistle-like *Gundelia* and *Cousinia*, and St John's wort (*Hypericum*) can be found.[16]

All of the SRP's research area lies below the lower Zagros treeline, which approximately follows the 500 mm isohyet.[17] During the early-to-mid Holocene, this higher-lying forest zone would have been home to different types of oak and pistachio varieties. However, upland forests have since fallen victim to logging, grazing, and politically motivated episodes of deforestation in the 1980s and 1990s,[18] with steppe vegetation subsequently colonising the uplands.[19]

Winding between these climatic and ecological zones are the Sirwan river and its tributaries. The Sirwan rises in the Zagros mountains, near Hamdan in western Iran and stetches over a total distance of c. 445 km before discharging into the Tigris just below Baghdad. It drains about 32,600 km^2 with a mean daily flow of 182 m^3/s. On its course southwest and following its confluence with the Tanjero, the river breaks through the Imbricate and High Folded Zone of the Qara Dagh massif near the modern town of Darbandikhan, after which it flows in a sinuous pattern, with its meanders the outcome of mass movement,[20] towards Kalar and the Hamrin basin beyond. Flow velocity and roughness mean that the river is generally not navigable along its upper course.

Along its middle and lower reaches, braided bars are scattered throughout the Sirwan channel, forming islands. Riparian vegetation grows on these islands as well as along the river banks, forming Riverine Forest of the Plains (Al-Ahrash) habitats, today refugia for several endangered species.[21] Many of these wetland habitats are acutely threatened due to extensive gravel mining at multiple locations along the river, the drilling of oil wells, and pollution from agriculture and untreated sewage.[22] Wetland habitats are also being destroyed as part of recent security measures. For instance, a dense riparian forest, which lines both Sirwan banks near Ban Asyaw, was cut down in January 2022 (Figure 1.5).

Two Sirwan tributaries, which carry water year-round and flow through the SRP's research region, are the Hawasan and the Qoratu rivers. Both rise in western Iran and drain into the Sirwan south of the Qara Dagh and Shakhi Bamu ranges. The Hawasan, Qoratu, and the Alwand beyond provide ample water to the landscapes flanking the Sirwan to the east. To the west, the Sirwan is fed by numerous but seasonal streams, which carry water only during the winter rains and spring snowmelt. The only year-round river to the west, the Narin, joins it just before it cuts through the Hamrin range further to the south.

Today, the waters of the Sirwan and its tributaries are extensively utilised to irrigate fields and fruit orchards (Figure 1.6). Underground aquifer systems include Lower Bakhtiari (Muqdadiya) and Quaternary deposits,[23] whose waters bubble to the surface in the region's numerous springs. This water supply is today heavily supplemented by artificial wells, which pump groundwater from a depth of between 20 to 30 metres.[24] The Sirwan/Diyala is also a vital source of life for the inhabitants of lowland central Iraq, where a complex network of canals and weirs northeast of Baghdad channels its waters into households and extensive irrigated field systems.

Prior to the regulation of the Sirwan flow rates by the Darbandikhan dam, and the widespread use of modern agricultural machinery, Mitchell and Naylor observed that less than half of arable areas were under cultivation in any one year in the middle of the last century, and that less than half of these in turn were under irrigation.[25] Rain-fed agriculture was practiced both in the southern plains and in the hilly uplands, as was animal husbandry. They also noted that crop yields varied considerably from year to year, but that even in an average year, they were extremely low. As a result of these limitations, the area was largely unable to produce cash crops such as cotton, while over a

14 Hewett *et al.* (2022).
15 Guest and Al-Rawi (1966); Zohary (1973); Léonard (1989).
16 Ghazanfar and McDaniel (2016, 14-15).
17 Wright (1962, 133).
18 Mühl *et al.* (2018, 119).
19 Ghazanfar and McDaniel (2016, 15).
20 Sissakian *et al.* (2014).
21 Ali *et al.* (2016).
22 Nature-Iraq (2017a, b).
23 Jalut (2021).
24 Al-Jiburi and Al-Basrawi (2015, Figs. 3, 4).
25 Mitchell and Naylor (1960, 472-473, Table II).

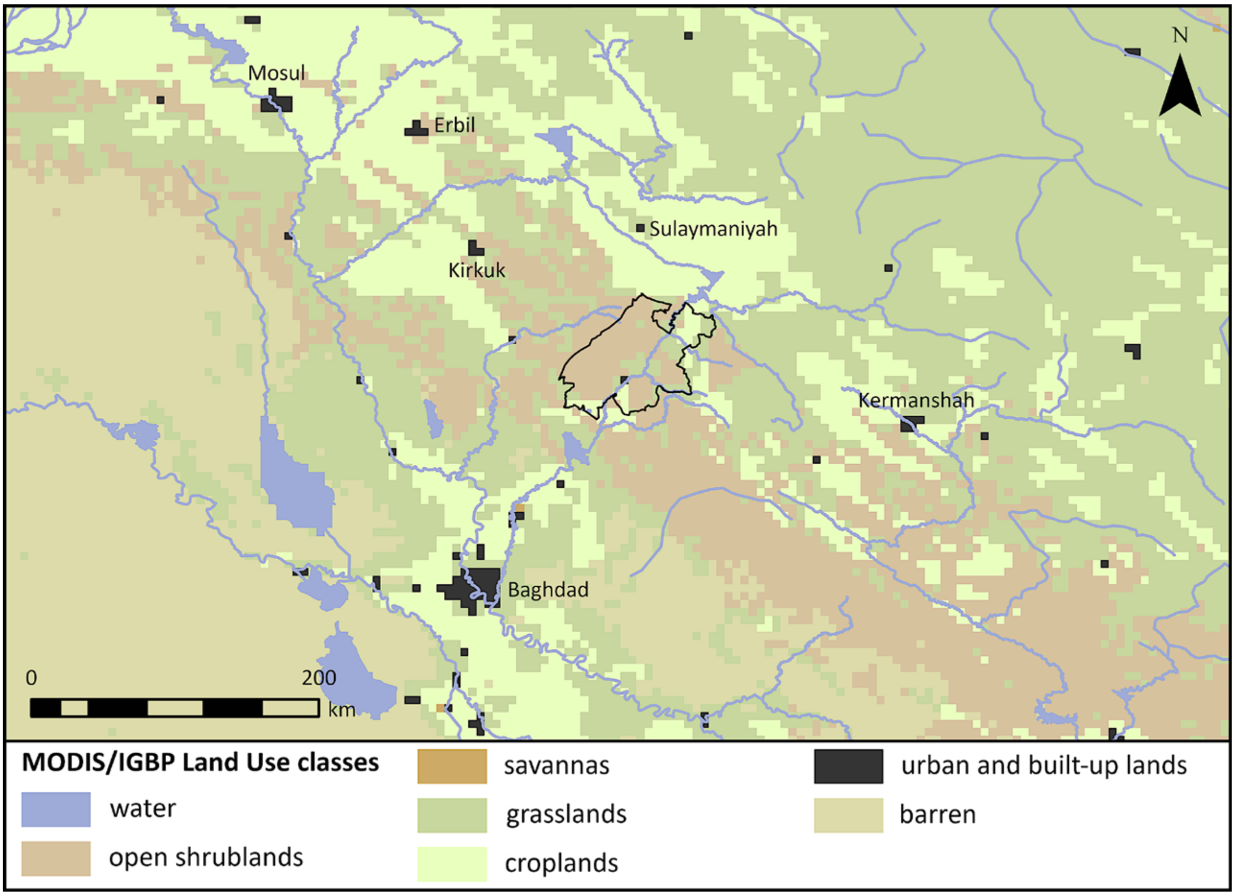


Figure 1.6 Modern land-use as documented by MODIS/IGBP (©NASA EOSDIS).

third of its agricultural production was home-consumed. Conditions may have been marginally more favourable during the early nineteenth century, when Claudius Rich described tobacco, cotton, and corn being grown in the region between Kifri and Khanaqin.[26]

Below Darbandikhan, the Sirwan and its tributaries are surrounded by hill-country, which is generally unsuited to irrigation agriculture. In the more recent past, these landscapes were instead utilised for stock-rearing. Until recently, pastoral nomads came to graze their flocks here during spring, when the hills are covered in lush grass, and before moving on to summer pastures in the Zagros highlands. A small sedentary population also inhabited the region in the 1950s, who were, according to their foreign observers, "precariously dependent on rain-fed agriculture" mainly on the raised river terraces.[27]

The only areas suitable for systematic irrigation are the plains stretching to the west and east of the Sirwan around the modern town of Kalar and to its south. Prior to the construction of the Darbandikhan dam, the Sirwan and its tributaries carried more than enough water during the winter months to satisfy irrigation needs along its course. However, flow rates were severely reduced during the summer, resulting in a much smaller area where crops could be sufficiently watered. A survey of soils and agriculture in the middle of the last century, found that summer irrigation along the Sirwan south of Kalar was restricted to 3% of the area that could be irrigated during the winter months.[28] Irrigation in the winter months, although water was abundant, had its own challenges. The temporary stone and brushwood dams, which were used to divert river water onto fields, were able to deliver an initial phase of irrigation to winter crops, but they could not withstand the first high floods. Thus, irrigation infrastructure had to be rebuilt every year, and winter crops would have had to rely on rainfall to mature, resulting in frequent crop failure.[29]

26 Rich (1836, 260-274).
27 Mitchell and Naylor (1960, 469).
28 Ibid., 472.
29 Ibid.

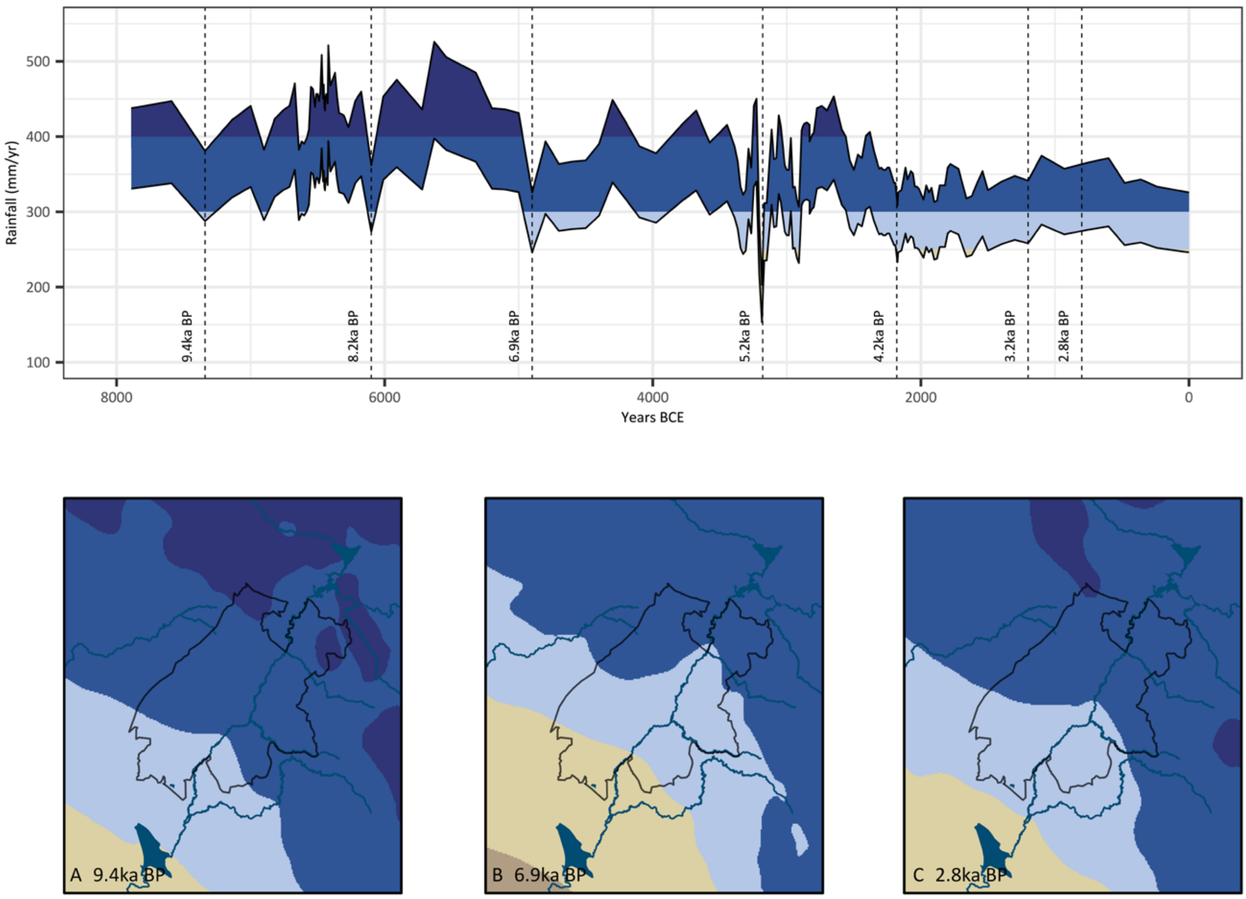


Figure 1.7 Model of long-term fluctuations in precipitation in the study region (cubic interpolation after Hewett *et al.* 2022). See Figure 1.4 for legend.

In 1952, the Iraq Development Board initiated the construction of the Darbandikhan dam, in order to control these seasonal fluctuations in flow volume, expand irrigated zones, and to prevent flooding in winter.[30] Despite water regulation, the agricultural productivity of the region has not changed much over the past 70 years. The main crops cultivated today are wheat, barley, and rice, followed by maize, sunflowers, chickpeas, lentils, as well as a range of vegetable and fruit varieties. Land capability for wheat and barley production, whether under irrigation or rain-fed, is consistently lower than in other parts of the KRI,[31] whose agricultural sector as a whole has been starkly affected by the agricultural experiments and forced population displacements of the 1970s.[32]

In the past decades, several severe droughts have impacted agricultural productivity in the Sirwan region and beyond. Regional palaeoclimatic proxies suggest that these multi-year droughts (1998-2000 and 2007-2010) are unprecedented since at least 950 CE, but sit within a broader long-term trend of increased aridity.[33] Modern droughts, moreover, are characterised by lower precipitation and higher temperatures, while droughts in the past were generally associated with lowered temperatures.[34] Accelerated growth of water exploitation in recent years and upstream water diversion and damming are further compounding this emerging climate-change-induced crisis in the region.[35]

A more favourable, wetter climate regime prevailed for much of the Neolithic, Chalcolithic, Bronze and Iron Ages, which form the chronological focus of this volume. Rainfall, however, also significantly fluctuated on an annual basis in the more distant past, and multi-year

30 Mitchell (1959, 390).
31 Mahmoud (2019, Fig. 11).
32 Genat (2017).
33 Flohr *et al.* (2017).
34 Guiot and Kaniewski (2015).
35 UNESCO (2014); Al-Faraj *et al.* (2015).

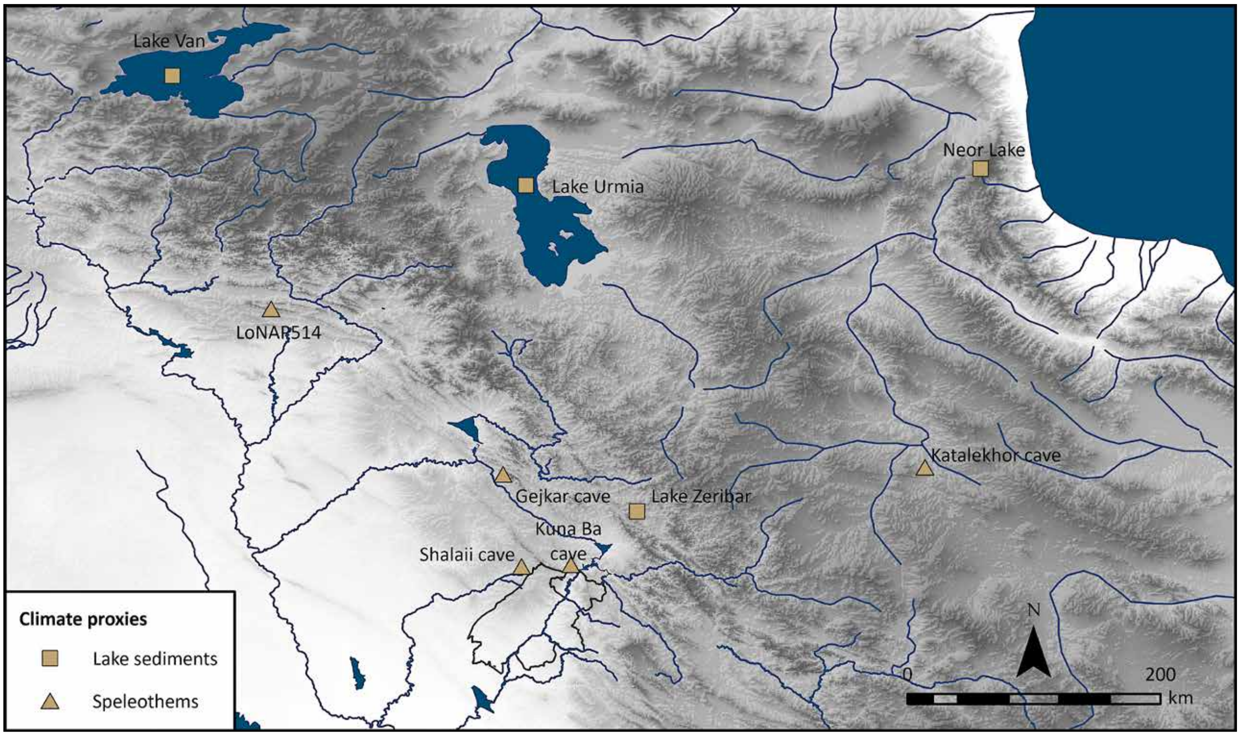


Figure 1.8 Map showing the locations of palaeoclimate proxy records in the wider region (DEM GTOPO30 ©USGS).

drying events regularly punctuated decades or centuries of more amenable conditions (Figure 1.7).

The most relevant regional palaeoclimatic records come from lake sedimentary cores in the form of pollen sequences and stable isotope values that act as proxies for precipitation and effective moisture, as well as from chronologically better constrained speleothem stable isotope sequences. Relevant sedimentary cores come from Lake Zeribar[36] and Lake Mirabad,[37] as well as Lake Urmia,[38] and Lake Van[39] (Figure 1.8). More recent data derive from the analyses of speleothems from the caves of Kuna Ba[40] and Shalaii,[41] which are located close to the SRP research region, and LoNAP514 further northwest.[42] Combined with high-resolution palaeoclimatic proxies, such as Greenland ice cores, and marine cores from the Atlantic and Mediterranean,[43] which provide chronologically fine-grained data on hemispheric and global scale climatic events, these regional proxy records permit us to paint – with a very broad brush – a general diachronic picture of the region's palaeoclimate and environment. More detailed chronological and micro-regional climatic reconstructions are currently hamstrung by the number and spatial distribution of available terrestrial records, and by their variable chronological resolutions.[44] Diverging temporal resolutions between palaeoclimatic and archaeological datasets presents an additional and significant issue for the reconstruction of how human societies were impacted by, and reacted to, changing climatic conditions.[45]

Beginning around 15,000 BP, sedimentary cores from Lake Zeribar indicate a transition from the cold and dry conditions of the Late Pleistocene and *Artemisia*-dominated steppe vegetation, to a warmer and wetter regime (Figure 1.9). The so-called Bølling-Allerød Interstadial saw grasses and trees spread into the Zagros mountains and into adjacent steppe and desert-steppe landscapes.[46] This trend was interrupted by the Younger Dryas (c. 12,900-11,700 BP), a prolonged cold and dry climatic reversal, which resulted in the lowering of lake water levels,

36 van Zeist and Wright (1963); Snyder *et al.* (2001); Stevens *et al.* (2001); Wasylikowa *et al.* (2006).

37 van Zeist and Bottema (1977); Stevens *et al.* (2006); Roberts *et al.* (2011).

38 Roberts *et al*. (2001).

39 van Zeist and Woldring (1978); Landmann *et al.* (1996); Wick *et al.* (2003).

40 Sinha *et al.* (2019).

41 Marsh *et al.* (2018).

42 Regattieri *et al.* (2022).

43 Rohling *et al.* (2015).

44 Nicoll and Küçükuysal (2013).

45 Flohr *et al.* (2016); Lawrence *et al.* (2022).

46 van Zeist and Wright (1963); van Zeist and Bottema (1991).

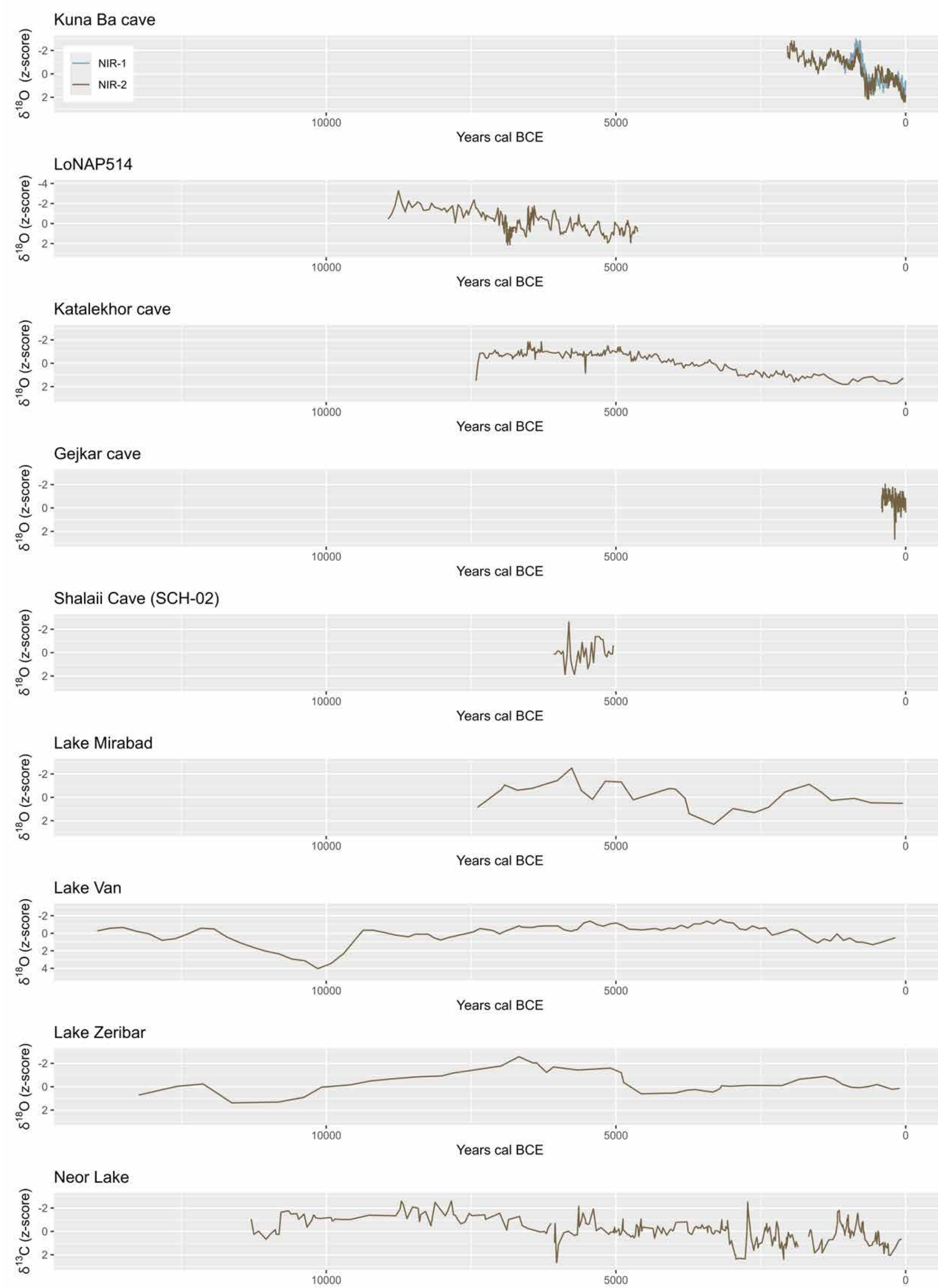


Figure 1.9 Late Pleistocene and Holocene climatic trends as indicated by regional proxy records (source data: NOAA/USGS).

increased water salinity, and the recolonisation of the region by steppe vegetation.[47]

Wetter conditions returned around 9750 BCE, marking the onset of the Holocene. Lake core pollen records indicate a renewed spread of grasses, almond, and pistachio trees around the lakes.[48] Coinciding with the Early Neolithic, this wetter phase continued until c. 6000 BCE,[49] including in the Zagros.[50] Aeolian input and changes in palaeohydrological conditions at Lake Neor in northern Iran also point to fewer dusty intervals during the early Holocene than in the preceding Younger Dryas.[51]

Oxygen stable isotope ($\delta^{18}O$) values from a stalagmite from Shalaii Cave in the Chamchamal region, which dates to between c. 6000-5000 BCE, point to wet but highly seasonal conditions, with only one rainy season.[52] Phytolith and macrobotanical data from the Neolithic and Chalcolithic sites of Tepe Marani and Gurga Chiya in the Shahrizor plain suggest temperate conditions with cereals grown in winter and a summer season for legumes and flax.[53]

From around c. 4000 BCE, lake sedimentary cores point to greater oscillations between wetter and drier phases, with conditions trending towards a drier climate.[54] Short-term climate variability and more prolonged droughts are also indicated by a higher frequency of intervals of aeolian input at Lake Neor.[55] At Lake Mirabad, a protracted peak in $\delta^{18}O$ values between c. 3800 and 2300 BCE includes a prolonged drought phase around 3400 BCE that coincides with poor pollen preservation.[56] *Pistachio*, a hardy and drought-resistant species, reappears in the Mirabad pollen record between 2600 to 2200 BCE.[57]

Reduced humidity, lower lake levels, decreases in oak forest, as well as an increase in charcoal in regional lake sediments point to dry conditions from between 2200-2000 BCE.[58] Enhanced dust depositions around 2200 BCE and again around 1800 BCE are notable in the Neor records.[59] Amidst this general trend towards cooler and drier conditions, lake cores register a wet phase between c. 2000 and 1300 BCE.[60] At Mirabad, for instance, precipitation appears to increase to values similar to the early Holocene, after which they decrease again.[61]

The Kuna Ba speleothem record, which is the geographically closest regional palaeoclimate proxy record for the SRP research region, indicates a period of high moisture availability at the start of the second millennium BCE, especially from c. 2000 to 1930 BCE.[62] This is followed by a more arid phase from around 1860 BCE, interspersed with wetter intervals in the second and third quarter of the second millennium BCE. A return to persistently higher precipitation occurs between c. 1360 to 1140 BCE, while an interval of relatively more arid conditions precedes the onset of significantly higher precipitation from c. 920 BCE. This so-termed megapluvial was followed by a simultaneous increase in $\delta^{18}O$ and $\delta^{13}C$ values, indicators of heightened aridity, between c. 800-700 BCE, and a peak arid phase comparable in severity to the post-1980 droughts in Iraq and the wider region, lasting c. 125 years from 675-550 BCE.[63] Geoarchaeological, sedimentary, speleothem, and lake core data all point to progressively more arid conditions thereafter.[64]

In light of these climatic trends, and the significant challenges that the high degree of seasonality in Sirwan flow volume and speed, as well as its often deeply incised and narrow floodplain would have posed to early hydraulic engineers, it is not surprising that historic qanat and canal systems in the region, similar to the Hamrin basin[65] and the Shahrizor plain,[66] all appear to date to the Sasanian period (224-651 CE) and later. Prehistoric, Bronze and Iron Age lower Sirwan communities relied on rainfall for their crops, managing environmental risks through diversified agropastoral economies built around hardy, drought-resistant crops and animals, and relatively low settlement densities (for more detail, see Chapters 2-5, 8, 11, and 13). Natural springs were used to water livestock or the plants that they consumed (see Chapter 8.3.3), while seasonal streams and the Sirwan spring floods presented opportunities for supplementary flood farming, and the wetland cultivation of summer crops.[67]

1.3 Multiple temporalities and intersecting narratives

Geological and archaeological timescales regularly collide with the event-centred temporalities of human experience in the seconds and minutes when the earth trembles, which

47 Smith *et al.* (1997); Roberts (1998, 70-71); Alley (2000); Snyder *et al.* (2001); Stevens *et al.* (2001); Wasylikowa *et al.* (2006).
48 van Zeist and Bottema (1977).
49 Roberts *et al.* (2011).
50 Jones and Roberts (2008).
51 Sharifi *et al.* (2015; 2018).
52 Marsh *et al.* (2018, 965); Al-Manmi *et al.* (2019).
53 Marsh *et al.* (2018, 964-965).
54 Roberts *et al.* (2001); Stevens *et al.* (2001; 2006, 496).
55 Sharifi *et al.* (2015).
56 Roberts *et al.* (2011).
57 van Zeist and Bottema (1977).
58 Roberts *et al.* (2001); Stevens *et al.* (2001); Wick *et al.* (2003).
59 Sharifi *et al.* (2015).
60 Roberts *et al.* (2011).
61 Stevens *et al.* (2006, 496).
62 Sinha *et al.* (2019).
63 Ibid.
64 Roberts *et al.* (2001); Altaweel *et al.* (2012, 7-8); Flohr *et al.* (2017).
65 Young and Killick (1988, 3-4).
66 Mühl *et al.* (2018).
67 For relevant evidence in the Shahrizor plain, see Marsh *et al.* (2018).

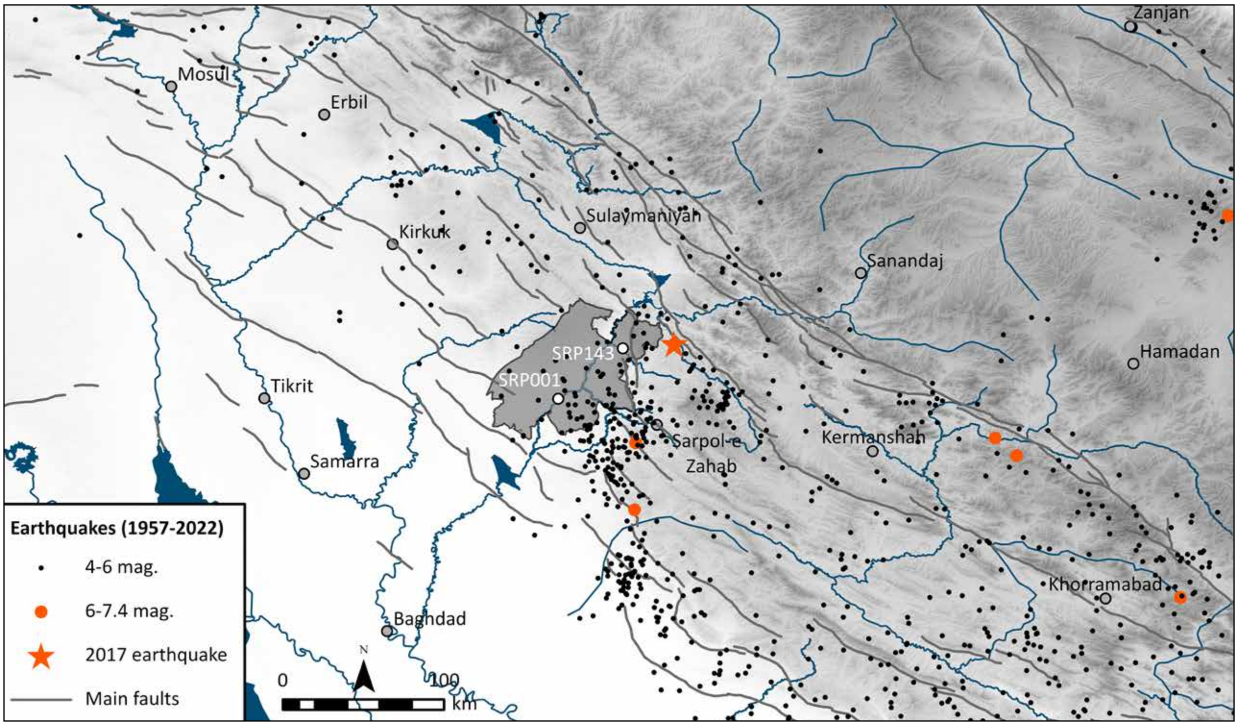


Figure 1.10 Map showing the locations of Tepe Qalandari (SRP143), Qala Sherwana (SRP001), and the epicentre of the 2017 earthquake (©USGS Earthquake Data Catalog; DEM GTOPO30 ©USGS).

it does frequently in the lower Sirwan region, sometimes in gentle tremors, and sometimes violently and with catastrophic results. The majority of uplift in the Zagros mountains occurred during the Miocene and Pliocene; Zagros orogenesis, however, is still ongoing. A structural element of the Alpine-Himalayan belt, the Zagros arc is one of the most seismically active fold-and-thrust belts in the world, and records for the last half-century alone include over 200 significant earthquakes.[68]

On 12 November 2017, one such powerful earthquake, 7.3 on the Richter scale, shook the KRI and neighbouring parts of western Iran (Figure 1.10). The earthquake claimed the lives of over 500 people and injured over 7000, causing extensive mudslides in the mountainous northern parts of the region, and damaging countless houses and essential infrastructure.

Important archaeological and cultural heritage was also damaged during the earthquake and its aftershocks. This includes the lower mound of Tepe Qalandari (SRP143), a predominantly Iron Age site which overlooks the Hawasan river in the northern district of Maidan. Built on a Pleistocene gravel terrace, the site has been gradually eroding into the river, which runs c. 30 m below along the site's southern limits. The 2017 earthquake caused stretches of the terrace to collapse further, which exposed subsurface archaeological remains, including parts of a brick paved floor (Chapter 11.4.3, Figure 11.12).

The earthquake also severely damaged the picturesque nineteenth century CE castle of Qala Sherwana (SRP001), which is increasingly enveloped by the fast-growing urban agglomerate of Kalar, the capital of Garmian district (Figure 1.11). Located about 100 km southeast of Sulaymaniyah, and 60 km southwest of the epicentre of the earthquake, the castle suffered significant structural damage as the shocks dislocated walls and caused the collapse of a central cupola (Figure 1.12). In the following five years, the Garmian Department of Antiquities rebuilt the castle with the support of national and international funding, including a grant from the Prince Claus Fund for Culture and Development that the SRP was pleased to help secure. The castle, and the ethnographic museum that it houses, reopened for visitors in 2022.

The Qala, however, is not only where geological and human temporalities occasionally collide, it is also one of the places in the lower Sirwan valley where local narratives about the region's past and its cultural heritage are anchored, and where they intersect with well-established *topoi*, or themes, in historical and archaeological storytelling. Four interrelated *topoi* are particularly relevant to the ways in which the region's early history is traditionally narrated; all three are

68 Nissen *et al.* (2011).

Figure 1.11 The settlement of Kalar on A) CORONA imagery from August 1969 (©Corona Atlas of the Middle East) and B) a GoogleEarth image from March 2022 (©CNES/Airbus).

Figure 1.12 Qala Sherwana A) in September 2017 and B) after the earthquake in November 2017 (courtesy of the Garmian Directorate of Antiquities).

externally constructed, and although neither is without significance to local experiences, or shaped by local forces during some periods, they all distract to varying degrees from the development of locally-centred, bottom-up archaeological histories. The first *topos* conceptualises the region as a perpetual political and cultural borderland, the second emphasises the Sirwan/Diyala valley's role as a communication corridor or thoroughfare for marching armies and traders, a third centres the predominantly negative ideological construction of transitional and highland landscapes and populations by Bronze Age and later Mesopotamian sources; and a fourth builds on anachronistic assumptions that pastoral nomadism presents a particularly effective and, therefore, ancient adaptation to the region's environmental conditions.

The Qala Sherwana is a source of cultural pride among the inhabitants of Kalar and the wider region. The castle is unique in the KRI in its exceptional state of

Figure 1.13 Ruined watchtower on the right bank of the Sirwan (cf. Casana and Glatz 2017, Fig. 12b).

preservation and, together with the Erbil citadel, it is one of the most celebrated and publicised tourist attractions, drawing around 100,000 mostly Iraqi visitors each year. It also forms an active part in local cultural life with many families visiting the castle and adjacent park during weekends, while wedding celebrations are regularly held in the leafy park just below the Qala. The regional Newroz (New Year) festival on 21 March takes place at the Qala, attracting thousands of participants. In 2012 and 2013, prior to the most recent Daesh-led outbreak of violence in Iraq, the festival 'Culture of Nations' was held twice at the castle and with participants from different parts of Iraq, neighbouring Iran, north Africa, South America, and Europe. The Qala is built on top of one of the tallest archaeological sites in the Garmian region, whose occupation history spans several millennia. Taking advantage of the height provided by the archaeological mound, the castle visually dominates the fertile plains stretching out to the east and west of the Sirwan, while the mound's antiquity lends it deep historical roots.

Local oral histories ascribe the construction of the Qala to Mohammed pasha Kaikhasro Beg-i-Jaff, a tribal leader under the Ottoman empire between 1866-1874 CE. There are no direct historical records to corroborate this, but a broad later nineteenth century construction is confirmed by nineteenth and twentieth century traveller accounts. Claudius Rich, a British commercial and political agent, who travelled in the region in the early decades of the nineteenth century, reported seeing "a high artificial mound called Shirwaneh" on the banks of the Sirwan river on his march from the Sasanian ruins of "Haoush Kerek" (Hawsh Kuru, SRP156) to the village of Bin Kudreh, but says nothing of a castle.[69] The German geographer, Carl Ritter, a few years later refers to Rich's account in *Die Erdkunde von Asien*, stating the existence of a "curious" artificial mound called "Shiwanah", but he too says nothing of a functioning castle.[70] Ernst Herzfeld on his trip from Kifri to Sarqala, and then to Kalar, by contrast, mentions a castle ("Kal'a-i Shirwana") in his diary entry from 29 May 1923.[71]

The Jaff were one of the largest Kurdish tribal confederacies, whose settlement and grazing rights under the Ottoman empire stretched from Khanaqin to the upland region of Penjwin.[72] The Jaff are said to have wintered around the Qala before migrating to higher altitudes in late spring. Along with other allied and rivalling tribes, at times in opposition to and at others in alliance with, more powerful geopolitical forces, they shaped the complex modern political landscapes of the region; their socio-political organisation and long-distance mobility proving both irksome and an asset to Ottoman and other imperial overlords.[73]

Together with other tribes, the Jaff confederacy is mentioned in the Treaty of Zahab (or Treaty of Qasr-e Shirin), a peace agreement between the Shah of Safavid Persia and the Ottoman Sultan that was concluded

69 Rich (1836, 272-273).
70 Ritter (1840, 417).
71 Herzfeld (1923, 49-51).
72 Rich (1836, 113).
73 Kasaba (2009).

on 17 May 1049 (1639 CE).[74] The treaty was an attempt to settle a series of border disputes between the two empires, including along the Sirwan river. A string of ruined watchtowers on top of gravel terraces overlooking the left bank of the Sirwan line the modern Darbandikhan-Kalar road, and attest to the unsettled nature of this particular borderland (Figure 1.13). A boundary in the modern sense developed in the region only from the mid-twentieth century, however: the line that today demarcates the national sovereignties of Iraq and Iran runs a few kilometres to the east of the river.

It is frequently assumed that this boundary has a deep history, and archaeological data and ancient textual sources that fit this *topos* tend to be privileged over others that may tell different stories of local communities, their lifeways, and interconnections. Potts, for instance, inferred from third millennium BCE textual sources a "deep-seated, mutual hatred and endemic warfare between the populations of Elam and the Zagros, and the cities of Mesopotamia," positing a cultural barrier running along the 600 m above sea-level contour line or the modern Iraq-Iran border from at least the eighth millennium BCE, and continuing well into later periods.[75] Concentrations of late third and early second millennium BCE landscape monuments in the Shakhi Bamu range and near Sarpol-e Zahab, have more recently been suggested to mark one of the oldest political frontiers, following the line of Longitude 45° East.[76]

A second *topos* emphasises the role of the Sirwan/Diyala valley as a communication corridor. The Sirwan/Diyala valley connects central and southern Iraq with the Shahrizor upland plain, and several branches of the Khorasan Highway and the later Silk Routes exited from the western Zagros piedmonts along the river. These paths were traversed by travellers, traders, and raiders together with their merchandise and loot for millennia and are thought to have drawn the interest of Mesopotamian states and empires. The Hamrin basin, which is located just to the south of the SRP research region, was referred to as the 'lock of the land' in ancient Mesopotamian sources.[77] Royal inscriptions and year names of Sargon and Naram-Sin of Akkad, and those of many later lowland rulers detail military interactions with polities in the western Zagros piedmont.[78] These short statements focus attention on macro-historical themes of conquest, destruction, and empire, with the Sirwan valley varyingly emerging as a tempestuous borderland, or a marching route to places of greater strategic or economic interest. Either way, they tell us little about past Sirwan communities, their social and cultural traditions, and historical trajectories.

Coveted by lowland polities since at least the third millennium BCE, the region and its inhabitants along with the rest of the Zagros mountains, have been the subject of intense ideological construction by their lowland neighbours.[79] These representations constitute a third *topos* that is frequently refracted in archaeological and historical accounts of the wider region, and that varyingly intersects with borderland narratives and those of lowland imperial interests already discussed. On occasion it also infuses modern Iraqi politics.[80]

Bronze and Iron Age textual and iconographic sources invariably cast Zagros mountain dwellers as the antithesis of civilised lowland urban life; an archetype that fundamentally underwrote ancient lowland political discourse and identity in the same way in which all imagined geographies help define and differentiate a self from a fascinating, dangerous, desired, but ultimately inferior 'other'.[81] This is most vividly expressed in visual terms on the Naram-Sin Victory Stele (c. 2200 BCE), which celebrates lowland victory over the Lullubi.[82] A later literary text describes highland warriors as only half human with "bodies of 'cave birds', humans with raven faces",[83] while the Gutians, another highland group, are described as "a people who know no inhibitions, with human instincts, but canine intelligence, and monkeys' features".[84]

Third and second millennium BCE lowland texts also provide some insights into how lowland Mesopotamian powers assessed the socio-political organisation of their highland neighbours. Some of these are described using Mesopotamian institutional titles, which convey a sense of socio-cultural equivalence that is, however, not always borne out by the archaeological record as we discuss in Chapters 5, 11, and 13 in more detail. Most importantly perhaps, the patchy chronological coverage of lowland texts invites anachronistic interpretations of local societies, obfuscating long-term local change and development, as well as undue analogy.

From the 1970s onwards, for instance, and influenced by nineteenth and early twentieth century CE accounts of the nomadic tribes that roamed the Sirwan/Diyala valley and adjacent uplands, prehistoric, Bronze and Iron Age piedmont communities too were imagined as pastoral nomads, despite ample evidence that most societies in Southwest Asia practiced mixed agropastoral economies and fairly

74 For a recent discussion, see e.g. Ateş (2019).
75 Potts (1982, 35); also referred to in Hole (1987).
76 Alibaigi *et al.* (2020).
77 Steinkeller (1981, 163, with references).
78 For a recent summary, see e.g. Altaweel *et al.* (2012).
79 Michalowski (1986).
80 Ahmed (2018).
81 *Sensu* Said (1978).
82 Winter (1999); Bahrani (2008, 101-114).
83 Mitto (2022).
84 Cooper (1983, II. 142-163).

sedentary lifestyles.[85] This presents a fourth recurrent *topos* that intersects with notions of timelessness or the absence of historic change in landscapes and communities constructed as marginal or rural in core-centric narratives.[86] Landscapes that are little known archaeologically are especially prone to being interpreted in this way.

All landscapes and societies, of course, are in constant flux. Over the course of the twentieth century CE, the long-distance nomadism that had played such a significant role in the region's more recent history, and that has had such a profound influence on archaeological and historical storytelling, became increasingly curtailed by the introduction of strictly controlled national borders such as the one eventually birthed by the Zahab Treaty, and by a range of sedentarisation measures implemented by governments across Southwest Asia.[87] The home of the Garmian Heritage Museum, the Qala Sherwana today commemorates this way of life with a small ethnographic collection of around 400 artefacts and historic photographs. These provide glimpses of Kalari life and urban development over the course of the last century, during which the lives of its inhabitants were transformed dramatically not only by changes in subsistence practices, but by wars, forced resettlement, and dictatorship. The castle too was damaged, rebuilt, and modified by these events and processes on several occasions.

1.4 History of archaeological research

The SRP is the first systematic archaeological research project in the lower Sirwan region, which, compared to neighbouring areas such as the Shahrizor plain or the Hamrin, had seen limited previous archaeological work. While the most prominent sites in the region were evidently known to local communities, the earliest descriptions of sites of archaeological interest in the study region are found in nineteenth and early twentieth century CE traveller accounts. We have already discussed the repeated mentions of the Qala Sherwana mound and castle (SRP001). The Sasanian sites of Hawsh Kuru (SRP156) and Qasr-e Shirin across the border in western Iran were also mentioned by Claudius Rich,[88] Carl Ritter,[89] and Ernst Herzfeld.[90] Henry Rawlinson documented the Bronze Age rock relief at Darband-i Belula in 1836, and noted a series of nearby ruins, including a fortress of "great strength" tucked away under the peak of Sartak in a mountain gorge (Qalay Yazdajurd, SRP136), and a cemetery near the village of Shaikhan with cupolaed tombs (SRP145).[91]

C.J. Edmonds also visited the Darband-i Belula relief.[92] On his second visit to the region in 1927, he was invited to spend the night in the camp of Usman Beg, the chief of the Sharaf Baiani tribe, at Tappa Qalandar (Tepe Qalandari, SRP143) which overlooks the Hawasan river. Edmonds also described a raised causeway leading to "Haurain" (Qala Horen, SRP112), "an ancient ruined city."[93] In the Sartak gorge, he came across a boulder carved with nine ibex motifs, which he ascribed, alongside the Darband-i Belula and Darband-i Gawr reliefs, to the Lullu/Lullubi. The SRP was unable to locate the carvings described by Edmonds, which a local resident informed us had been destroyed during the construction of the road through the gorge, but we were shown another boulder located just above the stream on the southern end of the Sartak gorge with similar ibex carvings (SRP135). In the southern part of the study area, Claudius Rich passed by the site of "Kalan Teppesi" (Tepe Kalan, SRP018), which he described as a tall square mound, with a smaller mound adjoining it and that he thought looked like a Babylonian temple.[94]

From the 1940s onwards, the State Board of Antiquities and Heritage (SBAH) documented around one hundred of the most prominent ruins, mounded sites, as well as a cave along the course of the lower Sirwan and its tributaries, which are published in the *Atlas of Archaeological Sites in Iraq*.[95] This was followed by an as yet unpublished University of Baghdad excavation at Qala Sherwana in the 1960s. More recent Iraqi research in the lower Sirwan valley include excavations at the Neolithic and Chalcolithic site of Tepe Rahim (SRP182)[96] and a series of rescue excavations by the Garmian Department of Antiquities, including a Parthian period site in the town centre of Kalar.

Thus, with only a handful of the most prominent and locally well-known archaeological sites recorded until recently, and an even smaller number investigated systematically, the lower Sirwan region has tended to appear as a blank spot on historical maps; a perfect *tabula rasa* where the hypothetical homelands of little known piedmont and highland groups such as the Lullubi and Simmureans, the Kassites, and sometimes also the Gutians, are freely moved around on the sand table of historical geography, and where conventional *topoi*, such as those outlined above, pass as history.

85 For extensive critiques, see Potts (2014b) and Arbuckle and Hammer (2019).
86 Van Oyen (2019).
87 Thevenin (2011).
88 Rich (1836).
89 Ritter (1840).
90 Herzfeld (1968; 1923).
91 Rawlinson (1839, 31).
92 Edmonds (1966, 159-160).
93 Edmonds (1928, 162).
94 Rich (1836, 276).
95 Iraqi Directorate General of Antiquities (1976).
96 Ramiz (2014).

1.5 Research themes and approaches

The central research objective of the SRP since its inception in 2013 has been to move beyond the above *topoi* and their predominantly external and state-centric perspectives, and to develop instead an in-depth, archaeological understanding of the nature of the region's past communities, their cultural and economic practices, the modes of socio-political organisation they developed, adopted, and rejected, and their long-term developments. To achieve this, the SRP employs a tri-scalar field methodology, which is conceptually anchored in a practice-centred framework.

Communities emerge from what people do. Cycles of socio-cultural reproduction rely on the teaching and learning of particular ways of doing, often through non-discursive, embodied experiences, as well as their discursive rationalisations in culture-specific frameworks of meaning.[97] Resulting communities of practice have been shown to share a strong sense of belonging that is embedded in, and emerges from, the acquisition and practice of specific technological skills and choices, which tend to persist over the medium-to-long term. A broad, practice-centred conceptual framework provides us with a heuristic toolkit to approach the iterative (re-)production of local communities in the lower Sirwan valley, and to begin to trace their relationships with surrounding regions at a range of spatial scales and across different temporal frames in four broad interlocking areas of practice. They include (1) settlement practices, and (2) livelihoods, the economic practices that local communities engaged in, and the foods and other necessities they produced and procured in the context of prevailing environmental and climatic conditions, (3) the local and larger-scale cultural worlds that lower Sirwan communities chose to participate in, and (4) the socio-political landscapes that emerged in different periods from local practices and choices, and their intersections with external political forces.

During the first phase of regional-scale fieldwork, the project focused on maximising the identification of archaeological sites and features in what is a very large research region, and a comparatively unknown archaeological landscape. The SRP survey team, therefore, employed a combination of satellite and aerial imagery-based remote sensing techniques with extensive, site-centred field-survey.[98] An initial round of remote sensing in 2013 identified c. 600 locales of archaeological interest in the SRP survey region,[99] about one third of which have by now been visited and confirmed as archaeological sites. Field-survey involves the collection of surface artefacts, mainly diagnostic pottery and lithics, the measurement of surface bricks, as well as the mapping of main site features, the collection of UAV-based aerial imagery, and the post-field integration of collected data into a Geographic Information System (GIS). More intensive off-site fieldwalking as well as the systematic exploration of landscape features that may be classified as natural places,[100] form a central focus of the second and still ongoing phase of SRP regional research. This will mitigate the inevitable biases inherent in remote sensing and site-centred approaches and will allow us to gain a more in-depth understanding of past landscapes beyond settlement sites.

Of the 230 sites surveyed to date, a small sample has been more intensively investigated through magnetic gradiometer surveys and test soundings. The latter produced stratified ceramic assemblages, faunal and archaeobotanical samples, as well as radiocarbon and OSL dates, which provide an intermediate spatial and temporal resolution that has aided the dating of surface collections. The interpretation of surface finds has remained nonetheless challenging. In order to be as transparent as possible about the emergent nature of our understanding of long-term, micro-regional cultural traditions and developments, we present surface assemblages, both pottery and chipped stone, in as much detail as possible in this volume. Due to the still incomplete nature of our knowledge of most prehistoric, Bronze and Iron Age cultural traditions in the lower Sirwan region and their temporal interrelations, we – for now at least, and with the exception of the extensively documented Late Bronze Age ceramic sequence from Kani Masi (SRP046) – eschew the use of type fossils and the construction of typologies for the dating of SRP survey assemblages. We also present finds that we have struggled to date, in the hope that future researchers will be able to date and interpret them more accurately.

Two sites, whose respective occupations span critical phases of socio-political development and associated highland-lowland interactions in the fourth and second millennia BCE, have been explored in detail, using a combination of extensive magnetic gradiometer surveys, surface mapping using UAV-derived imagery, and large-scale excavations. Between 2016 and 2019, the excavations at the site cluster of Kani Masi produced evidence for a Middle Bronze I village at SRP094, and an adjacent contemporary burial ground (SRP189, Chapter 5.3), as well as several large structures and craft production areas at SRP046 dating to the Late Bronze and Early Iron Ages (Chapters 6-10). Work at a second location, Shakhi Kora (SRP191), which dates to the fourth millennium BCE, began in 2019 and is currently still ongoing (Chapter 3.2).

97 Lave and Wenger (1991); Wenger (1998); Gosselain (2000).

98 Wilkinson and Tucker (1995); Wilkinson (2003).

99 Casana and Glatz (2017, 52).

100 Bradley (2000).

Excavations at these sites employ the Locus-lot recording system, and involve the collection of the standard suite of artefactual, botanical, and zooarchaeological data, and their analysis using a wide range of archaeological, Assyriological, art historical, and archaeometric methods, from radiography for the reconstruction of ceramic *chaînes opératoires*, and organic residue analysis of pottery, to stable isotope analyses of bone collagen and sequential tooth enamel samples in order to reconstruct local lifeways, from subsistence and food practices to ritual behaviours and mobility patterns, in as much detail as possible. These methods are discussed in detail at appropriate points in subsequent chapters, and in the relevant appendices.

Dates BCE*	Period
18,000-10,000	Epipalaeolithic
11,000-9800	Late Epipalaeolithic to Early Neolithic Transition
9800-7000	Early Neolithic/Pre-Pottery Neolithic
7000-5200	Late Neolithic/Pottery Neolithic
5200-4400	Early-to-Middle Chalcolithic
4400-3200	Late Chalcolithic
3200-2000	Early Bronze Age
2000-1600	Middle Bronze Age
1600-1150	Late Bronze Age
1150-300	Iron Age

Table 1.1 Chronological overview of material covered in this volume. * Where appropriate, dates provided follow the Middle Chronology.

1.6 Scope and structure of the book

In the chapters that follow, we present and analyse the results of SRP regional and site-based research as they pertain to the early history of the lower Sirwan region from the later Epipalaeolithic to the Iron Age (c. 13,000-300 BCE, Table 1.1). While organised along chronological lines, the book integrates all available strands of regional and site-scale data and their associated disciplinary expertises to address the project's central research themes. Our collective and collaborative approach to knowledge creation and interpretation is reflected in the multi-author monograph format, and the deeper understandings and thicker, empirically-grounded narratives of the Sirwan region's past that the breaking down of sub-disciplinary silos and publication conventions has allowed us to develop. This format also allows us to acknowledge a wider-than-usual range of contributions to the project.

In the following Chapter 2, we present the earliest evidence for human presence in the lower Sirwan region starting with an as yet ephemeral later Epipalaeolithic presence in the cave of Ashkawti Manga Wakal (SRP181). We then move to analyse the more substantial regional and site-based data for Neolithic and Early-to-Middle Chalcolithic settlement and subsistence practices, and examine the extent to which lower Sirwan communities participated in supra-regional cultural phenomena such as the Hassuna, Halaf, and Ubaid traditions.

In Chapter 3, we investigate local cultural practices and modes of social organisation during the Late Chalcolithic, and their interplay with lowland Mesopotamian expansionism at the site of Shakhi Kora (SRP191), the current and ongoing focus of SRP excavations, and through regional survey data. In Chapter 4, we chart the decline or rejection of Late Chalcolithic centralising institutions in the final fourth millennium BCE, and the return to small-scale and dispersed settlement practices in the following centuries.

Starting in the later third millennium BCE, Mesopotamian textual sources document lowland military ventures into the western Zagros piedmont zone and attempts to exert political control over upland societies. As a result, upland elites become increasingly visible in Mesopotamian sources, and make their appearance in local texts and monuments. Contrasting with this picture of increased piedmont socio-political integration, the archaeological record of the early second millennium BCE in the lower Sirwan region, which we detail in Chapter 5, points to landscapes overwhelmingly populated by small to very small sites and shallow spatial hierarchies. The village and adjacent burial ground of SRP094 and SRP189, which we excavated from 2017-2019, are characteristic of this Middle Bronze I settlement practice.

SRP research between 2016 and 2019 focused almost exclusively on the excavation of the Late Bronze Age and Early Iron Age component of the Kani Masi site cluster (SRP046), which shows close cultural connections with Middle Babylonian or Kassite sites in central and southern Mesopotamia. In Chapter 6, we introduce the excavation areas of SRP046 and propose a site-wide stratigraphic sequence. The site's ceramic typology is presented in Chapter 7, alongside a detailed analysis of local potting *chaînes opératoires*. In Chapter 8, we weave together contextual and artefactual information with the results of archaeobotanical, zooarchaeological, and stable isotope analyses to identify and characterise locales of food production, to define local practices of provisioning and food preparation, and what these reveal about intra-site social distinction and hierarchy, as well as wider cultural ties and identities. In Chapter 9 we analyse a series of interrelated depositional practices associated with ritual behaviours, including burials, large-scale feasting events and building closures, and subsequent commemorative acts, which provide us with insights into local cosmology and cultural identity, as well as the ways in which Kani Masi's inhabitants reproduced their community at the local and regional scale. Chapter 10 presents evidence for on-site administrative technologies and practices, while Chapter 11 places the excavation results from Kani Masi into a wider regional context.

Over the past six years, a major concern for the SRP has been to support our Kurdish collaborators and team-members in developing local infrastructure and capacity, as well as to make archaeological knowledge of the region more widely accessible. In Chapter 12 we present a summary of this work as it pertains to Kalar and surrounding areas.

In the final Chapter 13, we synthesise project results and return to our main research themes. The patterns that emerge from SRP's multi-scalar and long-term approach not only challenge standard historical narratives of the wider region, but also question prevalent conceptualisations of what it means to be resilient in the face of changing environmental and political conditions.

2

Prehistoric Sirwan Landscapes

2.1 Introduction

The central western Zagros piedmonts on either side of the Iraq-Iran border are an enormously rich source of information for prehistoric societies and landscapes (Table 2.1). Starting in the middle of the last century, archaeological research in the KRI produced critical new insights into Neanderthal communities and their social and ritual worlds at Shanidar cave,[1] as well as into those of Upper and Epipalaeolithic hunter-forager societies at Shanidar cave, Zawi Chemi Shanidar,[2] Zarzi,[3] Palegawra,[4] and Karim Shahir.[5] The region also played a central role in the Neolithic Transition, the millennia-long processes during which hunter-forager groups adopted increasingly sedentary lifestyles and began to rely on herding and farming for their subsistence. In the eastern Fertile Crescent, these processes are first attested at highland sites in Iran, such as at Sheikh-e Abad,[6] Ganj Dareh[7] and Abdul Hosein, and a little later at increasingly permanent piedmont settlements such as at Jarmo[8] across the border in Iraq.

The last fifteen years of intensive archaeological fieldwork in the western Zagros piedmont zone have added significant new knowledge to our understanding of prehistoric societies in the eastern Fertile Crescent. Ongoing regional surveys are providing a new landscape-scale understanding of Late Pleistocene and early-to-mid Holocene human presence, settlement, and land-use,[9] while excavations at Epipalaeolithic[10] and Early Neolithic[11] sites are shedding a detailed light on the practices of hunter-foragers and early sedentary communities and their interaction networks. Investigations at Late Neolithic Shakar Tepe[12] and Qalat Said Ahmadan,[13] and at Remremeh in the Mehran plain of western Iran,[14] as well as at Late Neolithic and Chalcolithic Tepe Marani and

1 Trinkaus (1983); Pomeroy *et al.* (2017; 2020).
2 Solecki (1981); Solecki *et al.* (2004).
3 Garrod (1930); Wahida (1981); Olszewski (2012); Jayez *et al.* (2019).
4 Braidwood and Howe (1960); Turnbull and Reed (1974).
5 Howe (1983).
6 Matthews *et al.* (2013a); Darabi (2015, 64-67).
7 Smith (1990); Darabi (2015, 31-37); Darabi *et al.* (2019).
8 Braidwood and Howe (1960); Braidwood *et al.* (1983).
9 Altaweel *et al.* (2012); Conati Barbaro *et al.* (2019); Dadaneh *et al.* (2019a); Tsuneki *et al.* (2019); Alibaigi and Salimiyan (2020); Ur *et al.* (2021).
10 Asouti *et al.* (2020).
11 Matthews *et al.* (2020a).
12 Odaka *et al.* (2020).
13 Tsuneki *et al.* (2015).
14 Darabi *et al.* (2020).

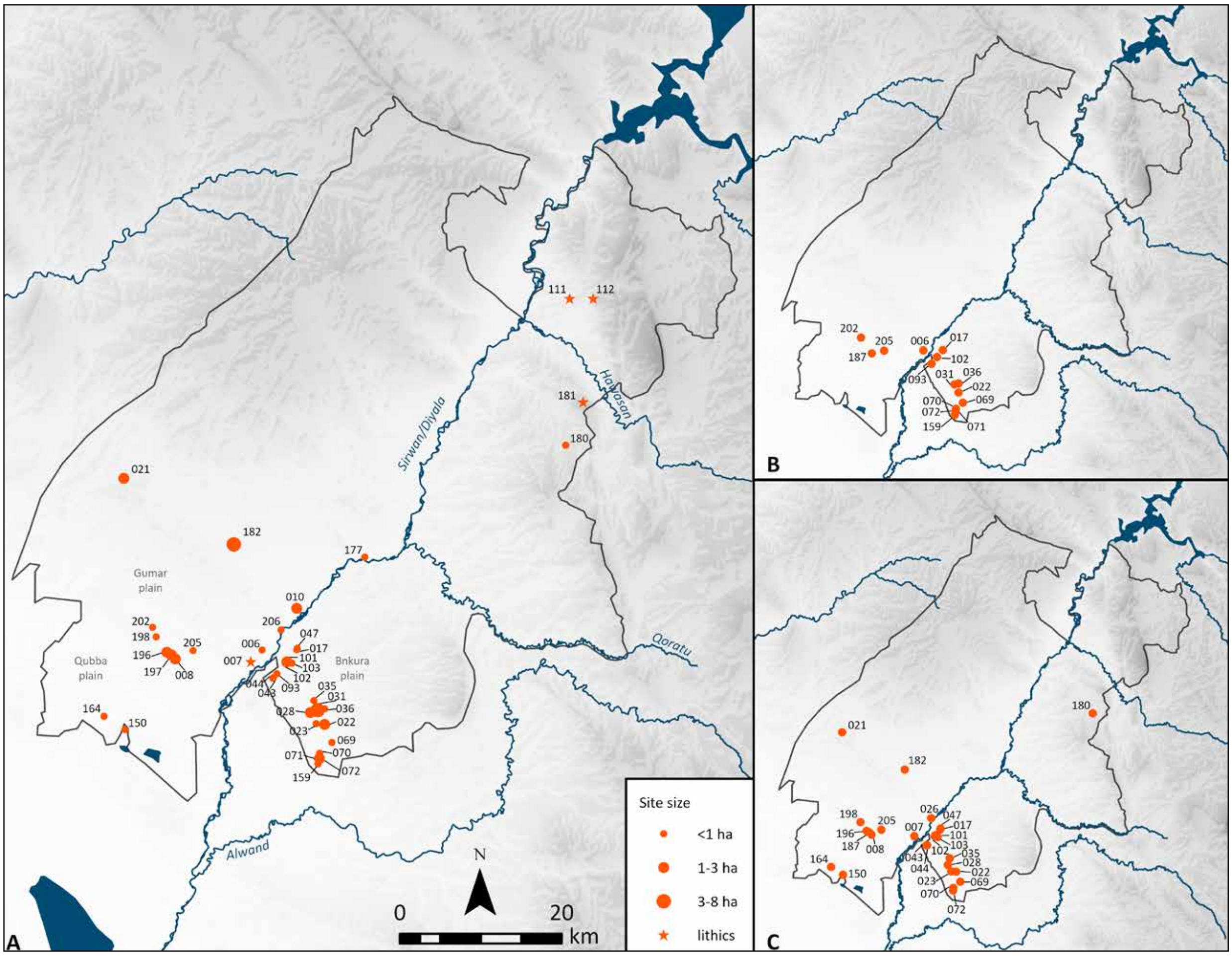


Figure 2.1 Map of prehistoric sites in the lower Sirwan region: A) all periods, B) Hassuna, and C) Halaf and Ubaid (DEM GTOPO30 ©USGS).

Dates BCE	Period
18,000-10,000	Epipalaeolithic
11,000-9800	Late Epipalaeolithic to Early Neolithic Transition
9800-7000	Early Neolithic/Pre-Pottery Neolithic
7000-5200	Late Neolithic/Pottery Neolithic
6700-5900	Hassuna
6150-4800	Hassuna/Samarra-Samarra/CMT
6100-5200	Halaf
5900-5200	Ubaid 1-2
5500-5200	Halaf-Ubaid Transition
5200-4400	Ubaid 3-4
4400-4200	Ubaid 5/LC1

Table 2.1 Periods and their approximate dates discussed in this chapter.

Gurga Chiya,[15] Kani Shaie,[16] Logardan,[17] Banahilk,[18] and Surezha[19] have begun to produce comprehensive portraits of local communities that reveal the varying degrees of interest and intensity with which different settlements and regions participated in the large-scale cultural phenomena known as the Hassuna, Samarra, Halaf, Ubaid, and Dalma horizons.

The results of SRP survey and test-soundings in the lower Sirwan region add a further regional perspective to this emerging tapestry of prehistoric lifeways (Figure 2.1, Table 2.2). The data presented in this chapter shed new light on the communities, who made the Sirwan region their home from the Epipalaeolithic to the Early-to-Middle Chalcolithic, their cultural practices,

15 Wengrow *et al.* (2016); Carter *et al.* (2020).
16 Renette *et al.* (2021).
17 Vallet *et al.* (2019).
18 Gómez-Bach *et al.* (2019).
19 Alden *et al.* (2021); Minc *et al.* (2021).

Site	PPN	HAS	SAM	HAL	UBA	LITH	Site	PAL	PPN	HAS	SAM	HAL	UBA	LITH
SRP006		x					SRP093			x				
SRP007					x	NEO-CHA	SRP101					x		
SRP008					x		SRP102			x	x		x	
SRP010	x					PPN	SRP103						x	
SRP017		x			x		SRP111							CHA-BA
SRP021				x	x		SRP112							NEO-BA
SRP022		x		x	x		SRP150					x		
SRP023				x			SRP159			x				
SRP028			x	x	x	NEO-IA	SRP164						x	
SRP031		x					SRP177		x					PPN
SRP035				x	x		SRP180						x	
SRP036		x				NEO-IA	SRP181	x						
SRP043				x			SRP182					x		
SRP044			x	x	x		SRP187			x		x		NEO-BA
SRP047					x		SRP196					x	x	NEO-LC
SRP069		x		x		NEO-BA	SRP198				x	x	x	NEO-LC
SRP070		x			x		SRP202			x	x			
SRP071		x	x				SRP205			x			x	NEO-BA
SRP072		x			x		SRP206					x		

Table 2.2 Prehistoric sites in the lower Sirwan region (see also Appendix I).

and the ways in which they negotiated their positions within shifting highland-lowland relationships during the spread of sedentary lifeways, agriculture, new social models, and cultural networks.

2.2 Epipalaeolithic

The earliest, albeit tenuous, evidence for human presence in the wider Sirwan region comes from the cave site of Ashkawti Manga Wakal (SRP181), which is located in the Shawal Dra hill range and overlooks a small upland plain through which the Goma Bahri stream flows to the south of the Hawasan valley. Surface collections in the entrance chamber and from the area surrounding the mouth of the cave produced evidence for long-term human use (see also Chapters 4.2-3 and 5.4.2.3). A collection of worked lithics and a radiocarbon date from a brecciated charcoal fragment date the currently earliest evidence for human presence at the cave to the later Epipalaeolithic (Figure 2.2).

Breccia form where carbonite-rich water flows over and seeps into archaeological deposits and cements them *in situ*.[20] In the case of Ashkawti Manga Wakal, breccia deposits containing cultural material were found above the current surface of the cave. This suggests that contemporary lateral deposits may have partially or completely eroded.[21] A charcoal sample taken from an *in situ* breccia deposit, which also included chipped stone and bone fragments, produced a radiocarbon date range between 13,371-12,847 cal. BCE (see also Appendix II.1).

The collected surface lithic artefacts have been significantly altered by patinae, corrosion, and concretions, which make it difficult to identify the raw materials used, and their fragmented state further impedes a confident identification of chronologically diagnostic technical traits. However, two distal fragments of flakes with centripetal removals and remains of a core platform showing traces of preparation do point to rather early production (Figure 2.2.D.1 and 5). A mesial blade-like item (Figure 2.2.D.2), moreover, would suggest a lithic production coherent with the radiocarbon date.

This early use of Ashkawti Manga Wakal appears to broadly fall into the so-called Bølling-Allerød Interstadial (c. 15,000-13,000 BP), a climatic interval during which warmer and wetter conditions replaced the arid and cold conditions of the late Pleistocene, when snow lines were lowered,[22] and steppe and semi-desert vegetation such

20 Dominguez-Bella *et al.* (2012).

21 For a wider discussion, see e.g. O'Connor *et al.* (2017).

22 Wright (1962; 1983).

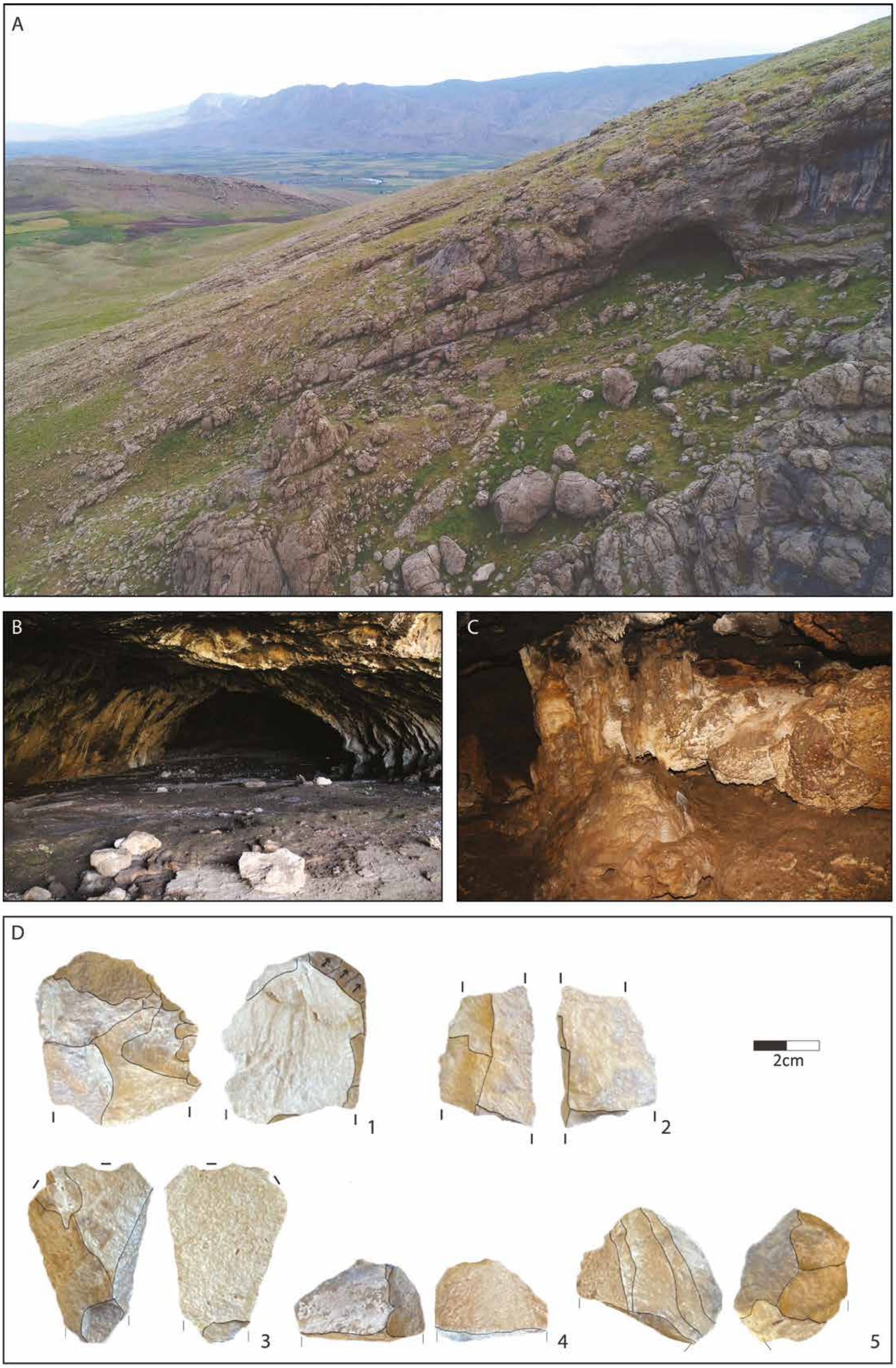


Figure 2.2 Ashkawti Manga Wakal (SRP181): A) wider landscape setting, B) cave entrance, C) cave interior, D) surface chipped stone assemblage.

as *Chenopodiaceae* and *Artemisia* prevailed.[23] During the Bølling-Allerød Interstadial, lake core data from Mirabad and Zeribar register the spread of grasses and trees to arid steppe and upland zones (see Chapter 1.2). This was followed by a millennium-long cold and dry snap, the Younger Dryas (c. 12,900-11,700 BP), which brought the return of *Artemisia-Chenopodiaceae* steppe vegetation across the region. The Younger Dryas has traditionally been assumed to have led to the abandonment of many sites in the Zagros uplands. More recent work, however, has shown that these colder and drier conditions would have had more limited negative effects on the subsistence economies of Zagros communities, which focused on wild goat, legumes, nuts, and fruits rather than cereal grains.[24]

Climatic conditions improved again from 9600 BCE, which saw the return of grasses and the spread of almond and pistachio trees across the region, followed later by oak. Geological cores taken on the Shahrizor plain paint a picture of early-to-mid Holocene environments consisting of grasslands, woodlands, marshes, and riparian galleried forests, interspersed with patches of arable Holocene alluvial soils.[25] Pleistocene terraces also would have supported dry cultivation, and formed preferred locales for Neolithic and Chalcolithic settlement.[26] While detailed environmental work has as yet to be carried out in the SRP research region, the lower Sirwan valley would have offered Neolithic and Chalcolithic societies a broadly similar patchwork of ecological niches, albeit with a somewhat greater uncertainty regarding annual precipitation and somewhat higher temperatures.

2.3 Early Neolithic

Coinciding broadly with the start of the Holocene, stratigraphic sequences from sites in the western Zagros highlands indicate the development of increasingly place-bound communities. The Early Neolithic highland site of Sheikh-e Abad in the Dinavar plain of west-central Iran, for instance, produced a c. 10 m deep stratigraphic sequence, which commences around 9800 BCE with ash layers containing lithic, bone and charred plant remains, followed by hardened working surfaces, covered in ash, debris and fire-cracked stones, and culminating in the construction of rammed earth architecture on the mound's summit around 7600 BCE.[27] Zooarchaeological data from Ganj Dareh and Abdul Hosein suggest that the processes leading to the domestication of wild goats were well underway in the late ninth and early eighth millennium BCE.[28] The cultivation of domesticated cereals such as two-row barley, emmer wheat, and lentils is attested from around 8000 BCE at Chogha Golan and East Chia Sabz.[29]

The earliest excavated Neolithic site in the Iraqi Zagros piedmont to date is the small low mound of Bestansur in the north-eastern part of the Shahrizor plain.[30] Bestansur's Neolithic inhabitants constructed rectangular mudbrick buildings, whose spatial organisation may point to community-wide planning and co-operation on the one hand, and to the existence of discrete households on the other.[31] The remains of more than 65 individuals, mainly juveniles, interred in one of the buildings in a mix of primary and secondary burials as well as evidence of skull caching, provide a glimpse of a complex social world and its ritual mediation. Ruminant dung and omnivore coprolites across the settlement suggest that the inhabitants of Bestansur lived in close proximity with wild goats, pigs and sheep, while also hunting large and small game, consuming land snails, fresh water fish and crab, and cultivating cereal crops and lentils. The chipped stone tools from Bestansur comprise mainly blades and bladelets, produced from bullet cores of locally available cherts, using the pressure technique, while obsidian, mainly from the Nemrut Dağ source, makes up about a quarter of the lithic industry.[32]

Lithic surface assemblages from two sites in the SRP survey area find close comparisons in the Early Neolithic laminar traditions of the western Zagros piedmont zone, including those at Bestansur, Shemshara,[33] and Jarmo.[34] They also compare well to Early M'lefaatian sites in western Iran,[35] including Ganj Dareh,[36] East Chia Sabz,[37] Ali Kosh,[38] Rahmatabad,[39] and the Tang-e Bolaghi caves.[40] Technological similarities as well as shared chert raw material sources, suggest the presence of similar Early Neolithic communities along the lower Sirwan.

The largest Early Neolithic chipped stone assemblage from the SRP survey region to date comes from the site of Grda Gozina (SRP010), a c. 1.4 ha large mound, which is surrounded by a modern village and located close to the right bank of the Sirwan (Figure 2.3, Appendix III). The

23 Stevens *et al.* (2001).
24 Arranz-Otaegui *et al.* (2016); Riehl (2016) cf. Matthews and Fazeli Nashli (2022, 58).
25 Marsh *et al.* (2018).
26 Altaweel *et al.* (2012, 4-8); Wengrow *et al.* (2016).
27 Matthews *et al.* (2013b).
28 Zeder and Hesse (2000); Daly *et al.* (2021).
29 Riehl *et al.* (2012; 2013).
30 Matthews *et al.* (2019; 2020a).
31 Matthews *et al.* (2019, 22).
32 Ibid., 24.
33 Matthews *et al.* (2020b).
34 Braidwood *et al.* (1983).
35 Nishiaki and Darabi (2018).
36 Nishiaki (2016).
37 Nishiaki and Darabi (2018).
38 Darabi *et al.* (2018).
39 Abe and Kharanaghi (2014).
40 Tsuneki and Zeidi (2008).

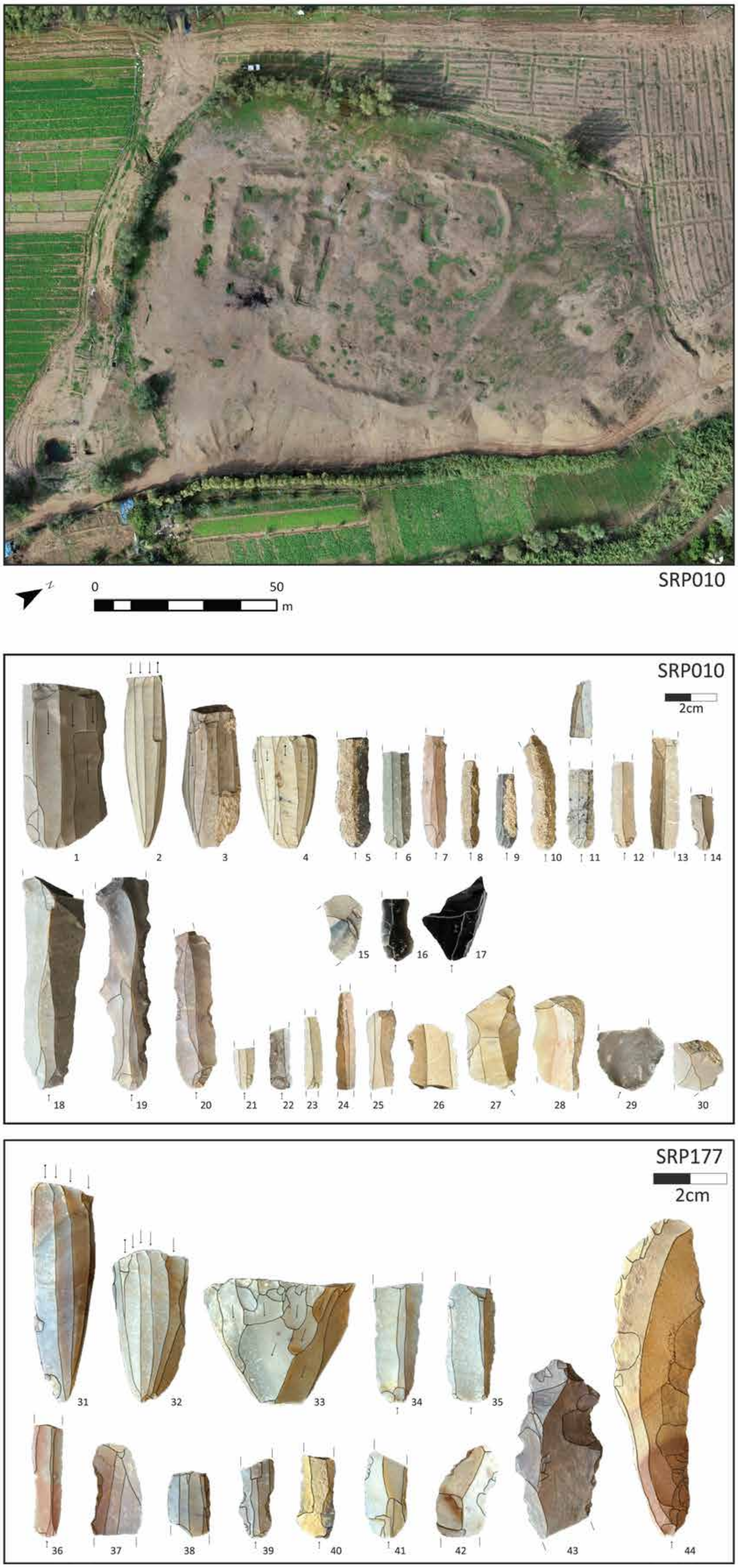


Figure 2.3 Orthophoto of Grda Gozina (SRP010) and chipped stone assemblages from Grda Gozina (SRP010) and SRP177.

main occupation at the site dates from the late Parthian to the early Islamic period, but a steep section cut on the eastern side of the mound exposed substantial Early Neolithic occupation layers. A total of 31 chipped stone artefacts were collected, including 20 blades and bladelets realised on chert raw materials (Figure 2.3.5-14, 18-26). One artefact is an obsidian proximal bladelet fragment (Figure 2.3.16), while four blade cores (Figure 2.3.1-4) and six flakes are also attested (Figure 2.3.15, 17, 26-30).

Based on their macroscopic features (colour, translucence, structure, cortex/neocortex features), attested cherts can be subdivided into five main varieties: (1) light-grey opaque spotted, (2) dark-grey opaque spotted, (3) dark-grey opaque shaded-mottled, (4) light-grey translucent spotted, and (5) light-to-dark grey opaque shaded-spotted. Varieties 2 and 3 are locally available as river pebbles. Varieties 1 and 4 are well-represented in the lithic assemblage of Bestansur, and likely derive from Cretaceous units exposed in Penjwin, Sargat, and Dokan,[41] some 100-150 km to the north and northeast of the SRP sites. Variety 5 shows the well-known macroscopic features of the dolomitic chert from the Pila Spi Formation,[42] which dates to the mid-upper Eocene[43] and is well-exposed in the Qara Dagh and Kolosh anticlines.[44]

Blades from Grda Gozina include chert raw material varieties 1 and 4 as well as brownish opaque spotted, brownish opaque mottled, and light-grey opaque spotted cherts. Other chert raw materials, which were collected from secondary outcrops are attested exclusively on flakes. It is worth highlighting the regularity of the blade items that exhibit trapezoidal or triangular sections and parallel unidirectional previous removals on their dorsal surfaces. Most of these blades have their proximal portions preserved and small (or punctiform) butts associated with overhang abrasion. These features are consistent with the adoption of the pressure technique for the most regular items (Figure 2.3.5-13, 21-24), and direct or indirect percussion for the less regular ones (Figure 2.3.14, 18-20, 25). Three almost complete items and a mesial fragment exceed the range of width measured on most of the blades, and their irregularity points to percussion techniques (Figure 2.3.18-20). Four cores attest *in situ* production of bladelets, which is also confirmed by the presence of a crested item. All but one core are of the bullet type (Figure 2.3.2-4), which is associated with the production of small, regular, and pointed bladelets. The remaining core was used to produce wider blades with flat terminations (Figure 2.3.1).

41 Matthews *et al.* (2020b).
42 Moscone *et al.* (2020).
43 Kadhim and Hussein (2016).
44 Sissakian and Fouad (2016).

A second Early Neolithic site is SRP177, which presents a small artefact scatter on a high gravel terrace overlooking the Sirwan river between Kalar and the village of Tazade. A total of 14 chipped stone artefacts were collected from SRP177, including two bullet cores (Figure 2.3.31-32), one flake (Figure 2.3.43), four unretouched blades (Fig. 2.3.34-36, 40), and seven retouched blades and flakes (Figure 2.3.37-39, 41-44). The entire assemblage has been realised on chert raw materials, in particular a light-grey opaque streaked and banded, and a light-grey opaque spotted variety. The assemblage was mainly produced through pressure-flaking. The remaining part of the blade assemblage is represented by surface maintenance items and bladelets produced by direct or indirect percussion. Retouched items include notched bladelets as well as a large laminar flake with invasive and semi-abrupt retouch on both edges (Figure 2.3.44); all features consistent with an Early Neolithic date.

The two Early Neolithic assemblages from SRP010 and SRP177 suggest that the lower Sirwan region formed part of the initial wave of dispersal of Neolithic herding and cultivation practices from the central Zagros in the course of the eighth millennium BCE. This initial introduction of Neolithic lifeways to the wider piedmont zone may also be attested in the Sarpol-e Zahab region across the border in western Iran, and perhaps also at Rihan III in the Hamrin,[45] and at Tamerkhan in the Mandali area.[46] In turn, the Sirwan and Sarpol-e Zahab regions may have formed part of an important routeway for the movement of materials such as obsidian into the high Zagros.[47]

Many of the Early Neolithic sites in the western Zagros piedmont and upland zones were abandoned in the later eighth millennium BCE. This appears also to have been the case for Grda Gozina (SRP010) and SRP177, neither of which shows signs of a later presence. In surrounding regions, this abandonment phase is followed by the establishment of new settlements at Ali Kosh, Chogha Bonut, Chagha Sefid, and Jarmo,[48] which ring in the Pottery or Late Neolithic.

2.4 Late Neolithic and Early-to-Middle Chalcolithic

Pottery first developed in the western Zagros region during the final eighth and early seventh millennium BCE. Clay was experimented with before then, including as unfired containers built into house floors and walls at the site of Ganj Dareh.[49] The earliest pottery vessels

45 Matthews (2000, 50); Alibaigi and Salimiyan (2020).
46 Oates (1968).
47 Matthews and Fazeli Nashli (2022, 85).
48 Matthews *et al.* (2013c, 233); Flohr *et al.* (2020).
49 Smith (1990, 333).

come from the highland site of Tepe Guran[50] and date to between c. 7100 to 6800 cal. BCE.[51] This earliest pottery has no temper and is only lightly fired. Somewhat later the chaff-tempered Archaic Painted Ware developed, which includes lattice patterns in reddish paint with occasional burnishes, an undecorated Buff Ware, and the Standard Painted Ware. Some of the latter's design elements, especially the so-called Tadpole ware, are found at lower altitude sites such as at Tepe Sarab near Kermanshah,[52] whose earliest Late Neolithic occupation dates to between c. 7000-6400 BCE.[53] Examples of these painted traditions are also attested at Jarmo (Earlier Manifestation),[54] and at six sites in the plains of Zahab, Qaleh Shahin, Beshiveh, and Pa Taq in western Iran.[55]

Despite the relatively close geographical proximity of Jarmo, and the Zahab and Lurestan regions, no unequivocal examples of these early pottery types have been identified in the SRP survey record thus far. This is somewhat surprising given the Early Neolithic presence at Grda Gozina (SRP010) and SRP177, and evidence for continuity in occupation in broadly comparable highland-lowland transitional landscapes elsewhere. At the site of Ali Kosh in the Susiana plain, for instance, which is located around 150 m above sea level and close to the Zagros foothills, an aceramic phase is superseded by a ceramic horizon dating to around 7000 cal. BCE.[56]

Factors that may help explain the absence of evidence for the very early Late Neolithic along the Sirwan and its tributaries include the limited quantity of early pottery at early Late Neolithic sites, light firing, and the fugitive nature of the paint, which tends to disappear on surface sherds.[57] This can be expected to result in limited and heavily abraded surface assemblages that are difficult to identify and date with any certainty. Geomorphic processes, such as erosion and alluviation, will also have affected the surface visibility of especially the earliest phases of human presence.[58] The lack of a definitively datable early ceramic Neolithic may also be related to community or household-scale cultural choices. As Bernbeck recently pointed out, there was a lack of directionality in the development and adoption of ceramic technologies in the western Zagros; a process that was not needs-driven, but characterised by localised play and experimentation with already familiar materials and technologies.[59] Observing the distribution pattern of pottery at Jarmo Operation II, he suggested that pottery technology was not adopted by everyone, and that some members of the Jarmo community may have resisted using it for some time. Similar processes may well have played out in Neolithic communities in the wider piedmont region.

Surface surveys to the north of the SRP research region have also struggled to identify the very early Late Neolithic, with sites associated with Proto-Hassuna and Hassuna traditions more numerous.[60] To the south, Temerkhan in the Mandali-Badra region produced materials related to Jarmo,[61] and small quantities of Hassuna incised sherds were recorded by the lower Diyala survey.[62] Hassuna-related husking trays, alongside Ja'far Plain Ware, Khazineh Red, Sefid and Samarra painted materials are also reported from the site of Remremeh in the Mehran plain in western Iran.[63]

The first Late Neolithic phase that can be identified with confidence in the SRP surface record dates to the later seventh through sixth millennia BCE and is culturally associated with the Hassuna tradition. Samarra-related materials are rare, while later Halaf and especially Ubaid materials are more widely attested.

2.4.1 Hassuna

A total of 15 sites have produced material culture associated with the Hassuna tradition in the SRP research region. All Hassuna-related sites are located in the southern part of the research area, especially the Bnkura and Gumar plains (Figures 2.1.B and 2.4). Lithic scatters in the Hawasan valley indicate activity in upland regions during the Neolithic and Chalcolithic, but no early pottery has been found there as yet.

Late Neolithic occupation at the majority of recorded SRP sites is attested in the form of relatively small ceramic and lithic surface assemblages, with primary phases of occupation dating to later periods.[64] Four sites yielded predominantly Hassuna-related surface finds and limited evidence for subsequent occupation.[65] The latter sites range in size between c. 0.5 and 2.5 ha and, thus, fall into the typical range of Late Neolithic sites in the wider region.

The largest concentration of early Late Neolithic sites, which includes Falah (SRP022), Tapa Musa Osman I (SRP031), Tepe Sirwan (SRP036), Kalay Mira II (SRP069), Mala Kunar I (SRP070), Mala Kunar II (SRP071), and SRP072, is located in the Sawzblagh (Kurdish for 'green

50 Meldgaard *et al.* (1963).
51 Zeder (2006a, Table 14.2).
52 Voigt and Dyson (1992, 157); Darabi (2015, 45-46).
53 Zeder (2006a, Table 14.2).
54 Adams (1983).
55 Alibaigi and Salimiyan (2020).
56 Zeder (2006a, Table 14.2); Darabi (2016).
57 Levine and McDonald (1977, 43).
58 Altaweel *et al.* (2012, 210, Fig. 7).
59 Bernbeck (2017, 205).

60 Altaweel *et al.* (2012, 22, Fig. 10.1-5).
61 Oates (1968, 3-4).
62 Adams (1965, 166).
63 Darabi *et al.* (2020, Fig. 6).
64 SRP006, SRP017, SRP031, SRP069, SRP070, SRP071, SRP072, SRP093, SRP102, SRP159, SRP205.
65 SRP022, SRP036, SRP187, SRP202.

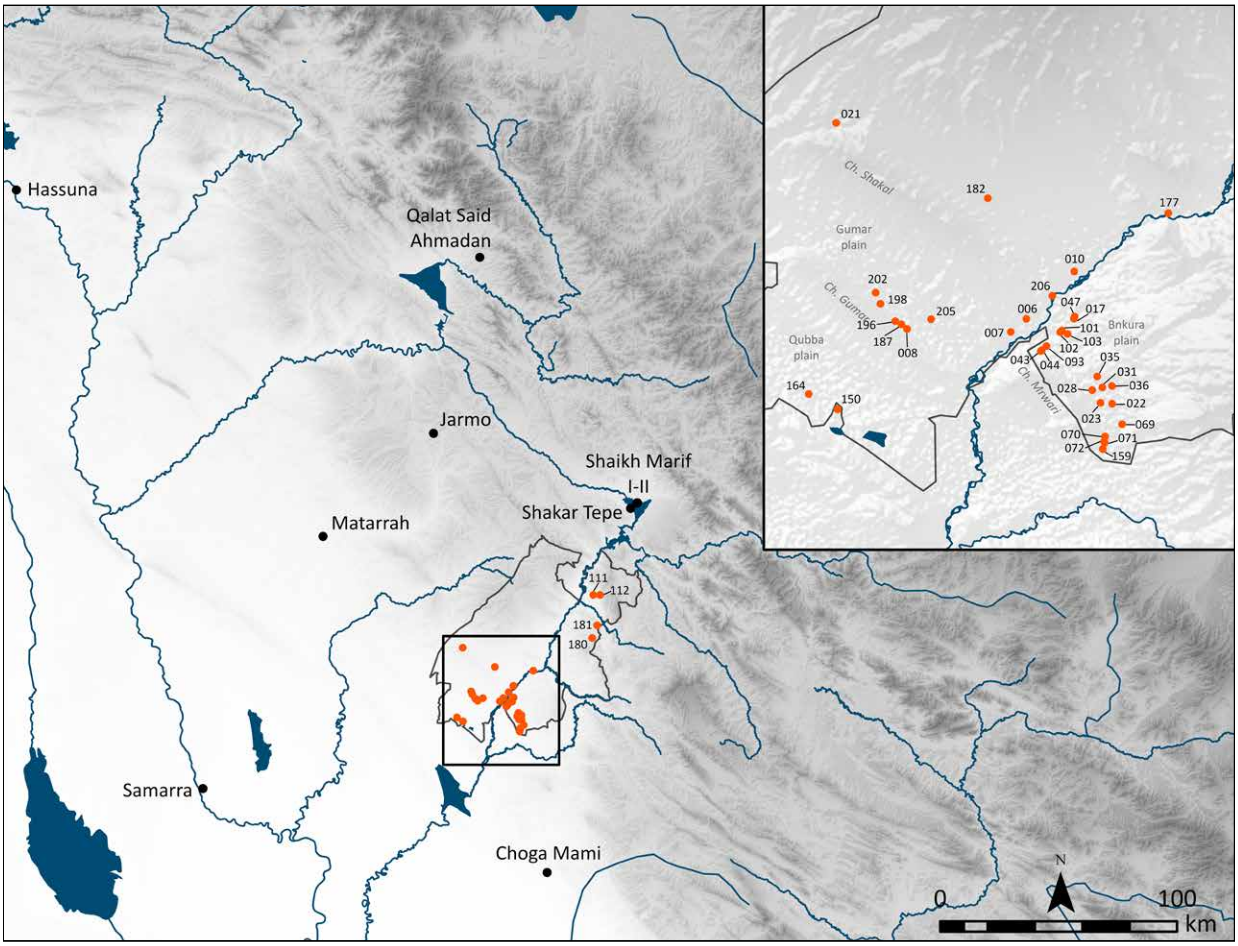


Figure 2.4 Map of Neolithic and Early-to-Middle Chalcolithic sites in the lower Sirwan region (DEM GTOPO30 ©USGS).

springs') area of the Bnkura plain, which is dotted with artesian springs and framed by the Mrwari hill range in the south. The plain slopes gently towards the southeast, with spring water and seasonal streams draining away from the Sirwan. Movement towards Khanaqin and the Alwand river, one of the major tributaries of the Sirwan/Diyala and access route into the west-Iranian uplands, is channelled through a narrow passage at the southern end of the plain. Two Late Neolithic sites, Falah (SRP022) and Tepe Sirwan (SRP036) were investigated more intensively with magnetic gradiometer surveys, and in the case of Tepe Sirwan, systematic surface collections and a 1 × 4 m test sounding.

Tepe Sirwan (SRP036) is a c. 0.9 ha low mound located to the east of the Kalar-Khanaqin road and a modern horticultural enclosure, whose proprietor, Kak Sirwan, offered us shade, tea, and fruit in his garden on several occasions. The site is today surrounded by agricultural fields and is itself partially subject to ploughing (Figure 2.5).

The ceramic assemblage from Tepe Sirwan includes numerous fragments of coarse, chaff-tempered bowl and jar rims with simple flaring necks (Figure 2.6.1-3), as well as large and very coarse vessels with corrugated or pitted inner surfaces, so-called husking trays (Figure 2.6.4-12). A second component of the ceramic assemblage is characterised by markedly finer, mainly mineral-tempered fabrics, which fire white to buff in mostly oxidising conditions. The shapes associated with this finer, mineral-tempered tradition are holemouth jars (Figure 2.6.13-15) and bowls (Figure 2.6.16-40), a large proportion of which feature impressed decorations. The assemblage includes only one painted sherd (Figure 2.6.41). No painted-incised pieces typical of standard Hassuna assemblages were found, nor any Samarra painted wares. Taken together, the Tepe Sirwan assemblage points both to a particular regional variation of the Hassuna tradition and to two chronological phases of occupation.

The coarse, chaff-tempered pottery is characteristic of the mid-to-late seventh millennium BCE, the Proto-Hassuna and Archaic Hassuna phases in north

Figure 2.5 Views of SRP036, SRP022, SRP031, SRP070, SRP071, SRP102, SRP017, and SRP093.

Figure 2.6 Late Neolithic pottery from Tepe Sirwan (SRP036) and Falah (SRP022).

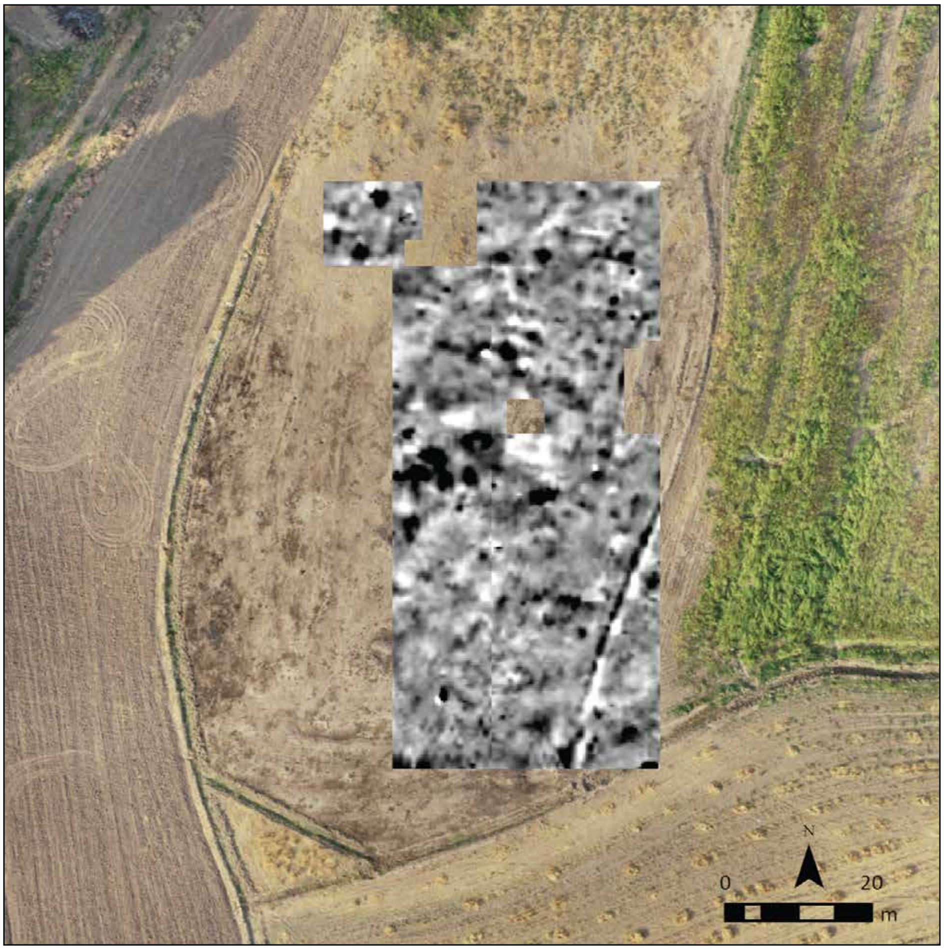


Figure 2.7 Results of the magnetic gradiometer survey on Tepe Sirwan (SRP036).

Mesopotamian terminology.[66] The most characteristic shapes of this assemblage are the so-called husking trays – large, flat trays with everting sides and deliberately pitted and corrugated internal surfaces, which some have interpreted as portable bread ovens.[67] Husking trays first appear in the mid-seventh millennium BCE and decline in frequency in the early sixth.[68] A recently excavated comparable assemblage comes from the upper Late Neolithic levels of Shakar Tepe in the southern Shahrizor plain. The Shakar Tepe assemblage consists of coarse chaff-tempered vessels, such as husking trays, as well as finer chaff- (and mineral-) tempered bowls, and jars with incised and painted decorations. These compare well to the assemblages of Matarrah,[69] surface collections from Shaikh Marif I,[70] and excavated contexts at Qalad Said Ahmad.[71] A series of radiocarbon dates situate the latter material between c. 6400-6000 cal. BCE.[72]

The fine, mineral-tempered and occasionally incised vessels from Tepe Sirwan and other SRP sites, find some comparisons in the Lower Phase at Matarrah, where Braidwood referred to this material as ‘Fine Simple Ware’ or ‘Fine Mineral-included Ware’ and interpreted it as a southern variant of the Hassuna phenomenon.[73] Examples of mineral-tempered pottery have also been recorded by the Shahrizor Survey Project and investigated in more detail at the site of Shaikh Marif II.[74] Similar to the situation at Tepe Sirwan and other SRP sites, the incised decoration on otherwise plain vessels at Shaikh Marif II resembles the typical Hassuna incised tradition, but also departs from it in terms of the incised patterns, the locations of application, and in terms of temper preferences and firing. Also striking is the almost complete absence of painted vessels, which are otherwise ubiquitous in Hassuna assemblages. Based

66 Bernbeck and Nieuwenhuyse (2013).

67 Voigt (1983); Taranto (2020).

68 Lloyd *et al.* (1945); Voigt (1983); Bernbeck (2017); Nieuwenhuyse (2009).

69 Braidwood *et al.* (1952); Odaka (2019).

70 Odaka *et al.* (2019).

71 Tsuneki *et al.* (2015).

72 Odaka *et al.* (2020, Fig. 3).

73 Braidwood *et al.* (1952, 13-15).

74 Odaka *et al.* (2019) refer to this pottery type as ‘Fine Clay Ware’.

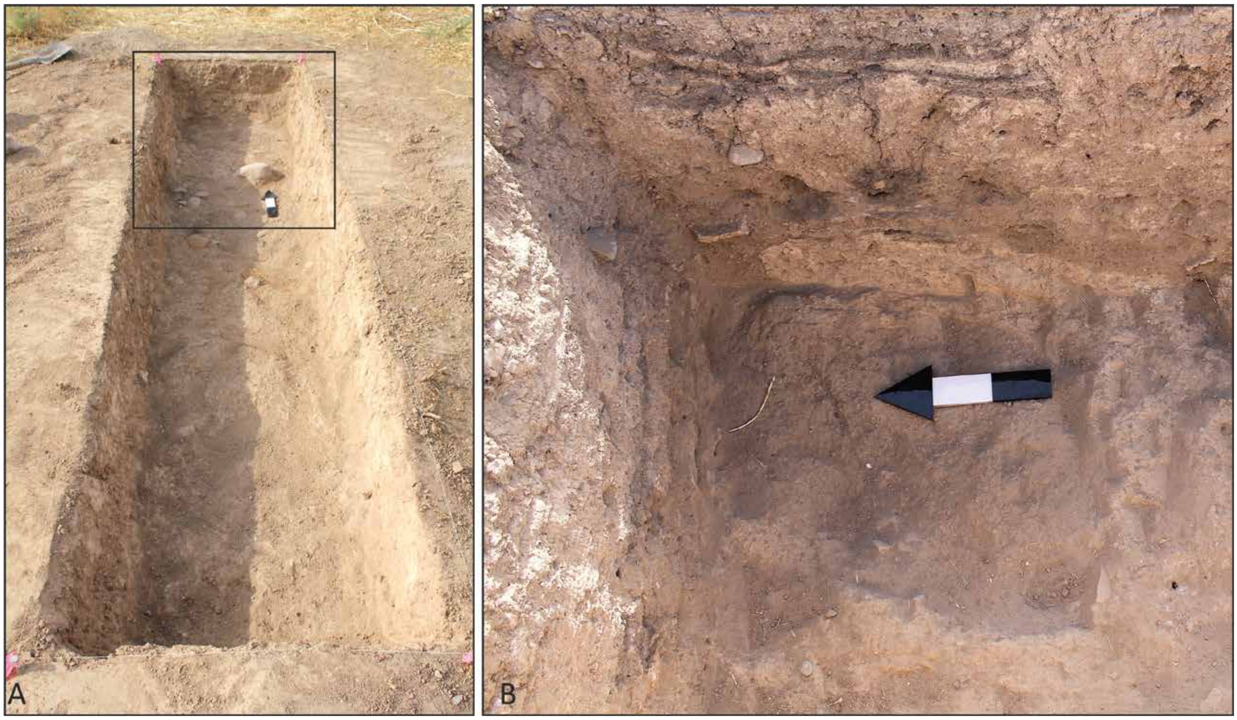


Figure 2.8 A) Test trench at Tepe Sirwan (SRP036) and B) exposed mudbrick feature and consecutive ashy deposits visible in the trench section.

on these discrepancies, Odaka, Nieuwenhuyse and Mühl proposed a date range for the Shaikh Marif II material between the end of the seventh and the middle of the sixth millennium BCE.[75] This phase is referred to elsewhere as early Halaf, whose otherwise widespread ceramic assemblage (Halaf I) is as yet absent from the Shahrizor plain. Prominent later sixth millennium BCE sites such as Tell Begum have produced local variants of late Halaf and transitional Halaf-Ubaid (HUT) pottery.[76]

In 2014, the SRP conducted a small magnetic gradiometer survey on Tepe Sirwan, which revealed a rectangular, multi-roomed structure near the top of the mound, with what appeared to be a hearth in the centre (Figure 2.7). This magnetic anomaly was investigated further in a 1 × 4 m test trench with the aim to collect samples for radiometric dating and stratified artefactual and environmental samples.

The test sounding revealed a circular mudbrick feature and an ashy pit containing both meaty and non-meaty parts of animal carcasses, with many bones showing signs of nonculinary burning at fairly high temperatures. This ashy pit was neatly covered with broken pottery, mainly of the fine, mineral-tempered and occasionally incised variety. Above were found several consecutive burnt patches, most likely a sequence of later open hearths (Figure 2.8). Several charred seeds and charcoal samples from the ashy pit and surrounding areas were sent for radiocarbon dating, but all samples disintegrated in pre-treatment. An Optically Stimulated Luminescence (OSL) age obtained from quartz grains from one of the trench sections in 2015 produced a date of 7700 ±600a or 6290-5090 BCE (Appendix II.2). Although less precise than radiocarbon dates, the OSL date situates the excavated occupation phase on Tepe Sirwan and its distinctive mineral-tempered and incised ceramic assemblage between the late seventh and mid-to-late sixth millennium BCE, lending tentative support to the chronological hypothesis advanced by Odaka, Nieuwenhuyse and Mühl.[77]

The small faunal and archaeobotanical assemblage retrieved from the lower loci of the trench point to a mixed agropastoral economy. Charred botanical remains include several pulses, most likely lentils (*Lens culinaris*), which are resilient, draught-tolerant plants (Appendix IV.1).

Overall, conditions during the Climatic Optimum would have been wetter than in the region today, and significantly more favourable to rain-fed agriculture

75 Ibid., 76-78.

76 Ibid., 71.

77 Ibid.

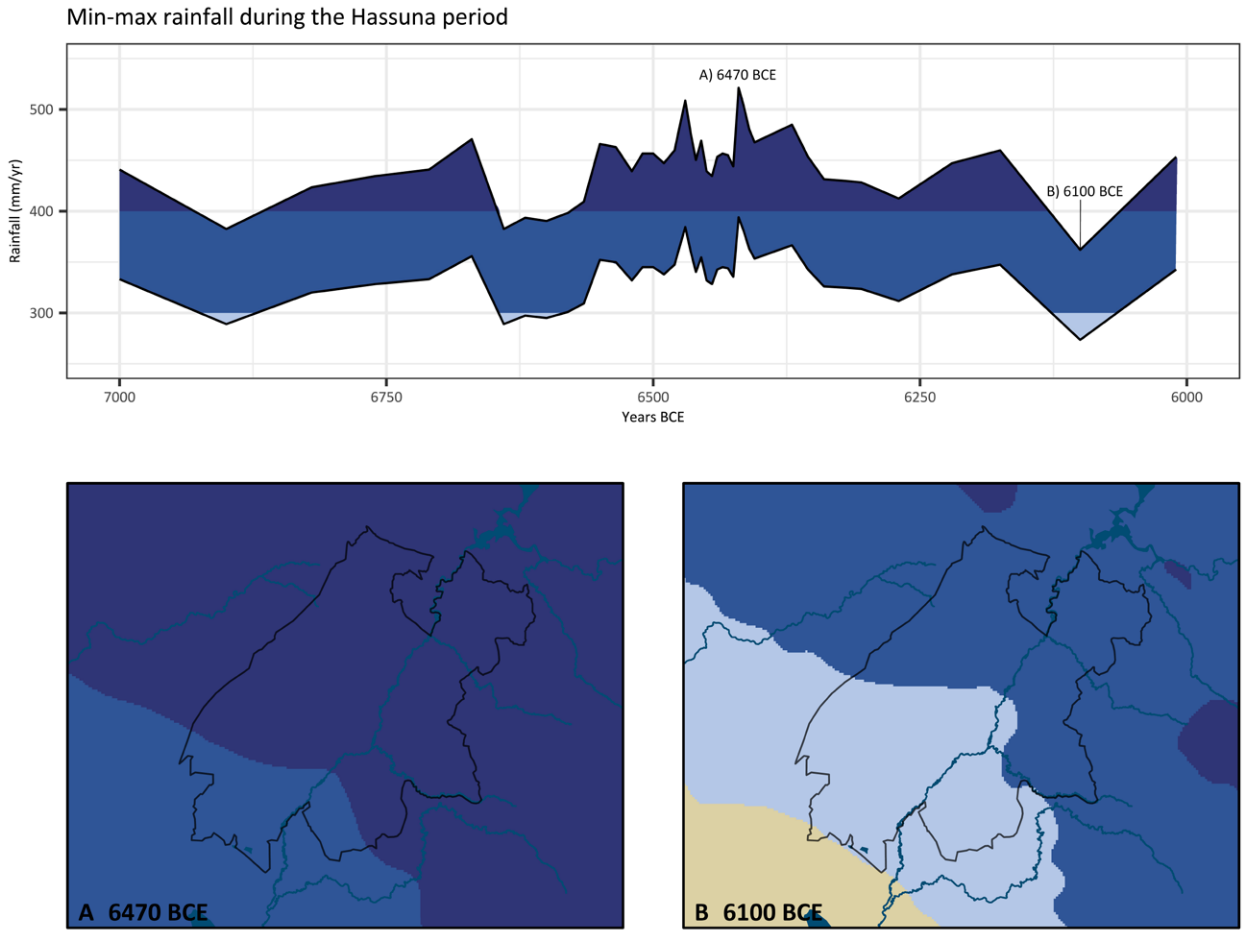


Figure 2.9 Model of precipitation in the lower Sirwan region during the Late Neolithic (cubic interpolation after Hewett *et al.* 2022). See Figure 1.4 for legend.

(Figure 2.9). It is possible that some Neolithic farmers took advantage of naturally irrigated stretches of arable land such as those recently identified at Jarmo,[78] or used artesian springs for this purpose.[79] More likely, however, is a focus on dry-farming as at other Hassuna sites, and a reliance on a diverse mix of domesticated and wild resources.[80]

The community at Tepe Sirwan appears to have relied more heavily on domesticates than on wild taxa for their meat (Table 2.3). Caprines (sheep, *Ovis aries*, and goats, *Capra hircus*) dominate the small and highly-fragmented animal bone assemblage; cattle (*Bos* sp., probably *taurus)* are less well represented. Gazelles (*Gazella* sp.) were hunted, and probably also smaller animals such as hares.

78 Tsuneki *et al.* (2019).

79 Alibaigi and Salimiyan (2020).

80 Braidwood *et al.* (1952); Braidwood and Howe (1960, 37-38); Helbæk (1960).

Due to the wide chronological span of the OSL-date it is unclear whether these subsistence choices may have been influenced by the 8.2 ka BP climate event, another phase of abrupt cooling and aridity, or are unrelated to it.[81] What we can say is that the faunal and botanical assemblages from Tepe Sirwan point to a focus on species that are comfortable in arid environments.

The test sounding and surface collection at Tepe Sirwan also produced a small chipped stone assemblage, which is dominated by flakes (Table 2.4, Figure 2.10). These were produced from local and possibly also imported siliceous sedimentary rocks, including cherts and radiolarite, the latter of which is locally available within Late Miocene to Pleistocene formations, and Quaternary alluvial deposits.[82] Obsidian bladelets from eastern Türkiye are also attested. Artefact surfaces are generally well-preserved, fragmentation rate is low, and chemical alteration is almost absent. Some

81 Alley *et al.* (1997); Weninger *et al.* (2006; 2009).

82 Sissakian and Al-Jibouri (2012).

			Anatomical representation		
Taxon	NISP	% NISP	Skeletal Element	NISP	MNE
Bos sp.	1	2.1	Horn core splinter	1	1
Ovis/Capra	4	8.3	Upper molar	1	1
			Lower molar $_{1\ or\ 2}$	1	1
			Ischium	1	1
			Metatarsal	1	1
Gazella sp.	1	2.1	Metacarpal	1	1
Ovis/Capra/Capreolus/Gazella	10	20.8	Upper molar$^{1\ or\ 2}$	1	1
			Tooth fragments	5	
			Mandible	1	1
			Humerus	1	1
			Ischium	2	1
Medium animals	29	60.4	Humerus	2	n/a
			Ilium	1	
			Femur	1	
			Rib	3	
			Long bone splinters	18	
			Unidentified	4	
Small animals	2	4.2	Long bone splinters	2	
Unidentified	1	2.1	Skull	1	
Total	48	100			

Table 2.3 Number of identified taxa (NISP) from the test sounding at Tepe Sirwan (SRP036). "Small" refers to animals the size of hares or foxes. "Medium" refers to animals the size of sheep. "Large" refers to animals the size of cattle. NISP = Number of Identified Specimens (raw count). MNE = Minimum Number of Elements, calculated following Dobney and Rielly (1988).
Of the seventeen specimens (35%) that were burned, most (15) were calcined or carbonised.

pieces from the test trench show macroscopic evidence of fire alteration (whitening) from accidental thermal shock.

In more detail, cortical, semi-cortical, and non-cortical flakes are present in the assemblage, with the latter predominating. These were struck from unidirectional cores using hard-hammer direct percussion. Knapping mistakes or accidents are numerous, and there are no signs of production standardisation. Four elongated or laminar flakes might be connected with core shaping activities (Figure 2.10.8-11). A further item is a unidirectional product exhibiting a sub-triangular section, but in the absence of its proximal portion an assessment of production technique is not possible (Figure 2.10.12). The only laminar product is a distal fragment of a tiny bladelet or microblade (Figure 2.10.7), whose regular edges, convergent and unidirectional previous removals on the dorsal surface, trapezoidal section, and straight profile suggest that it was produced using the pressure technique, possibly using a hand-held device.[83]

Categories	Number
Blades	1
Laminar flakes	4
Flakes	
unretouched	35
retouched	2
Flake cores	2
Total	44

Table 2.4 Chipped stone assemblage from Tepe Sirwan (SRP036).

The two cores both exhibit a facial exploitation using the direct percussion technique (Figure 2.10.1). A main extraction surface was set on the cobble's major axis. After the removal of several series of flakes, a new and

83 Pelegrin (2012, mode 1).

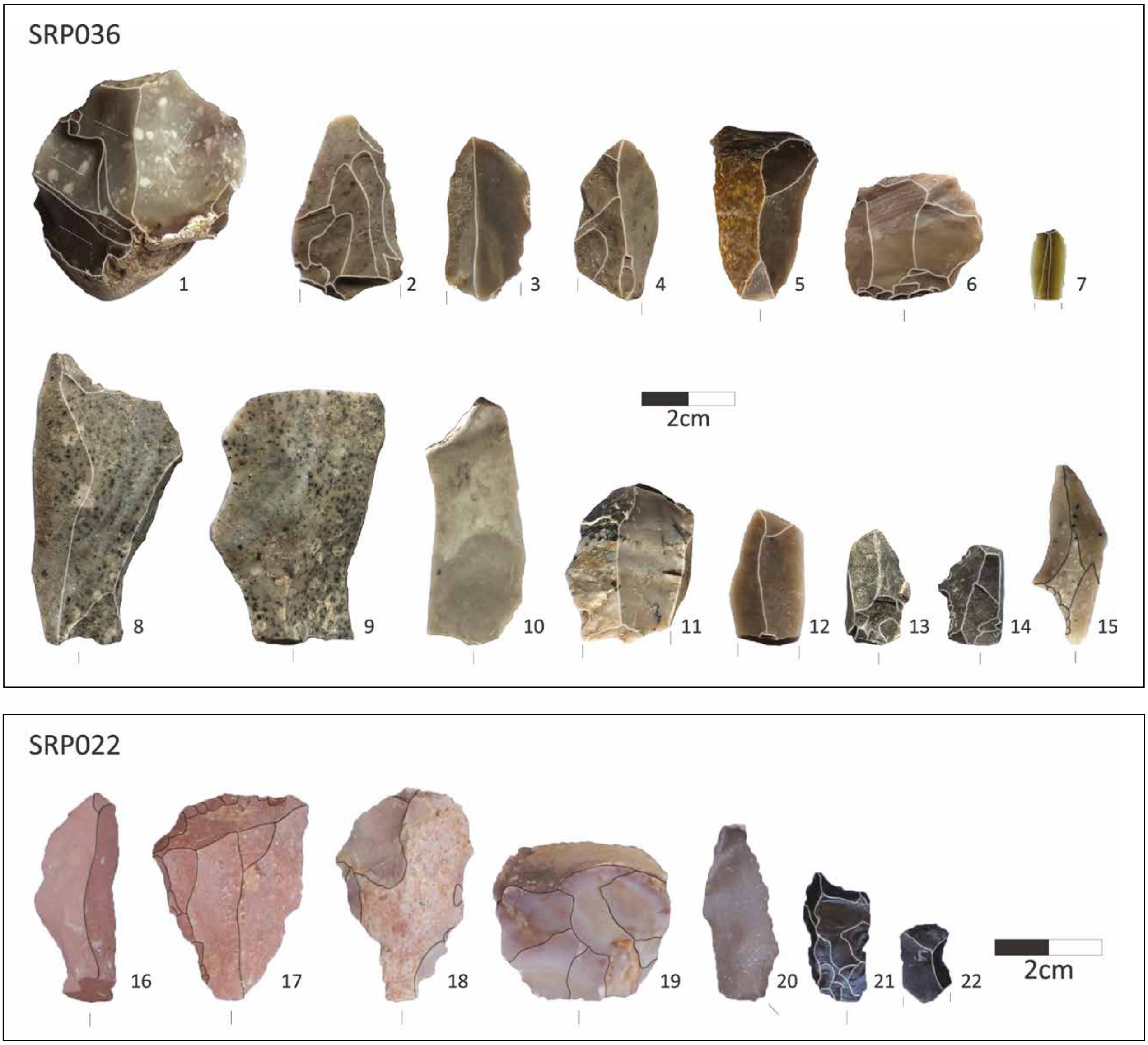


Figure 2.10 Chipped stone assemblages from Tepe Sirwan (SRP036) and Falah (SRP022).

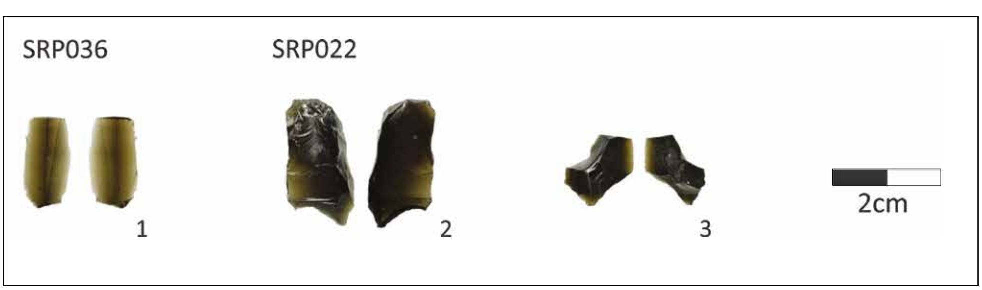


Figure 2.11 1) Obsidian blade fragment from Tepe Sirwan (SRP036) and 2) a lateral flake and 3) blade fragment from Falah (SRP022) subjected to pXRF analysis.

independent surface was opened on the minor axis. This strategy allowed the exploitation of a wider platform to produce several other flakes by optimising the remaining core volume.

Only two artefacts show signs of retouch. The first is a unidirectional flake exhibiting direct, semi-abrupt retouch on its left side and delineating a concave edge (Figure 2.10.15). The second object is a distal fragment of an angular flake-like piece. Its left edge has been modified by applying direct and abrupt retouch delineating a transversal and denticulate edge (Figure 2.10.14). On the blank's proximal area, further retouching created a concave edge. None of the artefacts from Tepe Sirwan can be characterised as formal tools. They were likely produced *ad hoc* for a range of tasks.

The chipped stone industry attested at Tepe Sirwan, which lacks several distinctive elements of the earliest Pottery Neolithic such as glossed pieces, scrapers, and imported pressure-blades, compares well to Late Neolithic traditions in the Iraqi Zagros piedmont region and in northern Mesopotamia. This includes the late PPNB to Proto-Hassuna sequence at Tell Seker al-Aheimar in the Upper Khabur basin of north-eastern Syria,[84] Qalat Said Ahmadan in the Peshdar plain,[85] Matarrah in the Kirkuk region, and Shakar Tepe in the Shahrizor plain.[86] The chert raw material used at Tepe Sirwan, moreover, finds direct comparisons at Shakar Tepe, pointing to participation in the same raw material distribution networks (see Figure 2.10.8-9). The surface lithic inventories of Shaikh Marif I and II also share many characteristics with the Tepe Sirwan assemblage.[87] In sum, the chipped stone assemblage from Tepe Sirwan, much like its ceramic tradition, connects the site and other Late Neolithic surface collections in the lower Sirwan region, to a piedmont, Hassuna-related community of cultural practice.

A second Late Neolithic site, which was investigated more intensively in the Sawzblagh area, is Falah (SRP022). This c. 1.6 ha low mound is located 1.5 km to the south of Tepe Sirwan (SRP036) and amidst what is today irrigated farmland (Figure 2.5). A small stream runs near the site and a modern farmhouse occupies a large proportion of the mound. This and the presence of farming-related metal waste on site made the magnetometry results difficult to interpret.

The pottery from Falah shares many characteristics with the Tepe Sirwan assemblage. This includes fragments of husking trays (Figure 2.6.42-45) and coarse chaff-tempered jars and basins, finer, mineral-tempered plain and incised vessels (Figure 2.6.46-58), and a small number of painted fragments (Figure 2.6.59).

Three obsidian fragments, a blade fragment (possibly a corner-thinned blade) from Tepe Sirwan (SRP036), as well as a lateral retouched flake and a blade fragment from Falah (SRP022) were subjected to provenance analysis using portable X-ray Fluorescence (pXRF) at the University of Manchester.[88] All three samples come from the peralkaline sources in eastern Türkiye, which is also suggested by the green colour of all three flakes. Following recent advances in distinguishing the two peralkaline sources at Nemrut Dağ (Sıcaksu) and Bingöl A,[89] it has been possible to assign the blade from Tepe Sirwan (Figure 2.11.1) and the lateral flake from Falah (Figure 2.11.2) to the Nemrut Dağ source, while the blade fragment from Falah (Figure 2.11.3) comes from Bingöl A.[90] Both Nemrut Dağ and Bingöl are attested as obsidian sources in the Late Neolithic of Mesopotamia, with Nemrut Dağ becoming more common after c. 6000 BCE.

Surface survey at 13 additional sites produced varying quantities of Hassuna-related finds. Tapa Musa Osman I (SRP031) yielded a small number of mineral-tempered and incised Hassuna-related sherds (Figure 2.12.1-2). The site is located c. 750 m to the west of Tepe Sirwan and has been heavily damaged by ongoing ploughing and levelling for agricultural purposes (Figure 2.5).

Kalay Mira II (SRP069) is a small low mound amidst modern wheat fields c. 2.3 km to the south of the above cluster of Late Neolithic sites. The site produced two Hassuna-related incised sherds (Figure 2.12.3-4) alongside painted Halaf and Ubaid pottery. A total of 14 chipped stone artefacts were also collected, including a core (Figure 2.13.1), eight flakes (Figure 2.13.2-4, 6-7, 10-11, 13), two blades (Figure 2.13.8-9), and three retouched artefacts (Figure 2.13.5, 12, 14; see also Appendix III). All artefacts were produced from chert raw materials, including locally available pebbles and cobbles from alluvial deposits bearing neocortex. Two proximal blade and bladelet fragments show no cortical parts (Figure 2.13.8-9). They are characterised by irregular morphology, punctiform butts, and overhang preparation, suggesting direct or indirect percussion techniques. Most of the flakes are small and feature unidirectional or orthogonal previous negatives. One fragment might be connected with surface maintenance of a unidirectional flake core and suggests *in situ* flake production (Figure 2.13.2). This is also indicated by the presence of a unifacial flake core exploited by unidirectional laminar and flake removals (Figure 2.13.1). Some flakes show evidence of retouch, but no formal tools

84 Nishiaki and Le Mière (2005).

85 Tsuneki *et al.* (2015; 2016; 2019).

86 Braidwood *et al.* (1952); Odaka (2019).

87 Odaka *et al.* (2019).

88 Campbell *et al.* (2017a).

89 Chataigner (1994); Frahm (2012); Kopanias *et al.* (2013); Robin *et al.* (2016).

90 Campbell *et al.* (2017a).

Figure 2.12 Late Neolithic pottery from the lower Sirwan region.

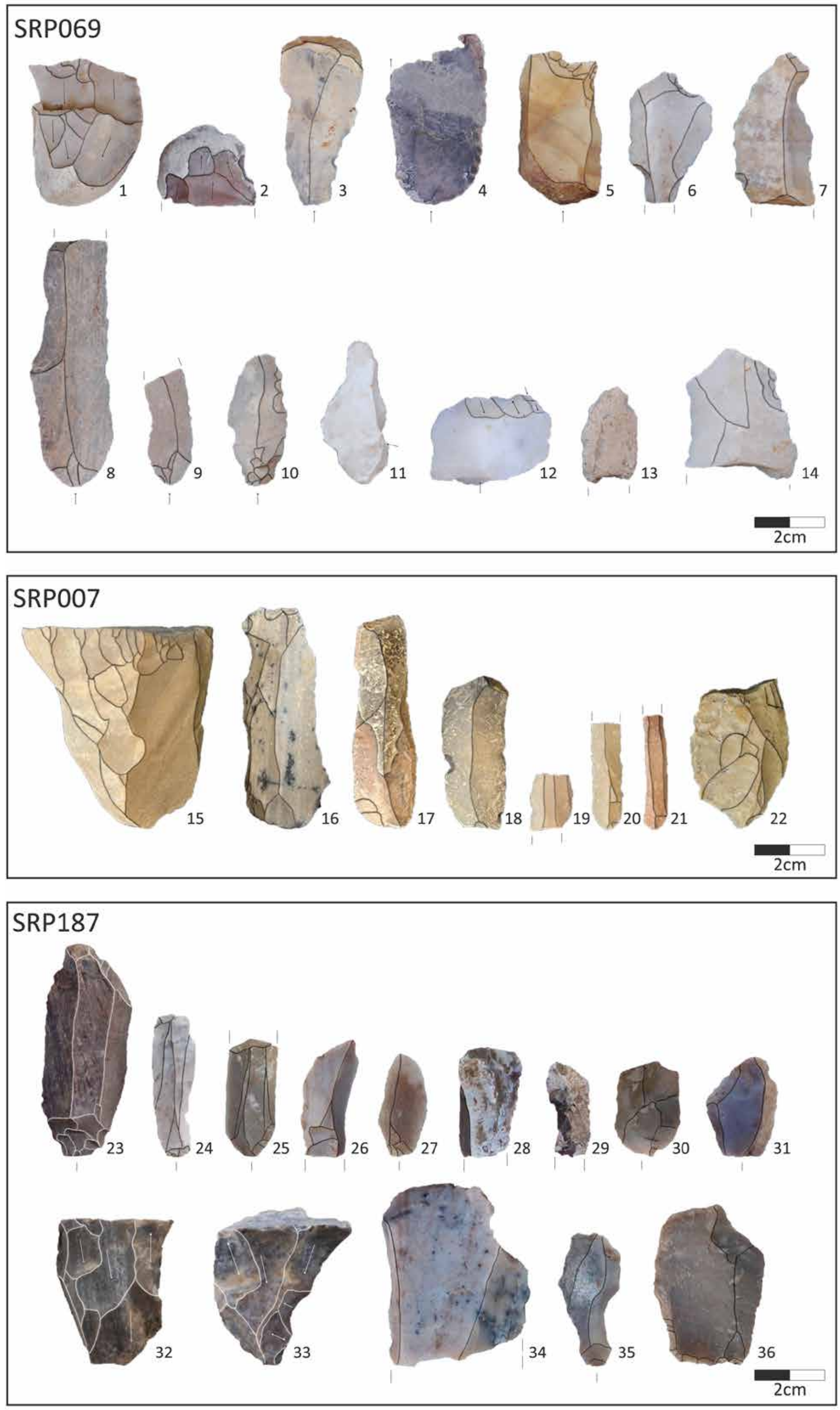


Figure 2.13 Chipped stone assemblages from SRP069, SRP007, and SRP187.

are present. These characteristics do not lend themselves to precise dating, but situate the Kalay Mira II chipped stone surface assemblage between the Late Neolithic and the Bronze Age.

A chaff-tempered simple bowl rim and a mineral-tempered simple jar (Figure 2.12.5) come from the site of Mala Kunar I (SRP070, Figure 2.5), whose main occupation dates to the Late Chalcolithic (see Chapter 3). The adjacent Mala Kunar II (SRP071, Figure 2.5) is a small, c. 1 ha, tall mound, whose main period of occupation appears to have been the early second millennium BCE (see Chapter 5). Among the surface collection was a small husking tray fragment and several pieces of the characteristic fine, mineral-tempered pottery, including two incised and one painted sherd (Figure 2.12.6-9). SRP072 is a small, c. 0.3 ha, low mound located within viewing distance of SRP070 and SRP071, whose surface collection also includes coarse chaff-tempered material, alongside body and rim pieces of the mineral-tempered and occasionally incised tradition (Figure 2.12.10-12). SRP159 is another small, c. 0.5 ha, low mound, located c. 1 km to the south of the SRP070-72 cluster. Finds include two hand-made jar rims and several lithics which may be Neolithic in date (Figure 2.12.13-14).

Another small cluster of sites with evidence for occupation in the later-seventh-to-sixth millennium BCE is situated in the northern Bnkura plain, not far from the eastern bank of the Sirwan. This includes War Qatar II (SRP102), a c. 3 ha mounded site located just off the modern road that runs parallel to the river from Grda Gozina to Jalawla (Figure 2.5). The top of the mound and its perimeters are badly damaged by military installations most likely related to the Iraq-Iran war. A working farm with several livestock pens, stables, and other functional areas currently occupies the lower parts of the mound, which is surrounded by ploughed farmland. The surface collection from War Qatar II includes both coarse and finer chaff-tempered bowl and tray rims (Figure 2.12.15-17), some of which show traces of paint, as well as mineral-tempered incised bowl and jar fragments (Figure 2.12.18-22).

Located within viewing distance of War Qatar II (SRP102), c. 2 km to the northeast, is one of the tallest multi-period mounds in the survey area: Tepe Imam Mohammed (SRP017, Figure 2.5). The majority of the surface material collected from Tepe Imam Mohammed dates to the Bronze Age and later, with a baked brick wall probably dating to the Parthian period visible along the base of the mound. Prehistoric and Bronze Age sherds, chipped stone, and obsidian were collected on the lower slopes and at the foot of the mound, including a possible Neolithic incised jar rim (Figure 2.12.23-24). Coarse chaff- and grit-tempered rim and body fragments were also collected at SRP093 (Figure 2.5), a small c. 0.8 ha low mound (Figure 2.12.25-26).

On the right bank of the Sirwan, the surface collection of the c. 1 ha low mound of Tepe Qalah (also known as Imam Shekh Langar, SRP006, Figure 2.14) includes a large husking tray rim (Figure 2.12.27). The nearby site of Shekh Langar (SRP007, Figure 2.17) produced a limited ceramic assemblage, with a small number of sherds suggesting occupation in the fifth millennium BCE (see below). The features of the chipped stone assemblage from Shekh Langar (SRP007), however, are consistent with a Late Neolithic-to-Chalcolithic date range (Figure 2.13). All eight collected lithic artefacts were produced from chert raw materials, especially a light-grey opaque variety, similar to examples from Grda Gozina (SRP010) and Tepe Sirwan (SRP036) discussed above. A brownish opaque mottled-spotted variety and a light-brown opaque and spotted chert are also present. Three of the six attested blades were produced by direct percussion (Figure 2.13.16-18), while the remaining three artefacts exhibit features more consistent with indirect percussion or pressure techniques (Figure 2.13.19-21). The core shows a single flat and a non-prepared platform associated with a main unidirectional extraction surface (Figure 2.13.15). The irregularity of the negatives indicates the employment of hard-hammer direct percussion. A flake that bears intentional fracture on the distal end was used as a platform to detach two burin spalls or microblades (Figure 2.13.22). Overall, the assemblage from Shekh Langar bears resemblance to Tepe Sirwan (SRP036) on the one hand, as well as the Late Chalcolithic industries of Shakhi Kora (SRP191) and Pira Faqira (SRP008) on the other (see Chapter 3).

Late Neolithic sites are also attested in the c. 30 km long Gumar plain, which stretches out between the right bank of the Sirwan in the east and Kifri in the west, and the Gumar and Shakal hill ranges to the south and north. The plain consists of Quaternary sediments of gravel, sand, silt, and clay and presents today an arid landscape, where agriculture requires extensive irrigation infrastructure.

Late Neolithic settlements include the c. 2.6 ha large and 3.5 m tall mound of Tepe Gumar I (SRP187, Figure 2.14), whose surface finds include coarse and finer chaff-tempered vessels, including husking tray fragments, as well as fine, mineral-tempered bowls and jars with incised decoration (Figure 2.12.28-51). A predominance of the latter wares may point towards an early-to-mid sixth millennium BCE date for the main occupation phase. Surface lithics are less diagnostic and fall into a broad Neolithic-to-Bronze Age interval (Figure 2.13.23-36). However, with the exception of some Halaf painted pieces (see below), no later pottery was recovered at the site.

A second site is Tepe Majid (SRP202, Figure 2.14), a c. 0.5 ha and 3 m tall low mound located to the north of the modern village of Yalanci and c. 4 km to the northwest of Tepe Gumar I (SRP187, Figure 2.14). The Tepe Majid surface collection consists of heavily chaff-tempered

Figure 2.14 Views of SRP006, SRP187, SRP202, SRP205, SRP206, SRP198, and SRP196.

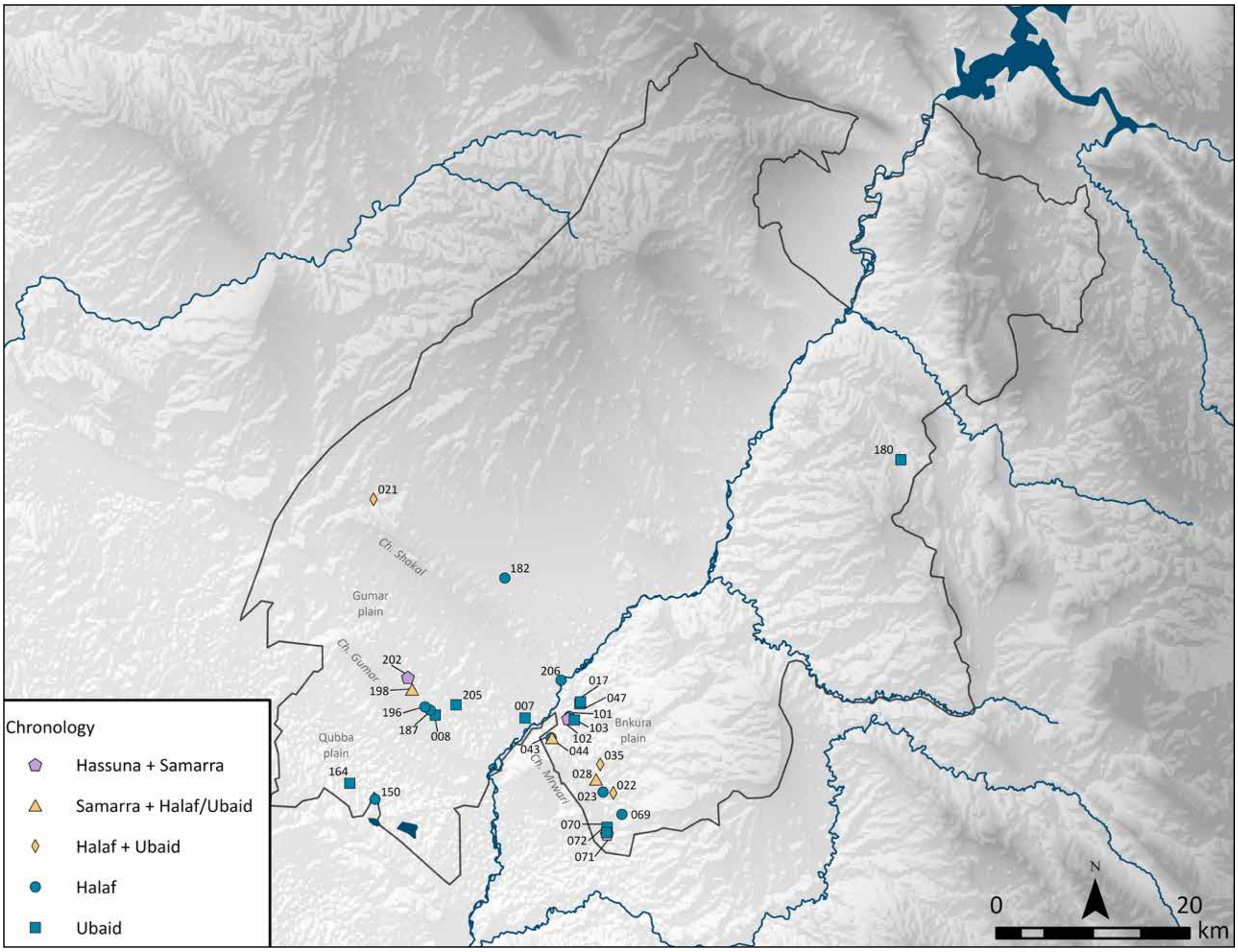


Figure 2.15 Map of sites with Neolithic and Early-to-Middle Chalcolithic pottery (DEM GTOPO30 ©USGS).

jar and husking tray rims (Figure 2.12.52-54), mineral-tempered bowls with thickened and inverted or everted rims (Figure 2.12.55-57), as well as numerous examples of the finer, mineral-tempered, and occasionally incised tradition (Figure 2.12.58-65). The nearby site of Ezadin Tepe (SRP205, Figure 2.14), which is occupied mainly in the Ubaid period, also produced two incised Hassuna sherds (Figure 2.12.66-67).

2.4.2 Samarra

Samarra and Choga Mami Transitional (CMT) pottery is rare in the SRP survey record, and identifications at six sites remain tentative (Figure 2.15). At three sites, possible Samarra/CMT painted sherds co-occur with Hassuna-related materials. This includes a sherd with nested dark brown rectangular painted designs on buff background (Figure 2.16.1), and a sherd with a cross-hatched pattern (Figure 2.16.2) from Mala Kunar II (SRP071) in the southern Bnkura plain. The former fragment may present a similar pattern known from Samarra ware dishes and bowls.[91]

A bowl with cross-hatched triangles and triple zigzagged lines below the rim (Figure 2.16.3) comes from Tepe Majid (SRP202) in the Gumar plain and finds broad but not exact comparisons in the decorative schemes of Choga Mami[92] and Matarrah.[93] War Qatar II (SRP102), which is located in the northern part of the Bnkura plain and whose surface assemblage includes both Hassuna and Ubaid pottery, also yielded a bowl rim with slightly everting lip and dark purple painted triangles and cross-hatches that may be associated with the Samarra/CMT tradition (Figure 2.16.4).

Three sites with small quantities of possible Samarra/CMT pottery also produced Halaf and Ubaid materials. This includes a small sherd from SRP044 (Figure 2.16.5, Figure 2.17), and a sherd from Mrwari (SRP028, Figure 2.17)

91 Nieuwenhuyse *et al.* (2001, Fig. 3.6).

92 Oates (1968, Pls. IV, VII).

93 Braidwood *et al.* (1952, Figs. 12.2-3, 13.13).

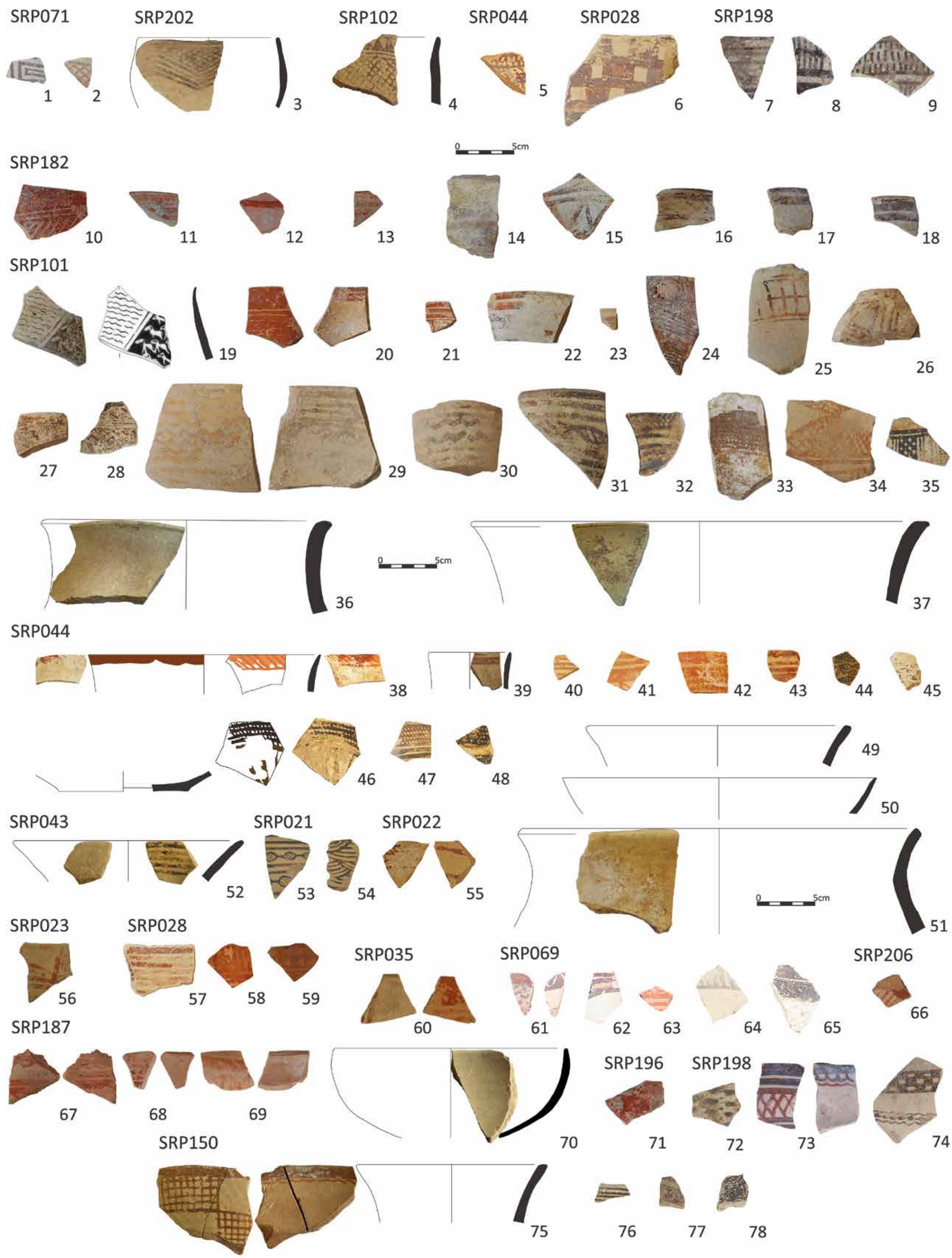


Figure 2.16 Samarra, Choga Mami Transitional, and Halaf-related pottery from sites in the lower Sirwan region.

Figure 2.17 Views of SRP101, SRP008, SRP007, SRP042, SRP043, SRP044, SRP046, SRP021, SRP047, SRP028, and SRP033-35.

with a reddish-brown painted checkerboard pattern (Figure 2.16.6) that finds comparisons at Tell Abada Level III.[94] Several sherds from Yalanci Tepe (SRP198, Figure 2.14) also broadly adhere to a Samarra/CMT aesthetic (Figure 2.16.7-9).

2.4.3 Halaf

To date, a total of 15 sites in the SRP research region have yielded Halaf-related pottery. Of these, three may have had relatively substantial Halaf occupations (SRP044, SRP101, SRP182). All three sites are located in the main Sirwan valley. Sites, which produced more limited quantities of Halaf-related surface finds are located in the Sawzblagh region and in the Gumar plain.

Tepe Rahim (SRP182) is located in Shakal, one of the satellite settlements of Kalar along the Kifri road. The low mound, which is today increasingly surrounded by modern buildings, was excavated in 2012 by an Iraqi team. This revealed Halaf-period architectural remains, including part of a *tholos* structure.[95] SRP surface survey at the site was kept brief and produced mainly Halaf-related material (Figure 2.16.10-18), as well as evidence for a more ephemeral later occupation.

War Qatar I (SRP101, Figure 2.17) is a small, c. 0.8 ha low mound in the Bnkura plain located on the edge of the Sirwan terrace, which has been damaged by the modern road, ploughing, and other earthmoving. Significant quantities of painted Halaf-related (Figure 2.16.19-31), some Ubaid painted pieces (Figure 2.16.32-35),[96] and several plain jar rims (Figure 2.16.36-37) were collected from the site's surface, and from the sections of irrigation ditches that cut through the archaeological deposits. One painted piece shows a flock of sheep walking towards a register of wavy lines, which may symbolise a river. Similar compositions, albeit with birds instead of sheep, and with cables or eyelet lines, are attested, for instance, on jars and bowls from Late Halaf Tell Hassan in the Hamrin.[97] Several sherds also show similarities with the Halaf-Ubaid Transition (HUT) assemblages at Tell Begum and other sites in the Shahrizor plain.[98] Absent from War Qatar I are later Ubaid painted designs, and the characteristic incised decorations, which are well attested at other SRP sites (see below). A similar surface assemblage was collected on the nearby site of SRP044 (Figure 2.17, Figure 2.16.38-51), suggesting a broadly contemporary occupation. SRP043 also produced a possible Halaf-related simple bowl (Figure 2.16.52).

Smaller quantities of Halaf material were found at four further sites, most of which have also yielded varying quantities of Ubaid pottery. To the northwest of Kalar, this includes two sherds with characteristic Halaf decorative schemes from Qala Kon (SRP021, Figure 2.16.53-54), which find parallels at, for instance, Tell Abada Level II.[99] The site of Falah (SRP022), which was occupied during the Hassuna and Ubaid, also produced what may be a very abraded Halaf painted sherd (Figure 2.16.55), while a piece from Tapa Kalay Mira I (SRP023) presents a rather unusual decorative scheme (Figure 2.16.56). The site of Mrwari (SRP028) produced a large Ubaid surface assemblage as well as one possible Halaf painted sherd (Figure 2.16.57) with parallels at Tell Abada II.[100] Two others may be related to west Iranian Neolithic and Early Chalcolithic traditions (Figure 2.16.58-59). SRP035, another site with a sizeable Ubaid assemblage, also produced one Halaf-related sherd with red cross-hatched decoration on the inside (Figure 2.16.60).[101] A small collection of Halaf-related painted sherds (Figure 2.16.61-63) comes from Kalay Mira II (SRP069), alongside two sherds that may be related to the Ubaid (Figure 2.16.64-65).

On the right bank of the Sirwan, SRP206 produced a small fragment of a red-painted sherd (Figure 2.16.66), as did Tepe Gumar I (SRP187, Figure 2.16.67-69), and the multi-period mound of Tepe Gumar II (SRP196, Figure 2.16.71). A more diverse Halaf assemblage comes from Yalanci Tepe (SRP198), including red and black bichrome pieces, which suggest a strong regional tradition (Figure 2.16.72-74) that has its closest parallels in the Hamrin.[102] Further south, the site of Qubba Tepe (SRP150) produced two Halaf (Figure 2.16.75-76) and two possible Ubaid-related pieces (Figure 2.16.77-78).

2.4.4 Ubaid

More numerous than Samarra/CMT and Halaf-related surface finds are assemblages associated with the mid-to-late Ubaid. Similar to the Late Neolithic, most sites with Ubaid material culture concentrate in the southern part of the survey region. The majority of Ubaid sherds have simple black or brown painted bands and festoons along the rims of vessels. At many sites painted pottery co-occurs with smaller quantities of comb-incised, herringbone-incised, and stabbed decorations, as well as painted and impressed or incised examples, which suggest a broad contemporaneity with Tell Abada Levels II-I,[103] Tell Madhhur,[104] Kani Shaie VII,[105] and Gurga Chiya Level II.[106]

94 Jasim *et al.* (2021, 268, Fig. 156.1-4).
95 Ramiz (2014).
96 For a comparison see, e.g. Jasim *et al.* (2021, 276, Fig. 167.2).
97 Chiocchetti and Fornaris (2013, Fig. 20).
98 Nieuwenhuyse *et al.* (2016).
99 Jasim *et al.* (2021, Fig. 396.1).
100 Ibid., Fig. 397.8.
101 Ibid., Fig. 397.9.
102 Ibid., Fig. 472.2.
103 Ibid., 78-83.
104 Moon and Roaf (1984, 147-149).
105 Renette *et al.* (2021, Fig.6.22).
106 Wengrow *et al.* (2016, Fig.12.25).

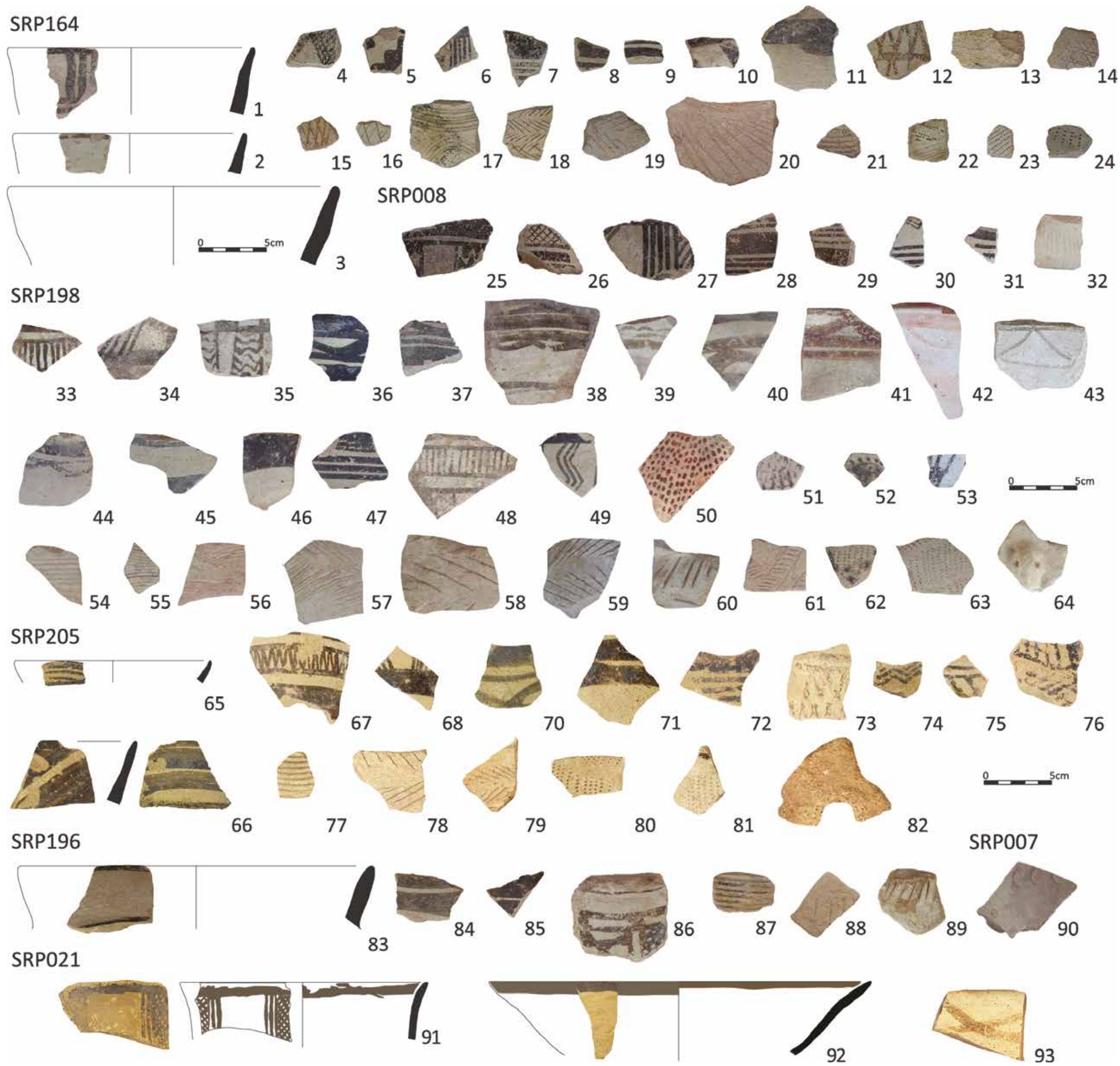


Figure 2.18 Ubaid pottery from sites in the south-western plains.

2.4.4.1 Right bank

Beginning in the northern Qubba plain and working our way north, surface collections at Tell Nergz (SRP164), a large and complex multi-period site, which consists of a central mound and lower terrace as well as a smaller high mound at its southern end, suggest a relatively substantial occupation in the Ubaid (Figure 2.18.1-24). Surface finds include several bowls with simple rims and simple painted decoration in dark brown to black (Figure 2.18.1-3) that find parallels in the Ubaid 3 designs at Tell Abada Level I[107] and Tell Songor C.[108] Of the recovered body sherds, cross-hatched rhombus designs (Figure 2.18.4) are attested in the Ubaid 2-3 assemblage at Tell Abada Level II-I,[109] while large wavy lines (Figure 2.18.5) are found in the Ubaid 3 material from Tell Rashid.[110] Also present are a range of incised and impressed decorative schemes with good comparisons at Tell Abada Level II-I.[111]

The Gumar plain was also relatively densely occupied during the early part of the Chalcolithic. Pira Faqira (SRP008, Figure 2.17), a c. 1.4 ha low mound located near the bed of a seasonal stream and overlooking the plain,

107 Jasim *et al.* (2021, Fig. 279).
108 Ibid., Fig. 490.12.
109 Ibid., Figs. 207.9, 250.2, 5, 298.
110 Ibid., Fig. 451.1.
111 Ibid., Figs. 385, 390.

produced a small number of painted and incised sherds that find comparisons in the CMT, Ubaid 1-2 and 3 traditions. A sherd with reverse angular wavy lines (Figure 2.18.25) finds broad, if not exact, parallels in the Transitional and Ubaid 1-2 repertoire from Tell Abada.[112] A piece with a fine cross-hatching and two solid bands (Figure 2.18.26) can also be compared to examples from Abada II,[113] as does a sherd with lines of stabbed dots (Figure 2.18.32).[114] The main occupation of Pira Faqira, however, dates to the early-to-mid fourth millennium BCE (see Chapters 3).

A similarly broad chronological range is attested at Yalanci Tepe (SRP198), located c. 3.5 km to the northwest of Pira Faqira (SRP008), which in addition to Samarra/CMT and Halaf-related pottery also produced an assemblage of painted and incised fragments that suggests a main Ubaid-related occupation (Figure 2.18.33-64). Yalanci Tepe is located near the confluence of a seasonal stream flowing down from the Gumar hill range and a stream crossing the Gumar plain. Some of the Early-to-Middle Chalcolithic pottery from Yalanci Tepe may date to the Ubaid 1-2 (Figure 2.18.33-35), but the majority presents mid-to-late Ubaid decorative designs that are well attested in the Hamrin, in the Bazian basin,[115] and further north in the Erbil plain.[116] The body sherd of a jar with a band of short parallel vertical lines (Figure 2.18.48) can be compared with a painted jar from Tell Madhhur,[117] and the fragment of a beaker with a band around the rim and three parallel vertical zigzags (Figure 2.18.49) has a good parallel in the Abada Ubaid 3 assemblage,[118] as do a sherd with red dotted decoration (Figure 2.18.50),[119] several fragments with circles and solid circles surrounded by smaller dots or lines (Figure 2.18.51-53),[120] and a range of incised and stabbed decorative patterns (Figure 2.18.54-63). The same is the case for several plain jars with pierced lugs (Figure 2.18.64).[121]

Yalanci Tepe also produced a small collection of chipped stones, which includes 12 flakes, 11 blades, and six retouched artefacts (Figure 2.19.1-30, also Appendix III), whose technical characteristics suggest a broad sixth-to-fourth millennium BCE date range. Regular blade items are mostly represented by proximal and mesial fragments (Figure 2.19.1-7, 11-12), the former of which exhibit a reduced and prepared butt associated with trapezoidal sections, which points to pressure-based production using a crutch device (Figure 2.19.4-5, 11). Although cores are absent, a neocrested fragment might be indicative of *in situ* core reduction (Figure 2.19.5). The remaining blades are less regular and testify to the adoption of percussion techniques. Retouched artefacts include three blades with distal truncation (Figure 2.19.2-3, 12). Among the retouched flakes, it is worth noting a flake bearing inverse and invasive retouch (Figure 2.19.16). All artefacts are produced from chert raw materials, with local secondary alluvial outcrops exploited especially for flake production. The same range of chert varieties is also attested at Pira Faqira (SRP008), Tepe Gumar II (SRP196), Tell Nergz (SRP164), and Mala Kunar I (SRP070), while technological similarities in flake production are attested at Tell Nergz (SRP164).

A third site with Ubaid occupation in the Gumar plain is Ezadin Tepe (SRP205), a c. 1 ha mound, which is located in the central part of the plain c. 2.3 km northeast of Pira Faqira (SRP008). As with Yalanci Tepe (SRP198), the Early-to-Middle Chalcolithic assemblage from Ezadin Tepe is dominated by painted and incised pottery, suggesting a broadly contemporaneous occupation. This includes a bowl with horizontal bands (Figure 2.18.65), and a deeper bowl with reverse decoration (Figure 2.18.66). A body sherd with tight wavy line finds general comparisons in the Ubaid 2-3 assemblages of Tell Abada,[122] alongside sherds decorated with bands, festoons, and parallel lines (Figure 2.18.70-72). The more abraded cross-hatched and zigzag patterns on chaff-tempered fabrics (Figure 2.18.73-74) also find broad comparisons at Abada II-I,[123] as do sherds with incised and stabbed decorations (Figure 2.18.77-81). A perforated clay object (Figure 2.18.82) finds parallels at the site of Mrwari (SRP028) in the Sawzblagh area of the Bnkura plain (see below).

The multi-period mound of Tepe Gumar II (SRP196) also produced a number of painted and incised Ubaid pieces (Figure 2.18.83-89), as well as chipped stone artefacts that can be assigned a sixth-to-fourth millennium BCE date range. Of the eight attested blades, seven are produced from chert raw materials and one from obsidian (Figure 2.19.38). Seven artefacts are very regular blades with triangular or trapezoidal sections (Figure 2.19.31-36, 38), with three blades exhibiting a punctiform butt associated with overhang preparation (Figure 2.19.31-33) – a likely sign of pressure or indirect percussion techniques that are also attested at Pira Faqira (SRP008), Yalanci Tepe (SRP198), and Kalay Mira II (SRP069). One item is a large laminar flake exhibiting blade removals associated with core surface maintenance (Figure 2.19.37).

112 Ibid., Figs. 155.2, 169.2, 176.3, 181.2.
113 Ibid., Fig. 286.1, 3.
114 Ibid., Figs. 389.1, 390.1.
115 Renette *et al.* (2021, 11, Fig. 7.6).
116 Stein and Alizadeh (2017, Figs. 7, 14).
117 Moon and Roaf (1984, Fig. 22.7).
118 Jasim *et al.* (2021, Fig. 362).
119 Ibid., Fig. 197.6-7.
120 Ibid., Fig. 317.18, 28.
121 Ibid., Fig. 375.
122 Ibid., Fig. 222.
123 Ibid., Figs. 422, 424.

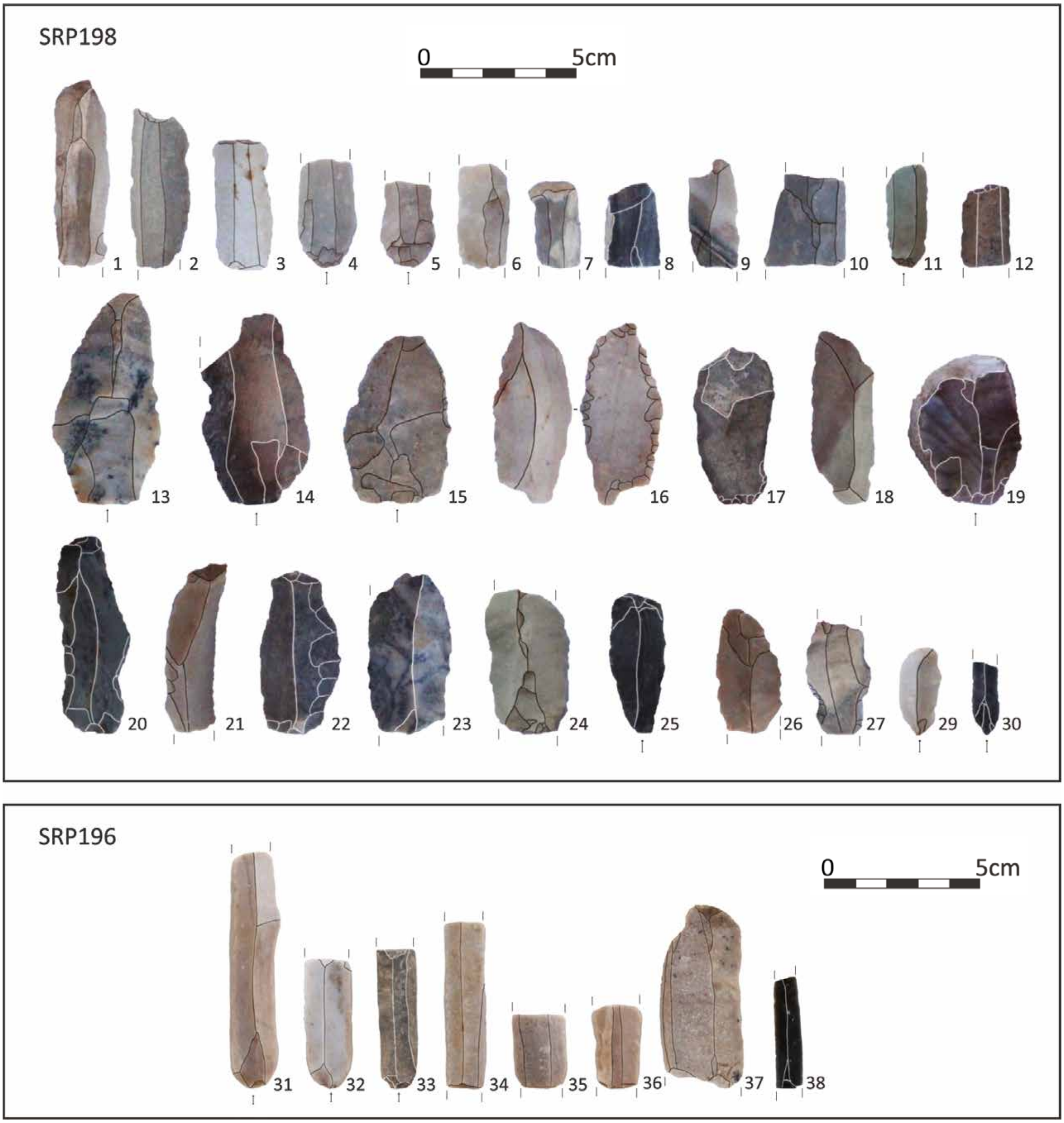


Figure 2.19 Chipped stone assemblages from SRP198 and SRP196.

The small, c. 0.7 ha, site of Shekh Langar (SRP007) is located on the right bank of the Sirwan, near the modern village of Ban Asyaw. The surface assemblage from this site is generally very limited, but a piece with halfmoon-shaped impressed decoration (Figure 2.18.90) can be compared to the Ubaid material from Telul al-Khubari in the Hamrin,[124] and a fragment of what may be a flint-scraped bowl could point towards an LC1 occupation.[125] This is broadly supported by the chipped stone assemblage, whose characteristics suggest a date range spanning the Neolithic and Chalcolithic (see Figure 2.13). Qala Kon (SRP021) also produced a small assemblage of Ubaid pottery, including a bowl (Figure 2.18.91), whose painted decoration can be

124 Ibid., Fig. 476.14.

125 Baldi (2012).

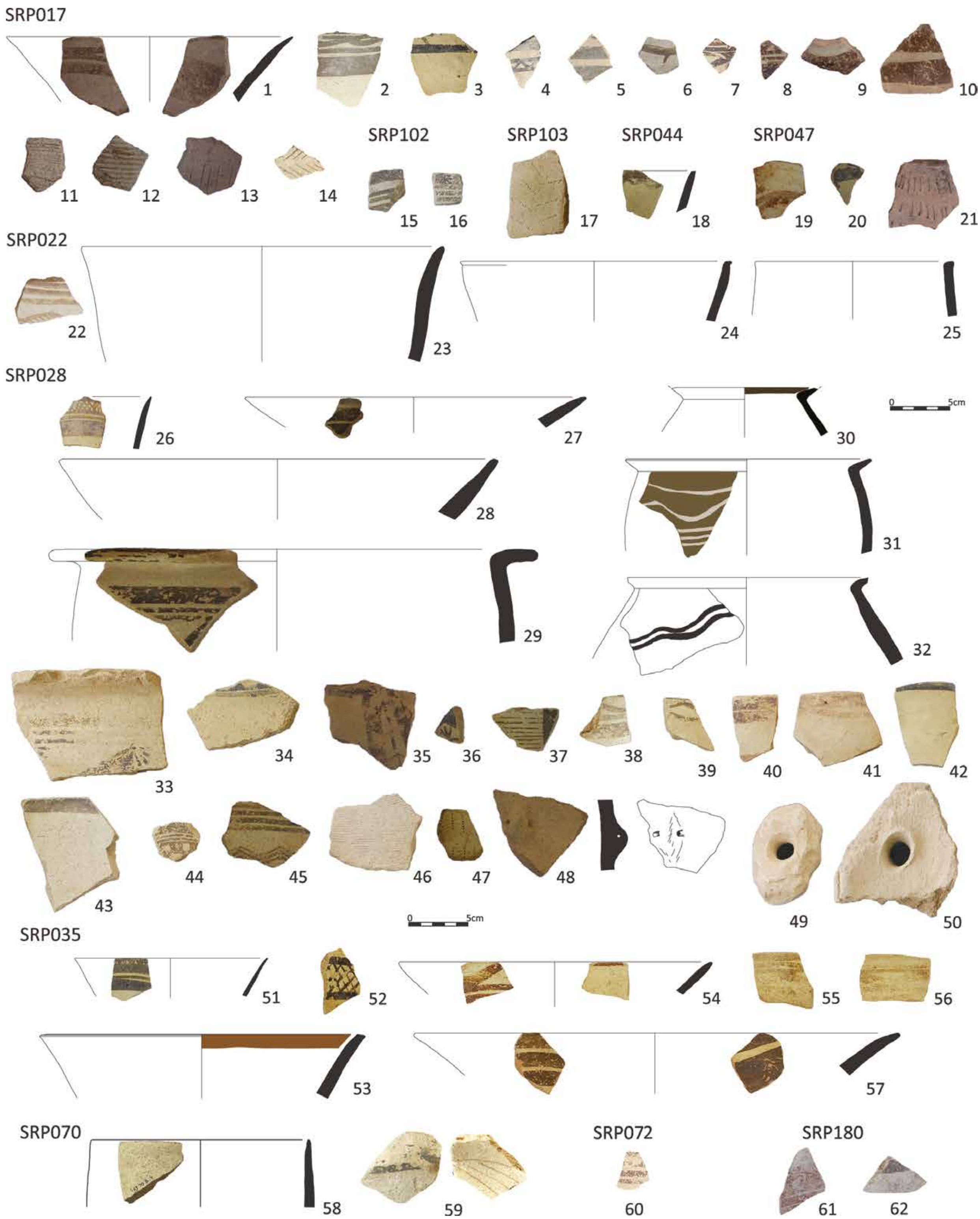


Figure 2.20 Ubaid pottery from sites in the Bnkura plain.

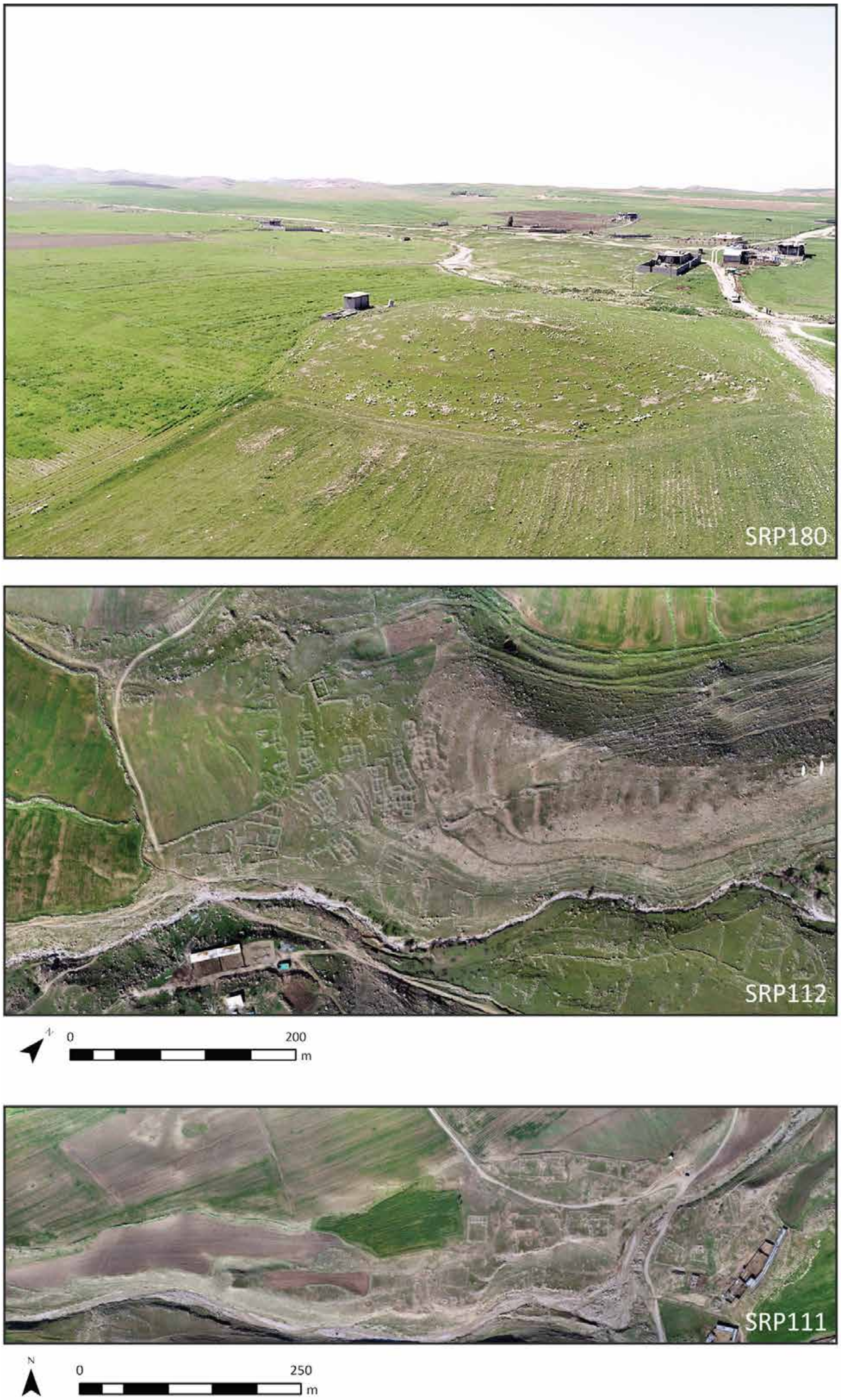


Figure 2.21 Aerial view of Tepe Qaburstan (SRP180) and orthophotos of Qala Horen (SRP112) and Tapa Awayi Gawra (SRP111).

broadly, but not exactly, compared to examples from Tell Madhhur,[126] a second shallow bowl with a brown painted band along the rim (Figure 2.18.92), and a bowl fragment with festoons on the inner surface (Figure 2.18.93).

2.4.4.2 Left bank

Across the Sirwan in the Bnkura plain, the large, multi-period mound of Tepe Imam Mohammed (SRP017) produced a small collection of chaff-tempered brown and black painted as well as comb-incised and herringbone-incised sherds, suggesting an occupation in the mid-to-late Ubaid (Figure 2.20.1-14). War Qatar II (SRP102), which was occupied also in the Late Neolithic, produced a small collection of sherds that suggest activity or occupation during the Early-to-Middle Chalcolithic (Figure 2.20.15-16). A sherd with lines of stabbed dots in a herringbone pattern (Figure 2.20.17) from Away Gawra (SRP103) could also belong to this period. Nearby SRP044, which produced a sizeable Halaf-related assemblage, also appears to have been occupied in the later Ubaid (Figure 2.20.18). This is also the case for Tapa Yahudi (SRP047), whose surface assemblage includes a small collection of painted sherds (Figure 2.20.19-20), and a jar fragment with short incised/dragged lines arranged in concentric circles (Figure 2.20.21) that can be compared to examples from Tell Abada II-I.[127]

The site of Falah (SRP022), which was also occupied during the Late Neolithic, produced one brown-on-buff painted Ubaid sherd (Figure 2.20.22) with parallels, for instance, at Tell Abada[128] and at Serik in the Mandali-Badra region,[129] as well as several plain ware vessels (Figure 2.20.23-25). The site of Mrwari (SRP028) appears to have housed a substantial Ubaid occupation. The site's surface assemblage includes several painted (Figure 2.20.26-27) as well as plain bowl (Figure 2.20.28) and jar rims (Figure 2.20.29-33), alongside numerous painted and incised pieces (Figure 2.20.34-47). The painted motif on one jar fragment (Figure 2.20.33), for instance, finds an almost exact parallel in an Ubaid 3 sherd from Tell Abada.[130] The decoration on another sherd (Figure 2.20.35) bears a more general resemblance to material from the same assemblage,[131] as does the motif on a further fragment (Figure 2.20.36).[132] Mrwari also produced numerous sherds bearing simple bands and festoons (Figure 2.20.38-43). In addition, the assemblage includes several examples of a heavily chaff-tempered ware, whose checkerboard and zigzag motifs flake off easily (Figure 2.20.44-45), and that can be compared to pieces from Ezadin Tepe (SRP205). Several pieces with impressed decoration (Figure 2.20.46-47), and a characteristic pierced nose-lug are also attested (Figure 2.20.48). A stone (Figure 2.20.49) and a baked clay (Figure 2.20.50) mace or weight can be compared to a similar object from Ezadin Tepe.

SRP035 is another small c. 1 ha low mound in the Sawzblagh region, which has been damaged by agriculture and earthmoving. In addition to a red-painted Halaf bowl fragment, signs of early occupation in the Chalcolithic include a fine-ware bowl with greenish fabric and a dark brown saw-tooth pattern around the rim followed by several painted bands (Figure 2.20.51). Fabric and motif are associated with the Ubaid 2 tradition, and find comparisons at the Ubaid pottery production site of Kall Karim in the Pusht-i Kuh region of western Iran.[133] SRP035 also produced several painted bowls associated with the Ubaid 2-3 (Figure 2.20.53-57). Small quantities of Ubaid-related material were also recovered from Mala Kunar I (SRP070, Figure 2.20.58-59) and the nearby SRP072 (Figure 2.20.60).

2.4.4.3 Uplands

Evidence for the Neolithic and Early-to-Middle Chalcolithic is sparse in the northern parts of the SRP research region. Lithic and pottery finds from a handful of locations, however, suggest that this is a function of taphonomy and survey method rather than an absence of prehistoric occupation. Qala Horen (SRP112) and Tapa Awayi Gawra (SRP111) are located along the southern hillsides of the Shakhi Bamu range (Figure 2.21). The most salient surface features at these two sites are clusters of stone-built structures and more recent field boundaries. Their chipped stone surface collections, however, point to human presence and use from the Neolithic (Figure 2.22, also Appendix III). The lithic assemblage collected at Qala Horen (SRP112) consists of six chipped stone artefacts realised on chert raw materials, including a subconical microblade core (Figure 2.22.2), a core or flake possibly reused as a tool (Figure 2.22.1), a flake (Figure 2.22.4), and four retouched artefacts (Figure 2.22.3, 5-6), which fall into a broad Neolithic-to-Bronze Age chronological range. Tapa Awayi Gawra (SRP111) produced nine chert artefacts, including a pebble core with several extraction surfaces (Figure 2.22.7), alongside flakes also realised on pebbles (Figure 2.22.8-15). There are no formal types in the assemblage, but most of the flakes are retouched, suggesting a Chalcolithic-to-Bronze Age chronological range.

Tepe Qaburstan (SRP180) is the only upland site, which has produced pottery fragments that can be tentatively

126 Moon and Roaf (1984, 154, Fig. 21.11-12).
127 Jasim *et al.* (2021, 442, Figs. 385.7, 386.14).
128 Ibid., Fig. 183.2.
129 Oates (1968, Plate XI.2).
130 Jasim *et al.* (2021, Fig. 420).
131 Ibid., Fig. 356.12.
132 Ibid., Fig. 312.2.
133 Mazaheri (2018, Fig. 8.6).

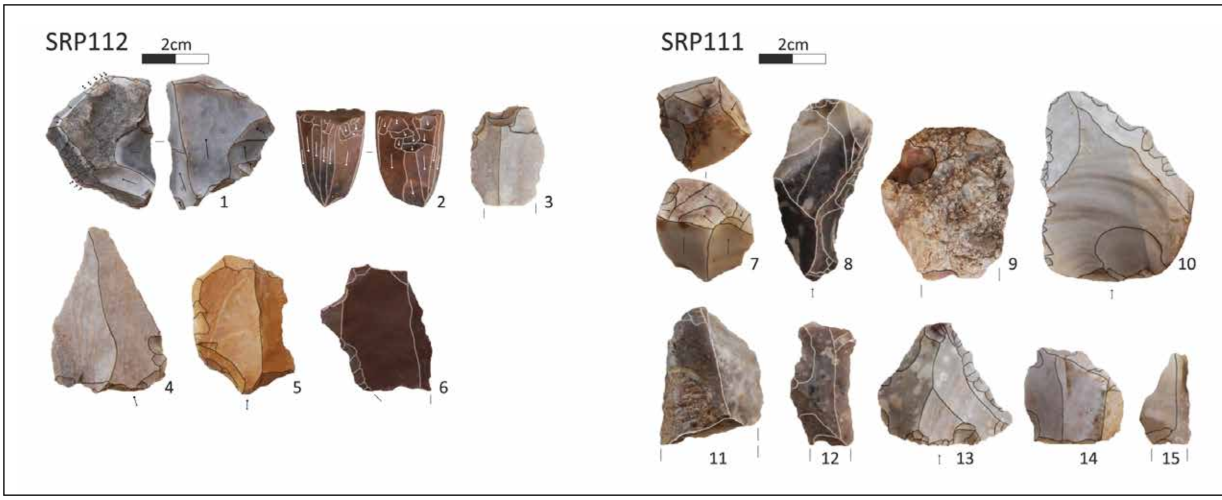


Figure 2.22 Chipped stone assemblages from SRP112 and SRP111.

associated with the Ubaid (Figure 2.20.61-62). The site is located in a small upland valley, 498 m above sea level, to the south of the Hawasan valley and consists of a c. 1 ha large and c. 4 m high main mound, which is almost completely covered by the remains of an Islamic cemetery. More substantial occupation is attested at the site during the Late Chalcolithic and Bronze Age (see Chapters 3-5).

2.5 Conclusions

In this chapter, we presented evidence for the earliest human presence identified to date in the lower Sirwan region. Tentative indications for a pre-Holocene occupation come from the cave site of Ashkawti Manga Wakal (SRP181). It is likely that other caves in the region, only a small portion of which have been explored to date by the SRP, were also used as campsites by Palaeolithic hunter-forager groups. Two sites, Grda Gozina (SRP010) and SRP177, which are both located not far from the banks of the Sirwan and atop Pleistocene terraces, can be dated with confidence to the Early Neolithic (Figure 2.23). They demonstrate that the lower Sirwan region formed part of the first wave of expansion of Neolithic lifeways into the lower altitude zones of the western Zagros piedmonts. Their chipped stone industries tie the two sites into a wider network of raw material exchange and communities of shared practice that encompassed western Iran, the Shahrizor plain, and the Rania region.

Signs of human presence become more numerous in the Late Neolithic, when 15 new sites, ranging in size between tiny hamlets and villages of up to 2.5 ha, are attested mainly in the Bnkura and Gumar plains. The pottery from these sites includes examples of classic Hassuna types such as coarse, chaff-tempered jars and husking trays, and a somewhat later, fine and mineral-tempered tradition with incised decoration, which is also attested in the Shahrizor plain. The chipped stone industries from these sites also tie their inhabitants into a wider piedmont community of practice, whose knapping techniques originate in the Early Neolithic of the same region. A microblade core found at Qala Horen (SRP112) hints at a Neolithic presence in the Hawasan valley, but no sites with definitive Neolithic pottery could be identified at any of the upland sites.

In the southern part of the survey area, Late Neolithic sites cluster in several discrete areas, each of which offered broadly similar environmental affordances. The majority of sites are located on the most fertile soils available in the region, which were, however, watered only by intermittent seasonal streams (Figure 2.24, see also Chapter 1.2). Only SRP093 and Tepe Qalah (SRP006) are located on somewhat inferior agricultural soils, seemingly a trade-off for proximity to the Sirwan and the opportunities it would have provided for the exploitation of riparian habitats, river-borne chert sources, and supra-regional communication networks. While settlement locales shift throughout the Neolithic and Early-to-Middle Chalcolithic, the preference for higher quality soils at the expense of immediate access to permanent surface water persists throughout the seventh, sixth, and fifth millennia BCE, as well as into later periods (see Chapter 13). A limited concern with the availability of surface water in the early Holocene has also been observed in the Erbil plain,[134] and for Ubaid settlements in the Mahidasht region of western Iran.[135] One of the most likely explanations for this pattern is the very favourable climatic conditions that

134 Ur *et al.* (2021, 214).
135 Levine and McDonald (1977, 49).

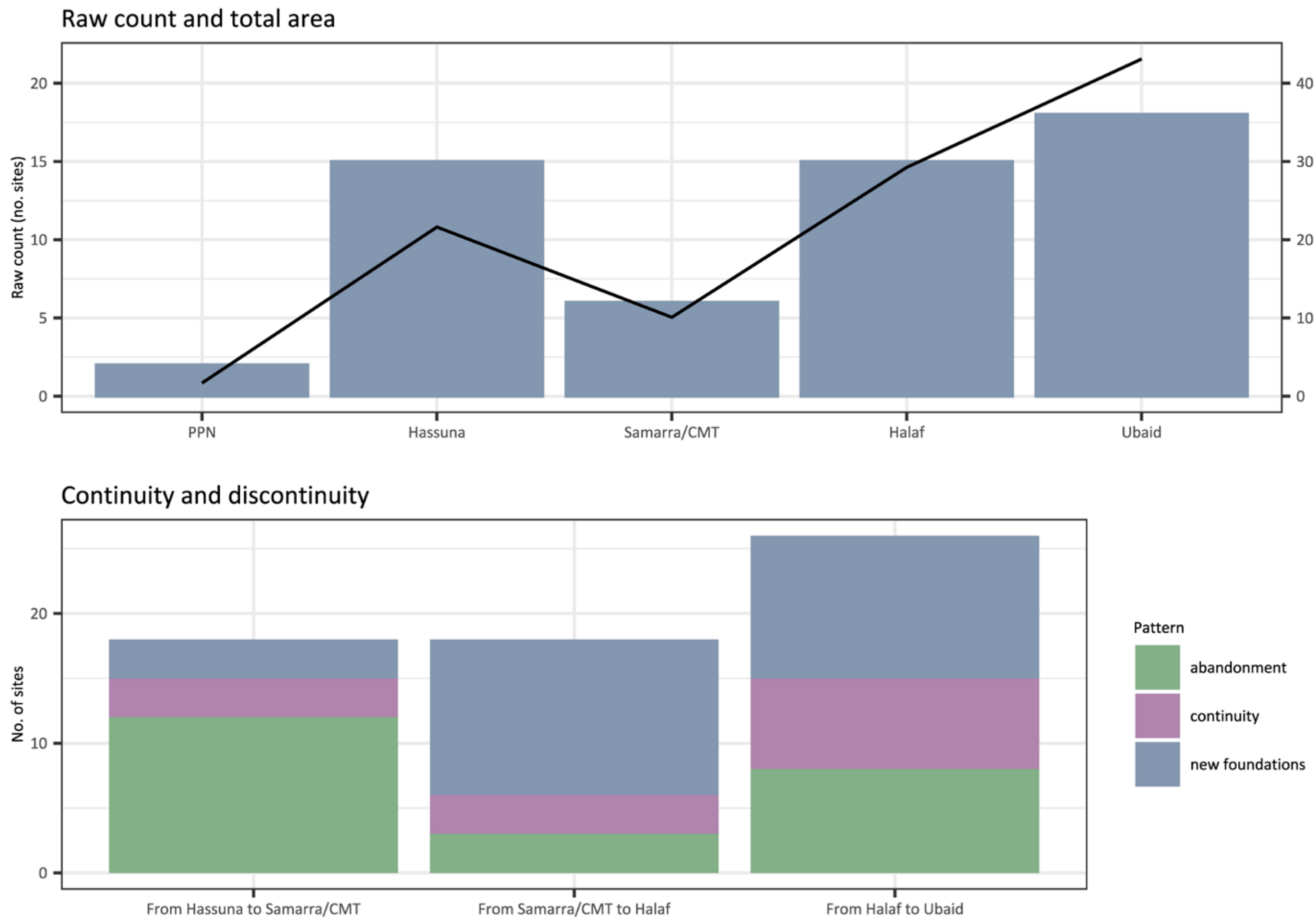


Figure 2.23 Neolithic and Early-to-Middle Chalcolithic site counts, total settled areas, and patterns of continuity and discontinuity. Note that counts are not weighted due to the uncertainty of chronological overlap between Hassuna, Samarra, Halaf, and Ubaid cultural traditions.

persisted during much of the Neolithic and Early-to-Middle Chalcolithic. Speleothem-based precipitation models suggest that throughout the early Holocene, the lower Sirwan valley received above 300 mm average annual rainfall (Figure 2.25), sufficient for the practice of early rain-fed agriculture, and placing the region outside of the 'zone of uncertainty' (see Chapter 1.2).

Coarse-grained chronological resolution, the long-lived nature of the cultural traditions in question, and the limited absolute temporal anchors available for the Late Neolithic in the SRP record and in the wider region, could mean that these Neolithic hamlets and villages were occupied broadly at the same time, partially, or not at all contemporaneously. Limited mound formation and generally small surface collections suggest that occupations may have been intermittent, and perhaps shifting between neighbouring sites. Further excavations and reliable absolute dates will be needed to test these hypotheses and to investigate whether these mounds were used by different groups or formed part of the settlement and activity landscapes of multi-sited communities.[136]

Surface collections, a magnetic gradiometer survey, and a test sounding at Tepe Sirwan (SRP036) suggest a fairly long-lived or recurrent occupation by one or more communities tied into a Hassuna-related piedmont cultural sphere, whose members cultivated and reared hardy domesticates, and exploited locally available wild resources. Chipped stone artefacts from Tepe Sirwan and other Late Neolithic sites in the region show that lower Sirwan communities accessed local raw materials, but also participated in regional and supra-regional exchange networks to obtain chert and obsidian.

136 Bernbeck (2008).

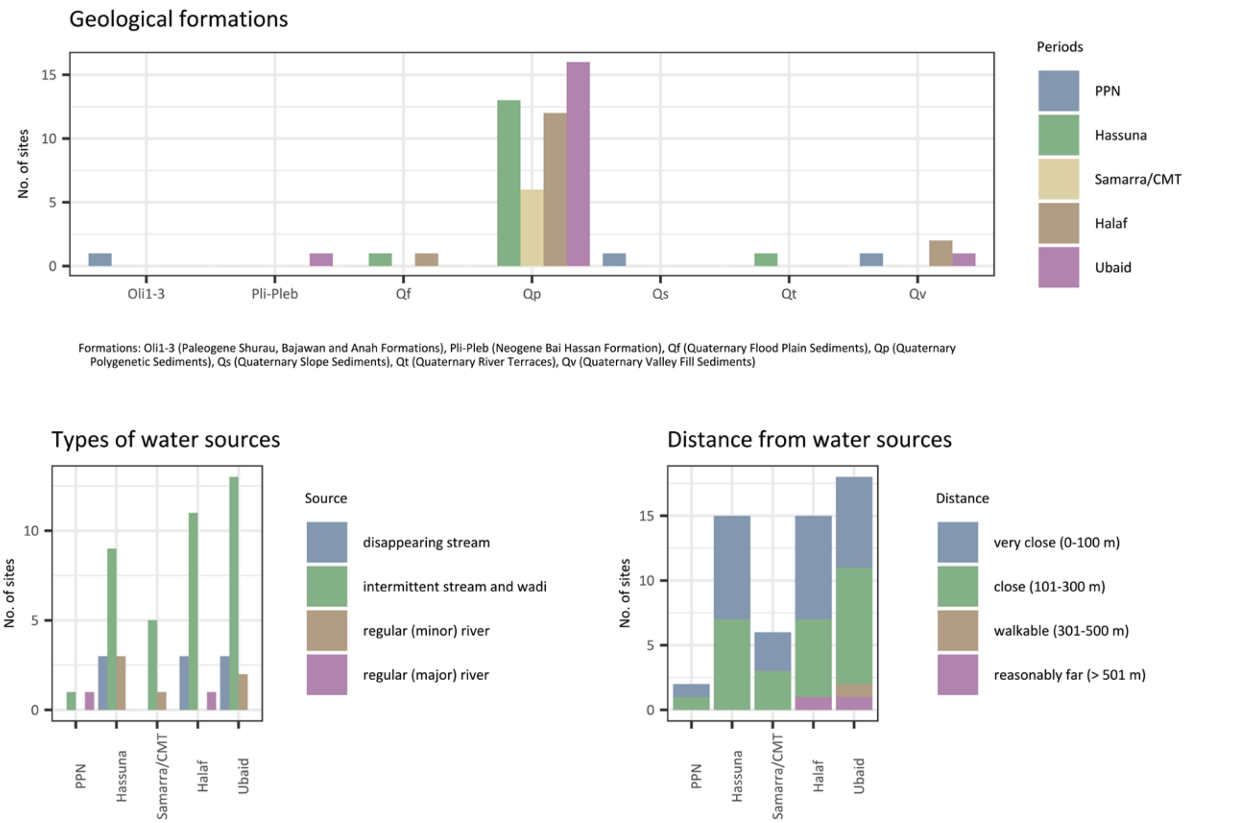


Figure 2.24 Soil quality and accessibility of water for Neolithic and Early-to-Middle Chalcolithic sites (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

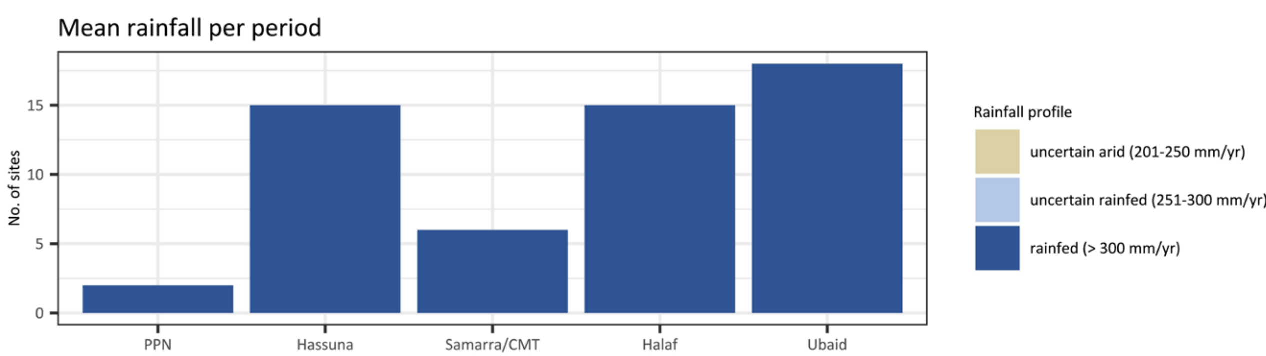


Figure 2.25 Mean rainfall for the Neolithic and Early-to-Middle Chalcolithic periods (source data: Hewett *et al.* 2022).

The SRP survey data indicate that about two thirds of Hassuna sites were occupied or in use in subsequent periods, as evidenced by Samarra/CMT, Halaf, or Ubaid surface finds. At these sites as well as at newly settled locales, we also find varying combinations of the latter cultural elements, pointing to likely chronological overlaps. The extent of this overlap or its cultural and social contexts, however, cannot be ascertained with surface collections, nor – at the moment at least – with extant data from the wider region, where old and newly available information point to a complex palimpsest of regional cultural networks, and varying temporalities of cultural and social continuity and change.

We have already discussed at length the potential continuity of Hassuna traditions into what is generally referred to as the Halaf I on the Shahrizor plain[137] and at SRP sites. To the south of the SRP survey area, limited Hassuna assemblages were found on the same mounds

137 Odaka *et al.* (2019).

that also yielded Samarra pottery in the Mandali-Badra region, while CMT materials dated to c. 5101-4896 cal. BCE at Choga Mami[138] were found alongside Late Halaf sherds.[139] Samarra and CMT painted pottery was also found together with early Ubaid material at Tell Abada[140] and at Tell Songor A,[141] as well as in the west Iranian Zagros.[142] A series of recent radiocarbon dates from Gird Banahilk, which is located near the modern town of Soran-Dyana to the northwest of the Shahrizor plain, place its Halaf occupation to 5559-5367 cal. BCE.[143] Classic Late Halaf fine wares are present in very small numbers at Yasin Tepe in the Shahrizor plain and a handful of other sites,[144] while pottery from Tell Begum[145] and Tepe Marani[146] present a more localised variant of the Late Halaf to Ubaid Transition (HUT) dating to c. 5500-5300 cal. BCE at Tell Begum[147] and to between 5480-5210 cal. BCE at Tepe Marani.[148]

Excavations at Tell Logardan (Trench C) in the Chamchamal region also produced Halaf and Ubaid materials. Level 9 consists of a heavily burnt *tholos* structure and an associated rectangular architectural unit, which yielded the full suite of the Halaf cultural assemblage, but also a significant proportion of Ubaid plain and painted ceramics, and stylistically hybrid decorative motifs.[149] More intriguing, the decoration on Halaf sherds at Logardan shows greater similarities with the Early Ubaid (Ubaid 1-2) in central Iraq rather than the Late Halaf forms and decorative patterns that might be expected to co-occur with Ubaid pottery.[150] Vallet and colleagues interpret this as the beginning of a gradual process of cultural replacement.[151] In Level 9, the Ubaid pottery is comparable to the Ubaid 3 material from Tell Abada Level II-I, while Halaf artefacts gradually disappear in Levels 8 and 7; only personal and domestic items associated with Halaf culture, such as small stamp seals, pendants, and stone vessels continue.[152]

A total of six SRP sites produced very small quantities of Samarra/CMT sherds, while 15 include one or more pieces of Halaf painted pottery. Only at three sites, Tepe Rahim (SRP182), where Iraqi excavations exposed a partial *tholos* structure, War Qatar I (SRP101), and SRP044, does Halaf material culture predominate. Surface finds include pieces that tie into standard Halaf aesthetics, but local variants with links either to Tell Abada and other sites in the Hamrin, or with Tell Begum in the Shahrizor plain are in the majority. Ubaid communities, attested at 18 sites, along the Sirwan were also closely associated with those of Tell Abada and Tell Madhhur, Kani Shaie and Gurga Chiya, and Ubaid-related sites in western Iran. In this way, the lower Sirwan valley can be said to have formed part of Baldi's central Zagros ceramic province,[153] although new questions have recently arisen regarding Ubaid geographies and temporalities.

The Late Ubaid occupation at Gurga Chiya is radiocarbon-dated to between 4530-4340 cal. BCE[154] and finds close parallels at Tell Madhhur.[155] At Surezha in the Erbil plain, Ubaid-style painted pottery, incised wares, and Dalma incised wares have been dated to between c. 5200 to 4620 cal. BCE,[156] with a single radiocarbon date from Kani Shaie tentatively agreeing with these high dates for the Ubaid-Late Chalcolithic (LC1) transition.[157] Dalma ware is attested at Kani Shaie VII,[158] at Gurga Chiya,[159] as well as at Tell Abada, Kheit Qasim, and Yorgana Tepe,[160] and more prominently at Surezha,[161] but absent from the Mahidasht of western Iran, which appears to have instead developed painted traditions more closely associated with the Ubaid and potentially lasting into the LC1.[162] LC1 materials are as yet elusive in the SRP surface record, and Dalma ware is entirely absent, suggesting perhaps an eastward cultural orientation during the Ubaid-LC1 transition. Very well attested by contrast are sites dating to the subsequent Late Chalcolithic, which we present in the following chapter.

138 Oates (1972).
139 Oates (1968, 13).
140 Jasim (1985); Jasim *et al.* (2021).
141 Kamada and Ohtsu (1993).
142 Darabi (2020).
143 Braidwood *et al.* (1983); Gómez-Bach *et al.* (2019, Table 1).
144 Altaweel *et al.* (2012, 22).
145 Nieuwenhuyse *et al.* (2016).
146 Wengrow *et al.* (2016); Carter *et al.* (2020).
147 Nieuwenhuyse (2018); Odaka *et al.* (2019, 70, Table 1).
148 Wengrow *et al.* (2016, 268).
149 Vallet *et al.* (2019, 167-168).
150 Ibid., 168-169.
151 Ibid., 170.
152 Ibid.
153 Baldi (2016, 118-119, 128).
154 Carter *et al.* (2020, 58, Table 3).
155 Moon and Roaf (1984); Wengrow *et al.* (2016, 261-268); Carter *et al.* (2020, 53-55).
156 Stein and Alizadeh (2014, 149-150, Table 2); Stein (2018, 31, 42).
157 Renette *et al.* (2022, 228).
158 Renette *et al.* (2021, 9-10, 39, Figs. 6.15-16, 7.1-3).
159 Wengrow *et al.* (2016, 13).
160 Henrickson and Vitali (1987, 40).
161 Alden *et al.* (2021).
162 Renette and Ghasrian (2020, 117).

3

The Late Chalcolithic in the Lower Sirwan Region

3.1 Introduction

The Late Chalcolithic (LC) of greater Mesopotamia has stood at the centre of many decades of culture evolutionary debates about the emergence of urbanism and centralising state institutions (Table 3.1). Meta-narratives about the chronology and geography of the momentous social transformations that some village communities underwent to become large, and increasingly hierarchically organised cities, have moved considerably in both geographical and conceptual terms over the course of the past half-century. These shifts have been largely determined by geopolitical developments and by the associated ability, or lack thereof, to carry out systematic archaeological fieldwork. Initially the story of centralising institutions started in southern Iraq and western Iran, where pristine state formation was thought to have taken place, and towards which a network of south Mesopotamian trading outposts channelled precious resources.[1] When international archaeological field projects migrated from Iraq to Syria and Türkiye, attention shifted to the identification and analysis of indigenous centralising institutions in the north Mesopotamian plains and adjacent upland regions, which in some cases were shown to predate those in the south.[2] Though the focus was now on local communities, the quest to identify the earliest manifestations of urban agglomerates and state institutions continued. At the same time, a more diverse set of relationships between local communities and southern traders or colonists also emerged from this research, challenging earlier Uruk-centric models of inter-regional interaction, and the ways in which the so-called Uruk expansion catalysed societal change.[3]

Over the past decade, the western Zagros piedmont and the KRI in particular have become a new focus for the investigation of the LC, while earlier research had already identified and investigated several LC sites. Excavations at Qalinj Agha (Erbil), for instance, brought to light tripartite buildings and Ubaid to LC 1-3 materials,[4] and Gerdi Resh in the Shahrizor plain yielded an LC3 architectural level.[5] In spite of these efforts, the wider region remained a blank spot on the maps of publications grappling with the so-called Uruk expansion, and with questions of emergent institutional power more generally.[6] Others hypothesised relationships with the Uruk world developing in a similar way to those observed in northern Mesopotamia;[7] although some of this was based on what is now considered erroneous information.[8]

1 Algaze (1993a, b; 2008).
2 Oates *et al.* (2007).
3 Stein (1999); Rothman (2001b); Frangipane (2010); Petrie (2013).
4 Al-Soof and El-Siwwani (1967); Al-Soof (1969); Hijara (1973).
5 Hijara (1976); Mühl (2013).
6 Rothman (2001a, Fig. 1.1).
7 Algaze (1993b, 63-71).
8 D'Anna *et al.* (2022).

Dates BCE	Phase	Period (Mesopotamia)
4400-4200	LC1	Late Ubaid
4200-3900	LC2	Early Uruk
3900-3600	LC3	Early Middle Uruk
3600-3400	LC4	Late Middle Uruk
3400-3200	LC5	Late Uruk
3200-2900	JN	Jemdet Nasr

Table 3.1 Periods and their approximate dates discussed in this chapter.

This erstwhile empty archaeological map is now being rapidly filled with new sites and archaeological knowledge, as intensive research in the KRI since 2010 has begun to produce a wealth of new information on LC communities in the western Zagros piedmonts. Similarly, work across the border in Iran is also becoming more internationally accessible[9] and helping to contextualise the fourth millennium BCE evidence from Godin Tepe.[10] Late Chalcolithic sites have been reported by all of the larger-scale survey projects in the region,[11] and varyingly extensive LC contexts have been exposed at Tell Nader,[12] Surezha,[13] Tell Helawa,[14] and Gird Lashkir[15] in the plains around Erbil, at Babw Kur in the Rania plain,[16] Qalat Said Ahmadan in Qaladizah,[17] Gird-i Rostam in Penjwin,[18] Tell Tanjero and Tell Greza,[19] Tell Begum,[20] Gird-i Shamlu, Bakr Awa[21] and Gurga Chiya[22] in the Shahrizor plain,[23] at Ban Qala in the Qara Dagh region,[24] at Kani Shaie in the Bazian basin,[25] and at Girdi Qala and Logardan near Chamchamal.[26]

Emerging from this ongoing work is an increasingly detailed regional picture. Results thus far not only provide insights into different pathways that lead towards greater institutional power and integration, which has been the focus of work in the Jazirah and in eastern Türkiye in the 1990s and 2000s, but they highlight a wide spectrum of LC forms of social and economic organisation and cultural practice. Perhaps most important for the advance of our understanding of these processes, this new phase of intensive fieldwork offers the opportunity to trace empirically, and at the scale of both individual communities and regionally, the ways in which different groups experimented with demographic scale, adopted more hierarchical or centralised socio-economic models, and rejected them either outright or over time. This goes hand-in-hand with the diverse range of relationships that local societies appear to have entered into with those located or originating in different parts of Mesopotamia and the Zagros piedmonts, and how they negotiated, adopted, or showed disinterest in non-local material culture and practices, and the social meanings and models associated with them.

Results to date point at several distinct regional developments in the piedmont zone compared to those documented in the Mesopotamian lowlands and in western Iran. In the Shahrizor plain, for instance, communities adopted material culture from elsewhere, including aspects of the chaff-faced traditions of northern Mesopotamia and some southern, Uruk-related traditions. However, they also show very limited enthusiasm for the otherwise increasingly popular plain and hastily produced LC1-3 bowl types that may have served in communal feasting events, such as the Coba bowls.[27] Late Chalcolithic communities in the Shahrizor plain, moreover, show no signs of urbanisation,[28] and there was limited interest in southern, Uruk-style vessels such as beveled rim bowls (BRBs) and jars during the LC4, but those attested were locally manufactured.[29] This is followed by an absence of intensive Uruk interactions in the LC5. This contrasts sharply with developments at Girdi Qala and Logardan in the Chamchamal region, where recent excavations identified a settlement with a southern, Uruk-related cultural assemblage starting in the LC2, as well as a community producing more localised material culture, suggesting a much earlier onset of the Uruk diaspora than in northern Mesopotamia or in the Iranian highlands.[30] Further to the east, the Great Khorasan Highway and the Sirwan/Diyala river valley have been envisaged as key corridors of movement and interaction, bringing societies in the western Zagros piedmont in contact with the Uruk world.[31]

9 Dadaneh *et al.* (2019a, b); Renette and Ghasrian (2020).
10 Rothman and Badler (2011).
11 Altaweel *et al.* (2012); Sconzo (2019); Ur *et al.* (2021).
12 Kopanias *et al.* (2013).
13 Stein (2018); Alden *et al.* (2021); Minc *et al.* (2021).
14 Peyronel *et al.* (2019); Peyronel and Vacca (2020).
15 Molist *et al.* (2019).
16 Skuldbøl and Colantoni (2018).
17 Tsuneki *et al.* (2015; 2016).
18 Potts *et al.* (2018).
19 Saber *et al.* (2014).
20 Nieuwenhuyse *et al.* (2016); Nieuwenhuyse (2018).
21 Al-Soof (1985); Miglus *et al.* (2013).
22 Wengrow *et al.* (2016); Carter *et al.* (2020).
23 D'Anna (forthcoming).
24 Catanzariti *et al.* (2020).
25 Renette *et al.* (2021).
26 Vallet *et al.* (2017; 2019).
27 Baldi (2012).
28 D'Anna *et al.* (2022).
29 Lewis *et al.* (2020).
30 Vallet (2020).
31 Henrickson (1994); Matthews (2013); Rothman (2013); Vallet (2020, 451).

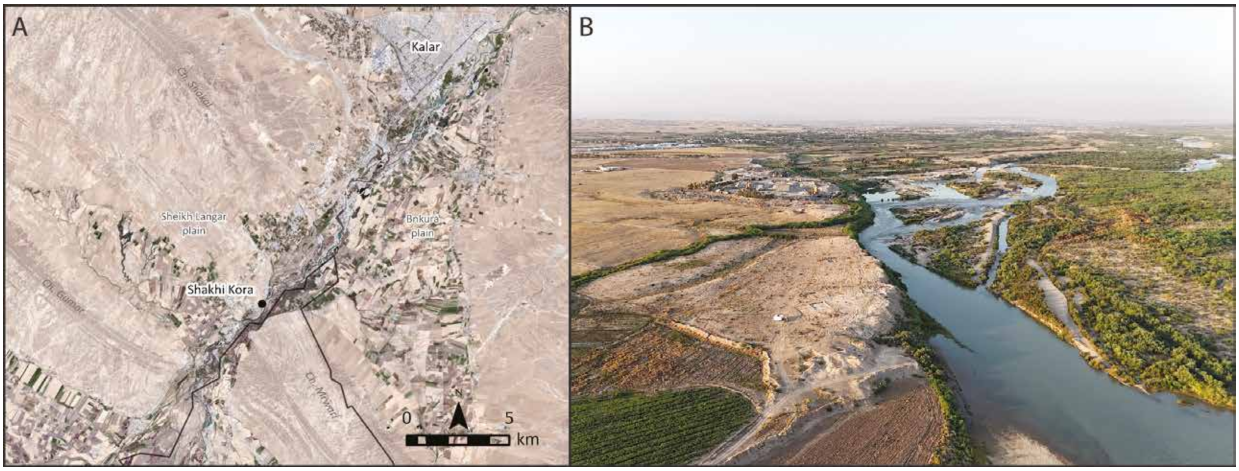


Figure 3.1 A) Map showing the location of Shakhi Kora (GoogleEarth image ©CNES/Airbus) and B) an aerial view of the site.

Archaeological evidence for, and research on, the LC in the Sirwan/Diyala region, however, has been very limited so far. Acknowledging the considerable problems inherent with the type fossil approach of the *Land Behind Baghdad* survey, which for the LC only includes BRBs, clay wall cones, flint-scraped bowls, and drooping spouts,[32] Adams noted that although more numerous than Ubaid sites, settlements dating to the 'Warka and Protoliterate' periods do not play a conspicuous quantitative part in lower Diyala surface collections. He also notes that these characteristic southern artefacts concentrate at a few larger sites. The presence of 'Protoliterate' remains on virgin soil at the main excavated Bronze Age centres, and a hypothesised growth in population density at these sites, is thought to be reflected in an increase in rural villages at the end of the fourth millennium BCE.[33] Only three LC sites have been reported from the middle Diyala, Tell Rubeidheh,[34] Tell Hassan,[35] and Tall Ahmad al-Hattu,[36] which point to a sparse and village-based regional settlement pattern during the mid-to-late fourth millennium BCE.

Excavations at the newly discovered site of Shakhi Kora (SRP191) and regional survey in surrounding landscapes by the SRP have started to shed light on the LC along the upper reaches of the river, where no fourth millennium BCE sites had been recorded previously. Work at Shakhi Kora is still ongoing, but our preliminary results suggest that LC communities along the Sirwan followed regionally distinct cultural and social trajectories to those documented in the Chamchamal, Bazian, Shahrizor, and Hamrin regions. The early LC in the lower Sirwan region shares many similarities with the wider piedmont zone, including its strong connections with northern Mesopotamia. At the same time, aspects of south Mesopotamian material culture were incorporated into local traditions as early as the LC2, and the community at Shakhi Kora, as we discuss in more detail below, developed increasingly strong cultural ties with the Uruk world from the middle of the fourth millennium BCE.

In this chapter, we present first the results of excavations at Shakhi Kora, the most extensive and enduring LC settlement in the region. Building on the stratigraphic and cultural insights gained from Shakhi Kora, the second part of the chapter will contextualise the site in its wider regional environment.

3.2 Excavations at Shakhi Kora (SRP191)

The majority of sites recorded by the SRP thus far are located in the plains surrounding the Sirwan south of the modern town of Kalar, which provide adequate, if not especially favourable agricultural soils (Chapter 1.2). The location of Shakhi Kora (Figure 3.1), just to the east of the modern village of Ban Asyaw and c. 10 km southwest of Kalar, distinctly diverts from this pattern. Moving south from Kalar on the modern road, one passes through the small plain of Shekh Langar, which today is extensively irrigated by mechanical means. The landscape changes drastically as we ascend the Pleistocene terrace that skirts the eastern limits of the Pulkhan anticline or Shakhi Shakal.

The terrace lies several metres above the plain of Shekh Langar and is today used for farming and grazing, as well as intensive, industrial-scale gravel mining and asphalt production. It is here that the Sirwan floodplain narrows significantly from its more unconstrained anastomosing configuration further upstream as it forces its way through the low hill ranges of the Shakhi Shakal and Chiaye Mrwari. Shakhi Kora, which means 'mountain

32 Adams (1965, 127, Fig. 11.2.A-D).
33 Ibid., 36-37.
34 Killick (1988).
35 Nannucci (2012).
36 Sürenhagen (1978; 1981); Eickhoff (1993).

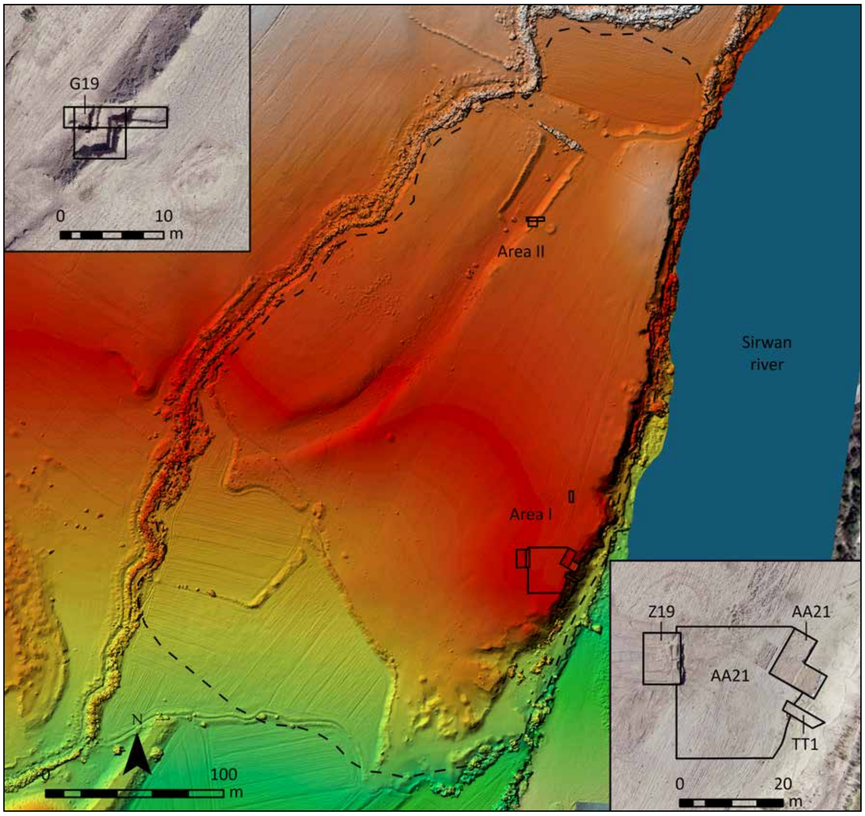


Figure 3.2 Digital elevation model of Shakhi Kora and its immediate surrounding landscape.

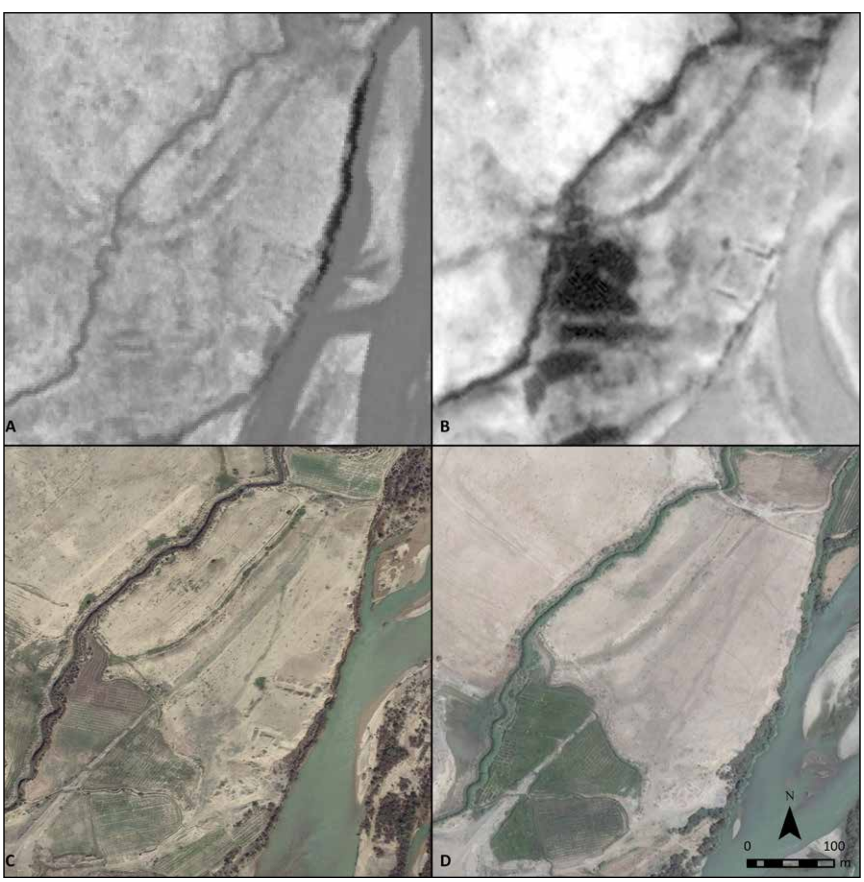


Figure 3.3 Satellite imagery showing military installations and other site damage on Shakhi Kora: A) Corona 1969 (©Corona Atlas of the Middle East), B) Royal Airforce aerial photograph, November 1951 (HAS-P series, ©UK Ministry of Defence), C) 2011 WorldView-2 2011 (©DigitalGlobe/ Maxar Technologies), and D) orthophoto, August 2022.

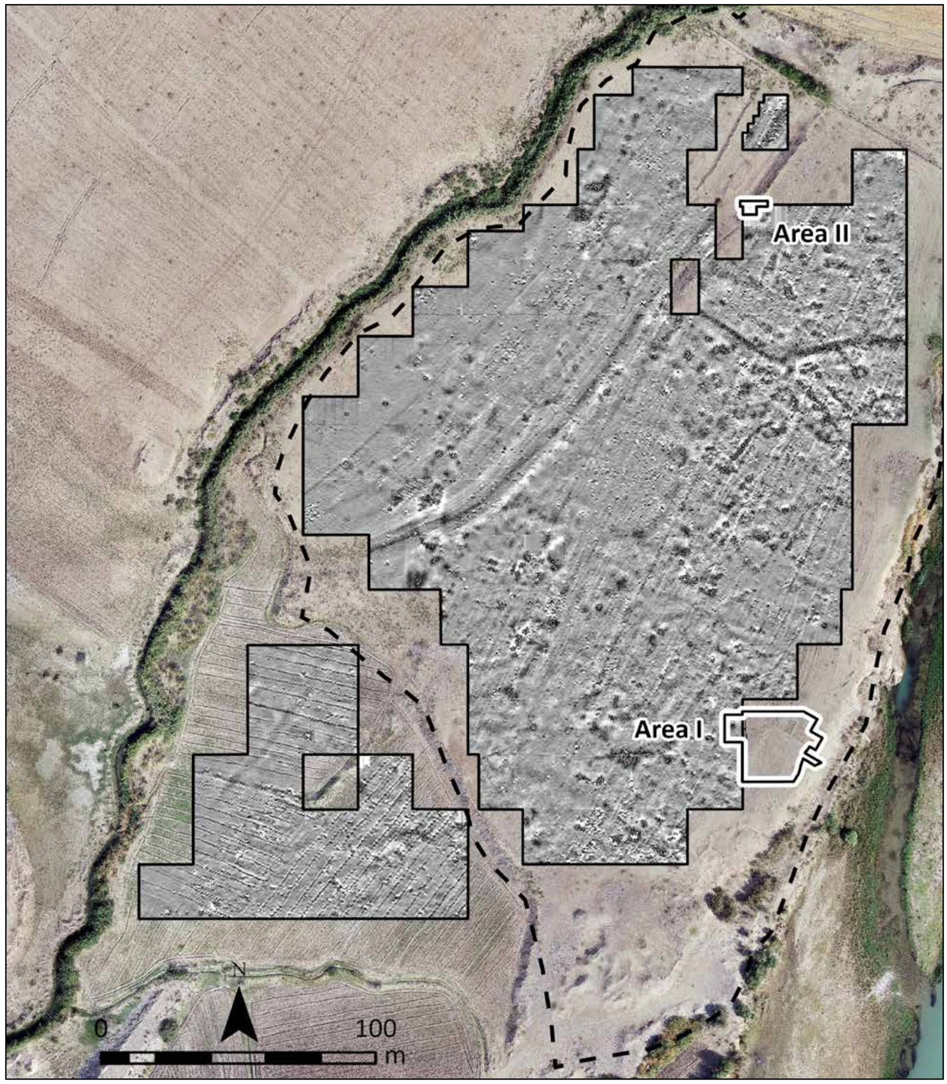


Figure 3.4 Results of the 2023 magnetic gradiometer survey on Shakhi Kora.

of the kiln', is strategically located at this geographical bottleneck on an elevated vantage point overlooking both the river and its surrounding landscapes. In the past, this passage would have been narrower still, as a significant part of the site has been eroded by the river.

Shakhi Kora, with a minimum of 8 ha of occupation, is the largest fourth millennium BCE site recorded to date in the lower Sirwan region and adjacent landscapes. Morphologically, the site appears to have consisted of at least two adjacent mounded settlement locales on either side of a natural depression (Figure 3.2). Except for a small collection of *in situ* baked bricks of Parthian or later date that are visible on the surface of one of the river-facing highpoints, surface material date almost exclusively to the fourth and the very early third millennium BCE. Surface distributions are densest on the higher-lying areas along the river-facing edge of the site, trailing off towards the depression in the west, and picking up again on the second mounded feature.

The site was first visited and recorded by the Garmian Department of Antiquities in April 2018 because of reports of illicit digging. An initial survey by the SRP in August 2018 documented further evidence for what looked like recent, targeted, and professional looting from large holes dug into the river-facing side of the mound. Other parts of the site are currently being destroyed by industrial gravel mining and extensive ploughing, while its entire eastern side is threatened by riverine erosion. A diachronic analysis of satellite imagery shows that the site has been damaged by twentieth century military activities, which include the construction of tank hides on the higher-lying areas of the site in the east, and the excavation of a large, c. 12-15 m wide, northeast-southwest running ditch (Figure 3.3). A smaller irrigation canal was also excavated on the western side of the site, and several dirt tracks, one of which runs parallel to the ditch, have also incised themselves into the site's surface over time.

Figure 3.5 Aerial image of Shakhi Kora with 2019 excavation trenches.

Excavation area	Trench numbers	Years excavated
I	TT1, AA21, Z19, W21	2018, 2019, 2022, 2023
II	G19	2019

Table 3.2 List of excavation areas on Shakhi Kora.

Following an initial damage assessment, the SRP together with the Garmian Department of Antiquities carried out an exploratory test sounding in August 2018. This provided a preliminary understanding of the stratigraphic depth and archaeological significance of the site. Results indicated that Shakhi Kora is among a very small number of settlement sites in greater Mesopotamia with what appears to be a relatively uninterrupted occupation sequence that spans most of the fourth millennium BCE, and that is accessible only centimetres below the current mound surface and over several hectares. Encouraged by these results and spurred on by the various sources of damage and threats to the integrity of the site, the SRP has since carried out four further excavation seasons in 2019, 2022, and 2023. We also began a programme of large-scale magnetic gradiometer survey in 2023, with preliminary results indicating the presence of several large structures at the site, open spaces, and what may be domestic quarters or neighbourhoods (Figure 3.4).

Excavations to date have taken place in two areas, with trenches placed in accordance with a 10 × 10 m alphanumeric site grid as well as prevailing topographic conditions (Figures 3.2 and 3.5, Table 3.2). Area I is located on the eastern, river-facing side of the mound where work to date has taken place in four adjacent trenches. This includes the small test sounding that was excavated along the eastern slope in 2018 (TT1), an enlarged adjacent step trench begun in 2019 and continued in 2022 and 2023 (AA21), a trench located c. 20 m to the west of the eastern edge of the site (Z19), and a further trench to the north started in 2022 (W21). Area II is located near what we currently believe to be the northern perimeter of the settlement and includes a further step trench along the modern ditch (G19). To date, a total area of 728 m^2 has been exposed across the two excavation areas and to a depth of c. 7 m in the step trenches. Fourth and early third millennium BCE occupation layers were reached between 15 and 70 cm below the current surface.

The results and interpretations presented in this chapter are preliminary and focused on introducing the site, and on providing a first outline of its occupation

Phase	Context	Lab No.	Uncal. (BP)	2 Sigma (BCE) IntCal2020	Period
1	TT1/L15/L1 TT1/L16/L1 TT1/L17	AA112459/X3414 AA112460/X34147 AA112461/X34148	5074±24 5069±22 5067±22	3956-3796 3953-3797 3953-3796	
2	AA21/L203 TT1/L8	AA116085/X37687 AA112457/X34144	5022 ±13 4992±28	3941-3713 3936-3655	LC2/3
3	TT1/L1 AA21/L9/L1 AA21/L20	AA112455/X34142 AA11484 /X36453 AA114849/X36454R	4925±21 4946±29 4893±29	3766-3644 3780-3648 3761-3633	LC3
4	AA21/L8	AA114847/X36452	4884±30	3760-3541	LC3/4
5	Z19/L110 TT1/L2 AA21/L2/L5	AA116084/X37686 AA112456/X34143 AA114846/X36451	4824±14 4767±45 4732±29	3646-3532 3642-3378 3631-3377	LC4/5
6	AA21, Z19	-	-	-	JN/ED I

Table 3.3 Preliminary phasing and associated radiocarbon dates from Shakhi Kora. Phasing is based on stratigraphic considerations, absolute dates, and ceramic analysis.

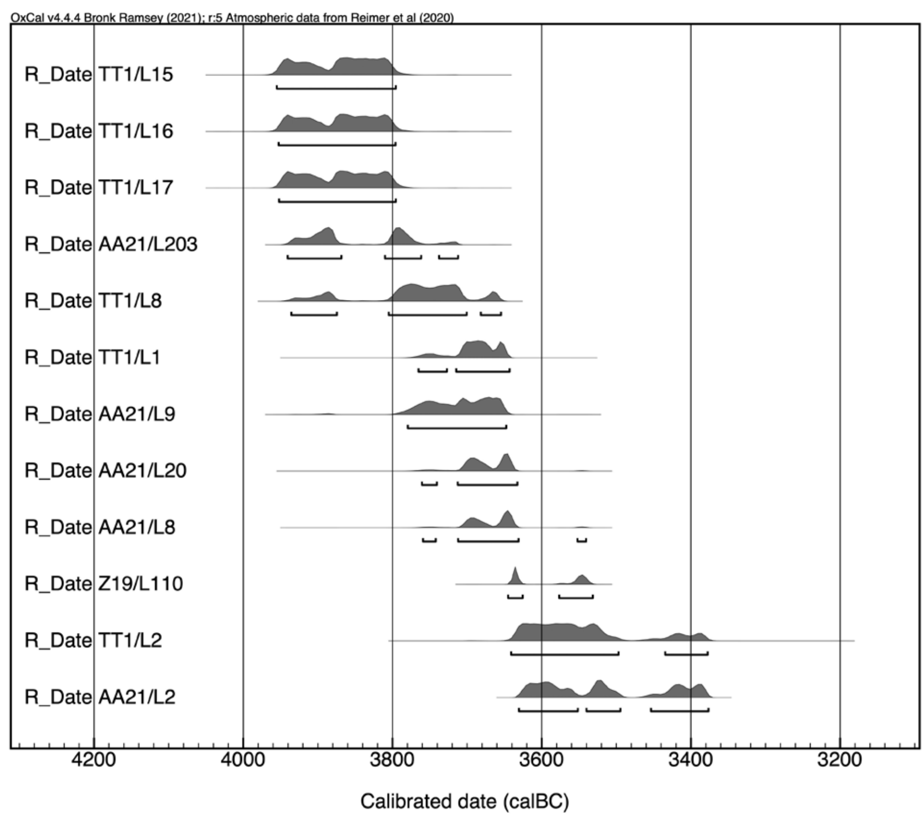


Figure 3.6 Multiplot of calibrated radiocarbon dates from Shakhi Kora.

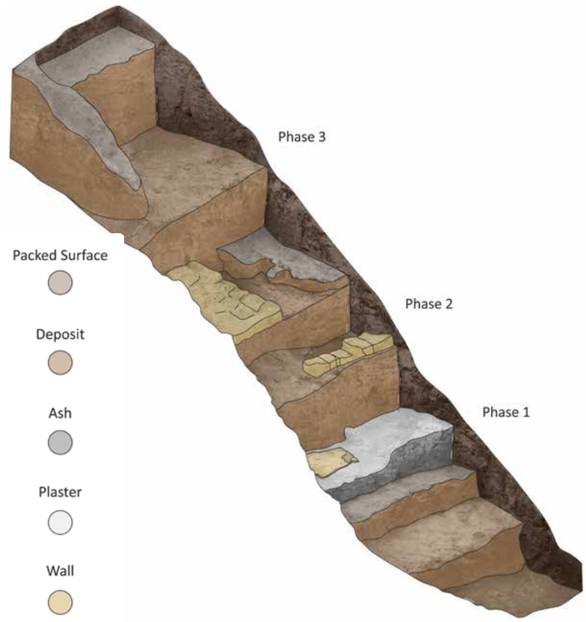


Figure 3.7 Annotated axonometric view of the stepped test trench (TT1) at Shakhi Kora.

history and material culture. As work progresses in the coming years, we expect our understanding of the LC and Early Bronze Age (EB) communities at Shakhi Kora to evolve significantly in chronological, social, and cultural terms. Preliminary phasing of occupation and activity horizons, radiocarbon dates, and proposed intra-site synchronisms are summarised in Table 3.3 and Figure 3.6 (see also Appendix II.1). The assignment of individual loci to occupation phases is based on a combination of absolute dates, stratigraphy, and ceramic data.

Phases 1 and 2 date to the early centuries of the fourth millennium BCE or the later LC2 to the early LC3. The pottery recovered thus far points to a community tied into a western Zagros piedmont cultural sphere with strong, but locally mediated, links to northern Mesopotamia, as well as limited but distinctive connections with the Uruk world. Phases 3 and 4 date to the middle centuries of the fourth millennium and share some similarities with Middle Uruk cultural traditions, against a background of continued local traditions. Phase 5, which can be assigned to the LC4/5, displays very strong, though not entirely exclusive, south Mesopotamian connections. Phase 6 presents an as yet difficult to define final occupation with material culture comparable to aspects of Jemdet Nasr (JN) and Early Dynastic I (ED I) traditions in the lower Diyala region.

3.2.1 Phase 1

In August 2018, a 2 × 7 m stepped test trench (TT1) was placed along the eastern edge of the mound and excavated over 3 days (Figure 3.7). This allowed the initial documentation of three early occupation phases at the site; three additional phases were documented in 2019 and 2022. A drastically lowered water-table in August 2022 permitted a closer examination of the river-facing section than had been previously possible. This revealed the potential of a further metre or more of occupation below the lowest step of TT1. The LC2/3 and LC3 occupation attested in the middle and upper sections of TT1 were subsequently exposed over larger areas in AA21 and will be discussed in more detail in Sections 3.2.2-5 below. An LC4/5 radiocarbon date in the highest TT1 step is intrusive. By contrast, the earliest occupation phase recorded to date, has been exposed only in the test sounding so far.

The quantities of cultural material recovered from the shallow steps of TT1 are small and their association with architectural remains and other features not entirely secure due to potential slope erosion. Keeping these caveats in mind, radiocarbon date ranges of c. 3953 to 3796 cal. BCE from a pebbled floor surface (TT1/L17) and ash layer above (TT1/L16) place Phase 1 in the late LC2 to LC3. A further charcoal sample produced a similar date range for a subsequent plaster floor (TT1/L14) and burnt mudbrick structure (TT1/L15), suggesting a relatively rapid re-building into what we have provisionally labelled Phase 2.

A small number of diagnostic fragments was recovered from Phase 1 contexts. They include a coarse bowl type (Figure 3.8.1), which is sometimes referred to as a proto- beveled rim bowl[37] and that can be compared to examples from LC2 contexts at Girdi Qala,[38] as well as examples from the Susa Acropole III,[39] or Tall-e Geser in the Ram Hormuz area.[40]

A bowl with thickened rim (Figure 3.8.2) compares to the club-headed bowls from LC2/3 contexts at Girdi Qala[41] and Tell Helawa.[42] Club-headed bowls are typical of the LC2/3 transition and are morphologically related to the hammerhead traditions of northern Mesopotamia. A bowl with internally profiled rim (Figure 3.8.3) also finds comparisons at Girdi Qala,[43] Tell Helawa,[44] and Kani Shaie,[45] and presents a well-attested type in the LC2 and LC3 of northern Mesopotamia, including at Nineveh[46] and Tepe Gawra.[47]

37 Chazan and Lehner (1990, 27, Fig. 2).
38 Vallet *et al.* (2019, Fig. 7.9-12).
39 Wright (2014, Fig. 7.5.a, b).
40 Alizadeh (2014, Figs. 57.H, 59.H).
41 Vallet *et al.* (2017, Fig. 19.7-9).
42 Peyronel and Vacca (2020, Fig. 14.18-21).
43 Vallet *et al.* (2017, Fig. 19.1-2).
44 Peyronel and Vacca (2020, Fig. 14.3-11).
45 Renette (2020, Fig. 9.6).
46 Gut (2002, Figs. 11.8-14, 13.16).
47 Rothman (2002a, Figs. 7, 10).

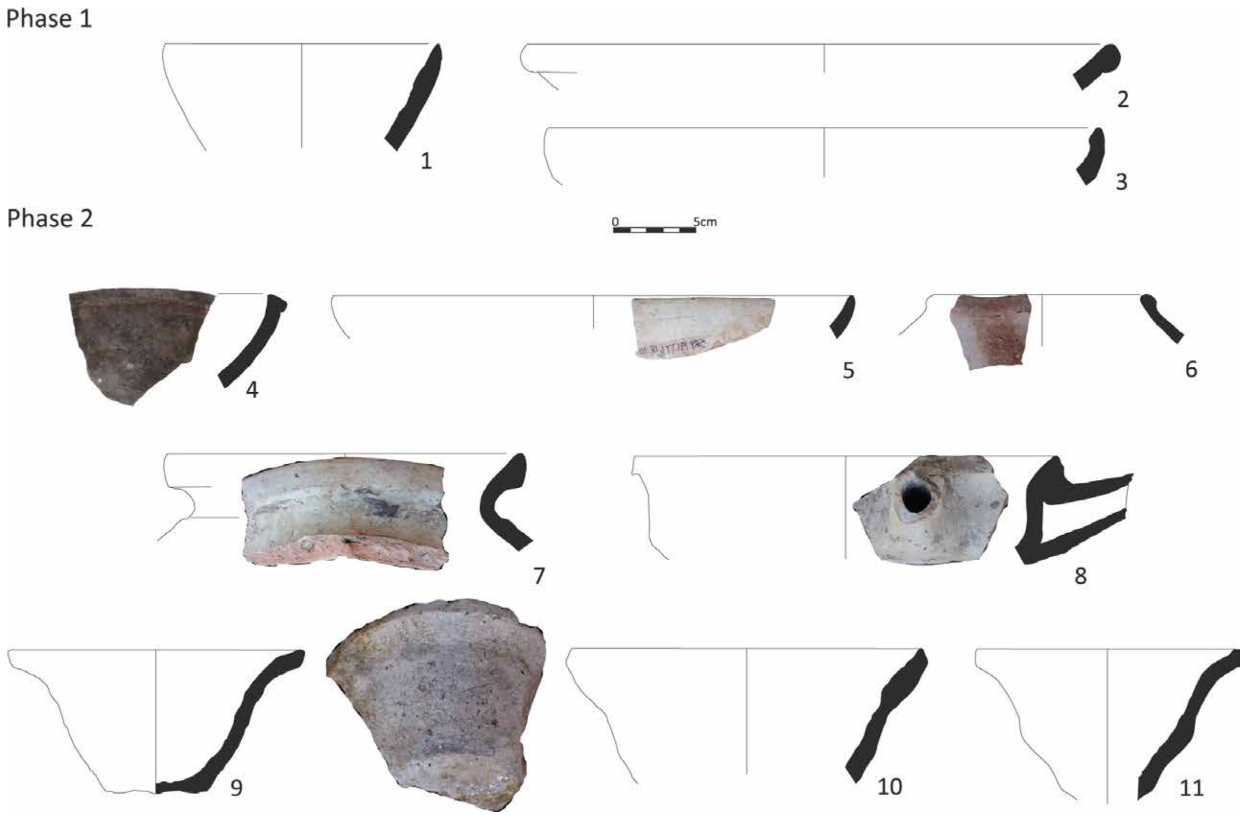


Figure 3.8 Pottery from Shakhi Kora Phases 1 and 2.

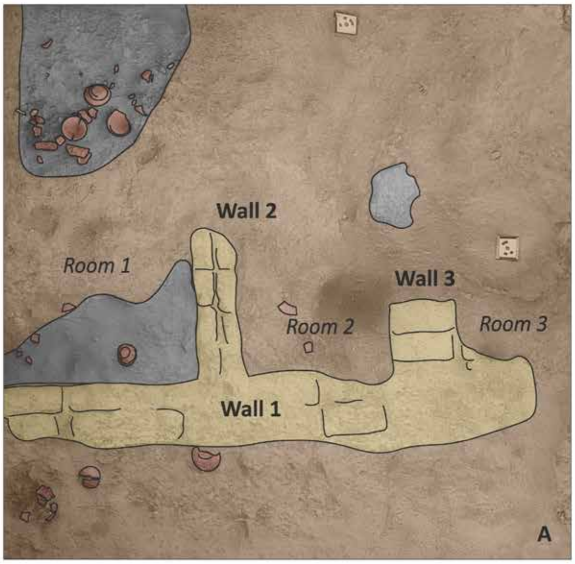
A single grey ware body sherd also comes from the same context. Grey ware finds are generally rare at Shakhi Kora but are well represented in the surface assemblages of Pira Faqira (SRP008), Ezadin Tepe (SRP205), Tepe Gumar II (SRP196), SRP117, and Gakol Kale (SRP079) (see Section 3.3 below). Chalcolithic grey wares are found across the Zagros piedmont zone and take varyingly localised forms. A grey ware tradition, for instance, has been identified at LC2 Kani Shaie,[48] while chaff-tempered, grey-firing mid-to-late Chalcolithic pottery was recently documented in the Marivan plain of western Iran.[49] A more broadly recognised grey ware is known from northern Mesopotamia in the LC3 period. This type of grey ware, which has a broader range of formal types and is chaff- and more occasionally mineral-tempered, is attested, for instance, at Surezha,[50] Tell Helawa,[51] in the Nineveh region,[52] at Tepe Gawra,[53] Qalinj Agha,[54] as well as in the highland regions of the Rania and Peshdar plains.[55]

3.2.2 Phase 2

Phase 2 contexts have been exposed in Area I in the test sounding as well as in the enlarged step-trench AA21 (Figure 3.9.A). AA21 was placed just to the north of TT1 on the eastern edge of the site. AA21 originally measured 10 × 5 m on the mound surface, while a series of 2.5-5 × 5 m steps were excavated along the slope. An exploratory 3 × 2 m westward extension was added in January 2022 and significantly enlarged in 2023 to connect exposures in AA21 with those of Z19 (see Section 3.2.5 below).

Phase 2 ceramics from the test sounding include an example of a club-headed bowl in grey ware (Figure 3.8.4) with parallels, for instance, at Tell Helawa,[56] and a bowl with simple pointed rim (Figure 3.8.5). A holemouth jar with thickened rim (Figure 3.8.6) finds parallels at

48 Renette *et al.* (2021, Fig. 8.17-20).
49 Dadaneh *et al.* (2019a, Fig. 6).
50 Minc *et al.* (2021, Figs. 3.12-13, 15).
51 Peyronel and Vacca (2020, Fig. 16).
52 Gut (1995, 248-251; 2002, 20); Gavagnin *et al.* (2016, Fig. 9.22-24).
53 Rothman (2002a, Figs. 9-10).
54 Hijara (1973, Fig. 15.9-12).
55 Giraud *et al.* (2019, 105).
56 Peyronel and Vacca (2020, Fig. 16.11-14).



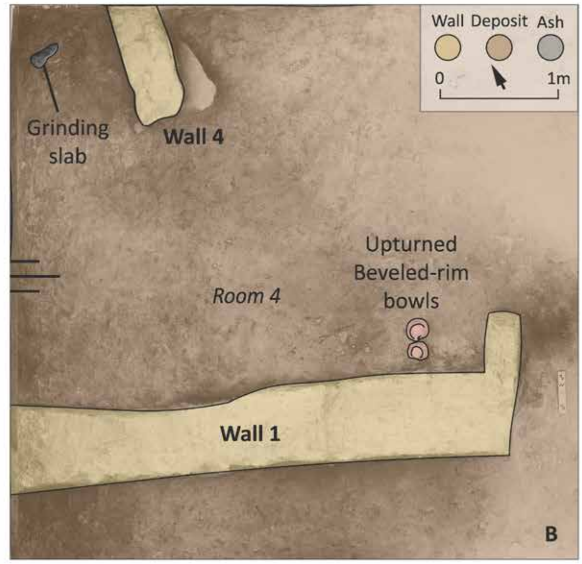


Figure 3.9 Annotated orthoimage of the lower step of AA21 in Area I showing A) Phase 2 and B) Phase 3 exposures.

Figure 3.10 Phase 2 exposure in Area I (AA21).

LC2/3 Girdi Qala[57] and Tell Helawa.[58] An interior-angled jar with pale buff slip (Figure 3.8.7) also compares to examples from Helawa[59] and sites in northern Mesopotamia such as Tell Brak HS 6,[60] Grai Resh,[61] and Nineveh.[62] A spouted bowl with s-shaped profile (Figure 3.8.8) finds broad parallels at Uruk-Warka.[63] Coarse chaff- and grit-tempered BRBs are well attested in Phase 2 (Figure 3.8.9-11), with similar

57 Vallet *et al.* (2017, Fig. 18.6).
58 Peyronel and Vacca (2020, Fig. 15.10-11).
59 Ibid., Fig. 15.8-9.
60 Matthews (2003, Fig. 3.14).
61 Kepinski (2011, Pls. 9.7-16, 10.1-7).
62 Gut (2002, Fig. 12.45-46).
63 Sürenhagen (1986, T/60).

Figure 3.11 Stacks of upturned beveled rim bowls along Wall 1 in Area I (AA21), Phase 3.

forms reported from LC2 contexts at Kani Shaie[64] and the LC2/3 at Girdi Qala.[65]

Phase 2 contexts in AA21 were excavated in August 2022 and consist of a series of rooms partitioned by a long, c. 3 mudbrick-wide wall that runs from the western trench section until the river-facing edge of the site (Wall 1). Wall 1 is abutted on its northern face by two perpendicular walls (Walls 2 and 3) that define several discrete architectural units to the north of Wall 1 (Figure 3.10). Large quantities of pottery were retrieved from these different architectural units (AA21/L203, L204, L207, L208, and L209 – Rooms 1-3). This includes BRBs, but bowls with coarse lower bodies and simple rounded rims, a late variety of the wide flower pot (WFP, see Figure 3.12.4-6), dominate the assemblage. This is a characteristic shape found in LC2/3 contexts across the region, including for instance at Tepe Gawra X-VIII,[66] Grai Resh,[67] Nineveh III,[68] Telul eth-Thalathat,[69] Girdi Qala/Logardan,[70] and Tell Helawa.[71] A rounded ash-filled depression (AA21/L208) suggests the presence of a hearth, while additional ashy deposits (AA21/L204 and L209) contained substantial amounts of faunal remains. In concert, this points to significant food preparation, and especially distribution activities being carried out in this part of the site. A charcoal sample dates Phase 2 in AA21 to between c. 3941-3713 cal. BCE.

In sum, the recovered pottery from the lower steps of TT1 and AA21 points to a local community that is connected primarily to the adjacent western Zagros piedmont and a wider north Mesopotamian cultural sphere in the late LC2 and early LC3. Pottery types traditionally associated with southern Mesopotamia and the Uruk phenomenon, which increase in frequency and diversity in subsequent phases, are comparatively limited, although BRBs are present in significant numbers.

3.2.3 Phase 3

Phase 3 contexts have been excavated in both Areas I and II. The largest exposure to date is the Area I step-trench AA21 (Figure 3.9.B). Here the end of Phase 2 is marked by a levelling of the area in preparation for the next structure. Substantial efforts were expended on the construction of the Phase 3 floor, which is unique for the site. This involved the placement of a foundation layer of orange-coloured mudbricks (AA21/L202) on the levelled wall and floor remains of the earlier occupation phase and their subsequent coating with c. 2 cm thick layers of white plaster.

Phase 3 retains some of the architectural layout of the preceding Phase 2, including the main wall (Wall 1) and a more ephemeral version of Wall 3, but the smaller compartments of Phase 2 now give way to a larger indoor space (Room 4), of which c. 20 m^2 have been excavated. A smaller mudbrick feature or wall was also articulated in the northern trench corner (Wall 4). Stacks of complete, upturned BRBs arranged in pairs were found *in situ* on the floor surface placed neatly against Wall 1 (Figure 3.11).

64 Renette *et al.* (2021, Fig. 9.2).
65 Vallet *et al.* (2017, Fig. 19.10-13).
66 Rothman (2002b, Pls. 18.1926-1926a; 19.2230, 2243; 22.2853, 2861).
67 Kepinski (2011, Pl. 12.9-10).
68 Gut (2002, Fig. 11.17-20).
69 Egami (1959, Fig. 51.2).
70 Vallet (pers. com. 20 Oct. 2019).
71 Peyronel and Vacca (2020, Fig. 14.1-2).

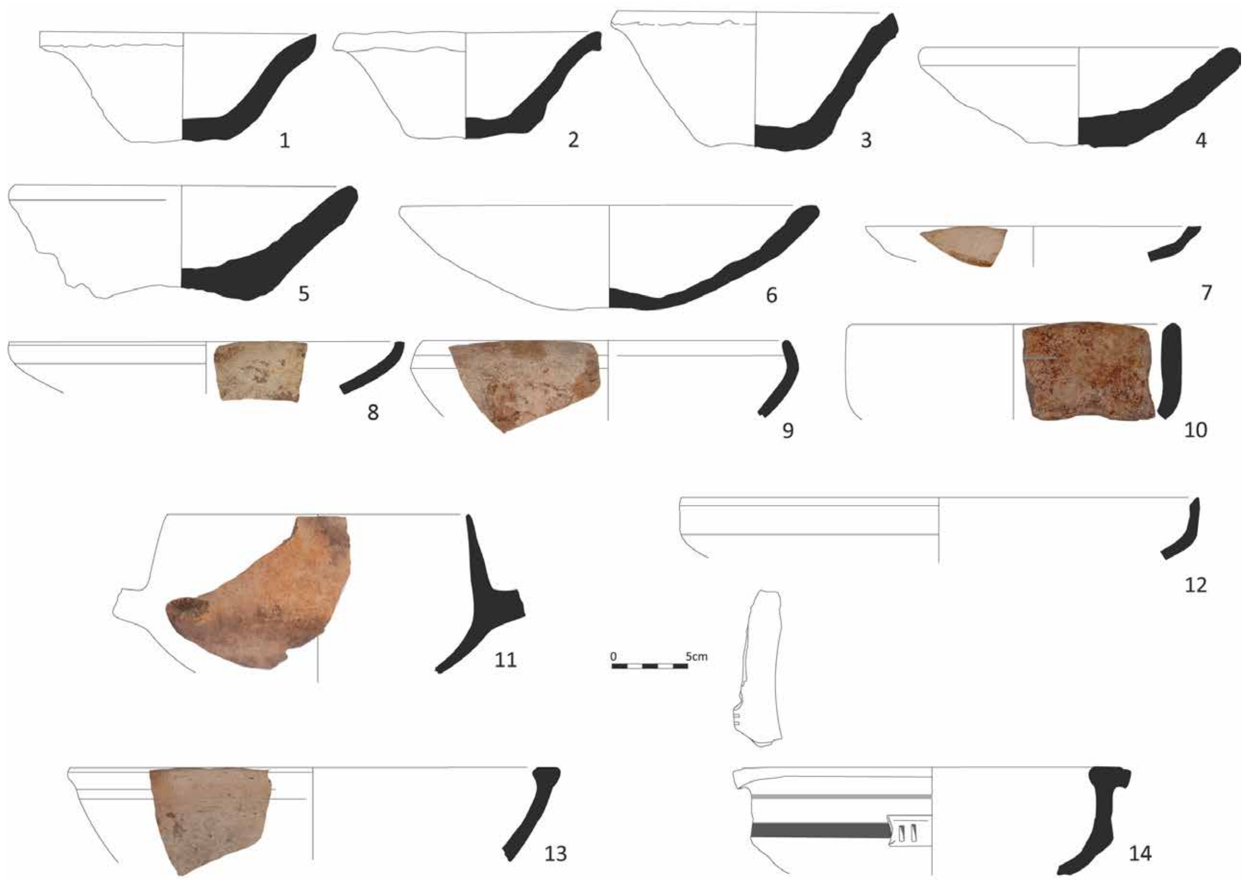


Figure 3.12 Bowl types from Phase 3.

A grinding slab and handstone sat on the floor in the northern trench corner behind Wall 4.

The floor of Room 4 was covered by a c. 60-70 cm deep collapse horizon (AA21/L9), which contained broken mudbrick and soft, mostly blackened soil. It also included large quantities of pottery, especially BRBs and WFPs (Figure 3.12.1-6), alongside chipped stones (see Section 3.2.7 below) and an ovoid handstone (Appendix V.1), suggesting a primary function in food processing and distribution.

Also attested is a bowl with sinuous profile (Figure 3.12.7) that is broadly comparable to vessels from LC2/3 contexts at Girdi Qala[72] and to the Middle Uruk Farukhabad assemblage.[73] Bowls with simple straight or in-turned rims (Figure 3.12.8-11) find broad parallels, for instance, at Kani Shaie VIa.[74] Bowls with internally profiled rims continue from the preceding Phase 2 (Figure 3.12.12), while examples with internally and externally strengthened rims (Figure 3.12.13-14) are attested in both buff-orange and brownish-grey fabrics. Rim swellings with incised and impressed decorations are attested for the first time in this phase (Figure 3.12.14), becoming more frequent in subsequent layers and with parallels at, for instance, Tell Rubeidheh.[75]

Band-rim (Figure 3.13.1-2, 5-7) and flaring-neck (Figure 3.13.3-4) jars with everted rims, the former of which are already attested in the preceding Phase 2, are a common feature of Phase 3. Formal comparisons can be found in LC2/3 contexts at Girdi Qala,[76] Tell Helawa,[77] Kani Shaie Vd,[78] and Farukhabad.[79] They are also present in LC4 contexts at Gurga Chiya[80] and at Tell Rubeidheh.[81] Several of the globular jars from Phase 3 have pre-firing

72 Vallet *et al.* (2017, 79, Fig. 19.5).

73 Wright (1981, 102, Fig. 47.q, r).

74 Renette *et al.* (2020,18-20, Fig. 9.7).

75 McAdam and Mynors (1988, 47, e.g. Fig. 34.97).

76 Vallet *et al.* (2017, 78, Fig. 18.3-4).

77 Peyronel and Vacca (2020, 97, Fig. 15).

78 Renette (2020, 21, Fig. 10.17-19).

79 Wright (1981, 98, Fig. 44).

80 Wengrow *et al.* (2016, 262, Fig. 8.4-8); Lewis *et al.* (2020, 5, Fig. 3b).

81 Killick (1988, Fig. 31).

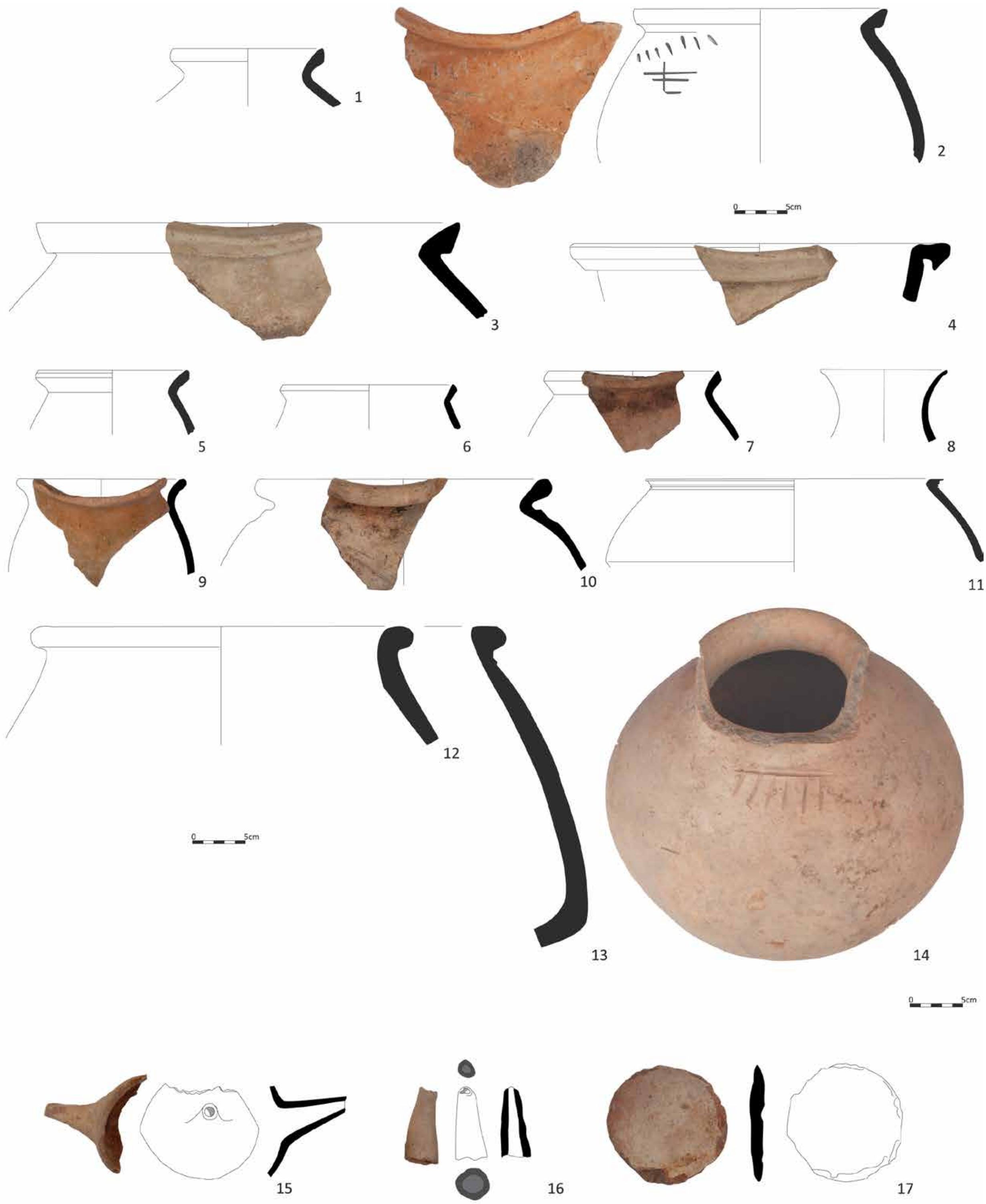


Figure 3.13 Jar types, examples of spouted vessels, and a ceramic scraper from Phase 3.

Figure 3.14 Large, squat pithos at the bottom of Area II (G19).

Figure 3.15 Phase 4 contexts in Area I (AA21).

potmarks on the shoulder (Figure 3.13.2 and 14). Larger jars with angular or rounded thickened rims and bag-shaped bodies (Figure 3.13.12-13) find parallels in west Iranian assemblages, such as the proto-Elamite contexts of Area C at Arisman.[82] Phase 3 spouts are upward-pointing, conical or slightly drooping at the tip (Figure 3.13.15-16), which tend to fall into the LC3 to early LC4. There is also evidence for the recycling of pottery to produce tools, which takes the form of circular knapped disks (Figure 3.13.17). Similar objects have been found, for instance, at Nineveh.[83]

Overall, the formal characteristics of the pottery assemblage and the predominance of chaff-tempered wares in Phase 3 point to a date in the LC3, which fits well with a radiocarbon date range of c. 3780 to 3648 cal. BCE obtained from a charcoal sample from the collapse layer above the floor (AA21/L9). Culturally, the ceramic assemblage of Phase 3 presents a mix of piedmont forms with a limited range of Uruk-related types. Numerically, however, the assemblage is dominated by WFPs and BRBs, and – similar to Phase 2 therefore – associated with the distribution of food at a significant scale. Comparable localised cultural practices and regional networks are also borne out by the Shakhi Kora lithic assemblage (see Section 3.2.7 below).

In 2019, another step-trench (G19) was opened in the northern part of the site, where a canal and a bulldozed road had cut into the site in Area II. About 70 cm below the topsoil, a sequence of three surfaces was encountered with occasional fireplaces, but no definitive architectural remains (Figure 3.14).

The ceramic assemblages from the three surfaces and associated fill layers are dominated by a combination of WFPs and BRBs, suggesting a broadly contemporaneous Phase 3 (and possibly part of Phase 2) occupation in this part of the site. The ceramic repertoire recovered from Area II is more restricted than that of Area I. It mainly includes, in addition to WFPs and BRBs, medium-sized jars with simple flaring and some triangular rims. A small round pounder and an oval grinding slab fragment from the upper-most surface seemingly underwrite the quotidian nature of these spaces (Appendix V.1), as does a ceramic spindle whorl fragment.

The lack of clearly identifiable architectural features in Area II may be due to the limited areas exposed in the trench to date. Alternatively, food preparation and other craft activities could have taken place outdoors, or in temporal shelters such as tents or reed structures, which would have left few traces in the archaeological record. An indicator for a relatively persistent occupation of this part of the site takes the form of a large, squat, open-mouthed pithos that had been sunk into the gravel deposit. The jar, whose low carination points to connections with the proto-Elamite ceramic traditions of western Iran,[84] was carefully covered by a large shallow plate and contained sterile sandy soil, which had gradually seeped into the vessel. In the absence of any cultural, faunal or archaeobotanical materials from inside the jar, it seems most plausible that it was used to store water or another type of liquid.

3.2.4 Phase 4

For the next phase of occupation, we have to return to the step trench in Area I. Phase 4 here consists of a deliberate filling and levelling event that sealed the destruction fill of the Phase 3 Room 4 with a layer of soft but very compacted soil mixed with large quantities of pottery (AA21/L8), as well as a subsequent floor surface (AA21/L5, Figure 3.15). The ceramic assemblage associated with this floor and an ashy hearth area point again to food production and distribution as a central function, alongside other craft activities as suggested by the presence of a polisher (Appendix V.1).

A charcoal sample from the fill layer (AA21/L8) produced a date between 3760 and 3541 cal. BCE. This articulates well with the LC3/4 pottery types recovered from the two consecutive loci. BRBs (Figure 3.16.1-3) and coarsely made shallow platters (Figure 3.16.4) are numerous, with BRBs now dominant, while more delicate bowl types with inverted rims are also present (Figure 3.16.5), as are small jars with simple everting rims (Figure 3.16.6). Flaring-rim jars continue from the preceding phases and take a variety of forms (Figure 3.16.7-10), as do neck-less holemouth jars with low carinations (Figure 3.16.11-12). A cannon-spouted globular vessel (Figure 3.16.13) presents a southern Mesopotamian feature and finds nearby comparisons, for instance, at Tell Rubeidheh.[85]

3.2.5 Phase 5

Phase 5 presents a further re-building event in Area I, which has been exposed over a contiguous area of c. 600 m^2 across trenches AA21 and Z19. This includes a large, pillared hall with at least two, but possibly originally three, rows of squared pillars (Figures 3.17 and 3.18). The pillars are constructed using a rammed earth technique for the cores, which were then plastered over. Large numbers of clay cones from deposits in Area I as well as on the mound's surface, may suggest that this was a technique suitable for the placement of cones on the outside of the pillars. No wall cones, however, have as yet been found *in situ*. The pillars are standing on top of a floor, which runs across most of the exposed Area I (AA21/L245 and AA21/L6-L7), connecting the pillared hall with a semi-outdoor food preparation area in the east, and a storage space and courtyard to the west. A mudbrick wall, which runs into the

82 Helwing (2011, Figs. 15.24-27, 16.28-32).

83 Gut (2002, 47, Fig. 4.f).

84 Helwing (2011, Figs. 15.24-27, 16.28-32).

85 McAdam and Mynors (1988, e.g. Fig.73.104).

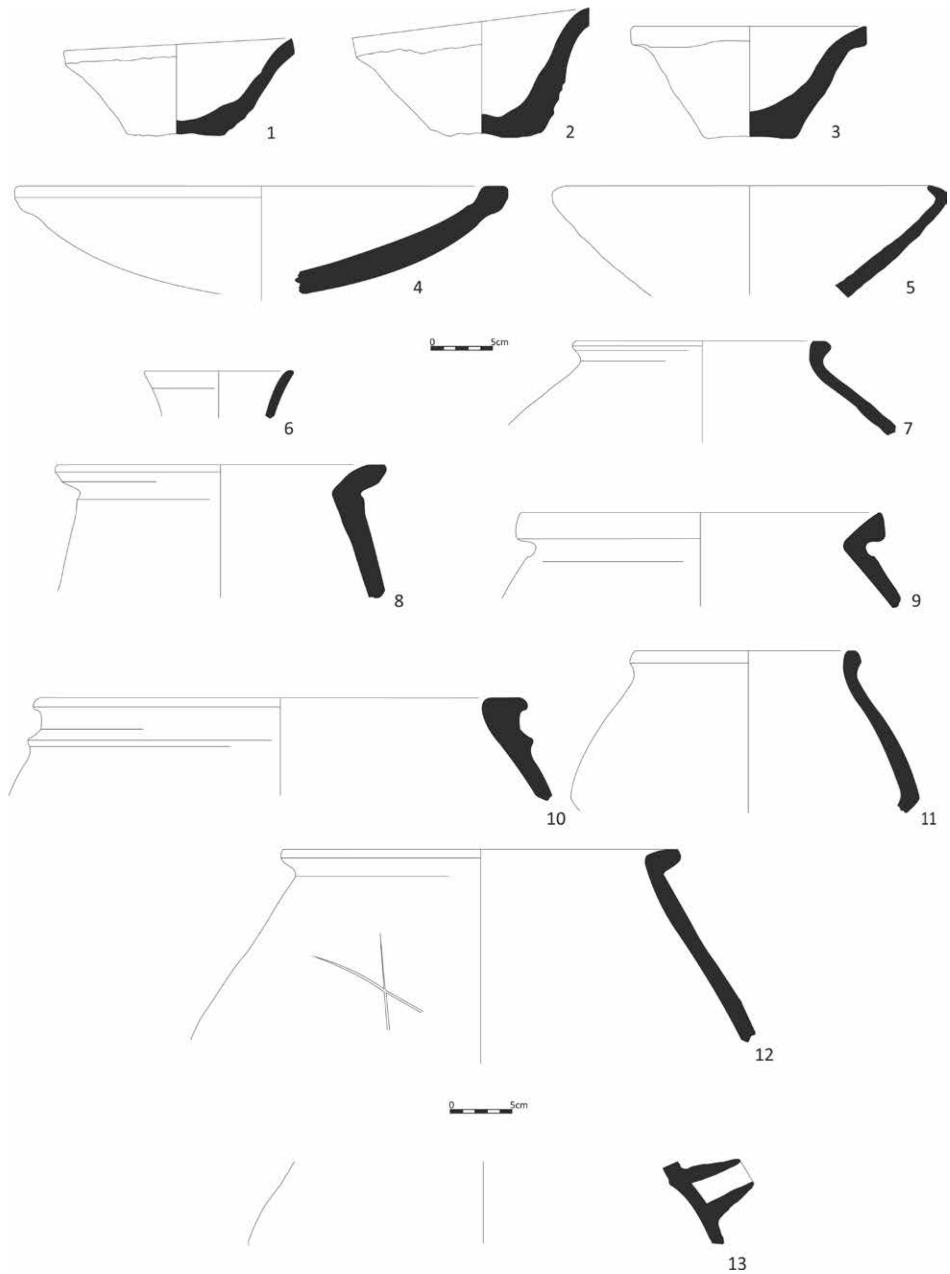


Figure 3.16 Pottery associated with Phase 4.

north-eastern trench section, may delimit the pillared hall in the north.

Found associated with one of the pillars (Pillar I.2), was an *in situ* collection of pottery vessels, bones in an ashy matrix, what may be two degraded braziers, and several squared, amorphous, and possibly bitumen-covered artefacts with the impressions of plant-fibre matting on one side (AA21/L244 and AA21/L255, Figure 3.18.A-C). There is little doubt that these items formed part of a deliberate depositional act, most likely a ritual offering. A reclining ram stone figurine, which compares well to those deposited in the Eanna complex at Uruk-Warka,[86] was found a few centimetres above this assemblage and close to the pillar, further underscoring the likely official, and perhaps religious, function of this structure (Figure 3.19.A).

The pillared hall was equipped with an extensive underfloor drainage system (Figure 3.18.D). The purpose-made clay pipes compare with examples from late fourth millennium BCE Tell Brak,[87] Habuba Kabira,[88] and Girdi

86 Bahrani (2017, 50, 67).

87 Emberling *et al.* (2003, 8, Figs. 9-10).

88 Kohlmeyer and Ludwig (2021, 148, Pl. 35.3).

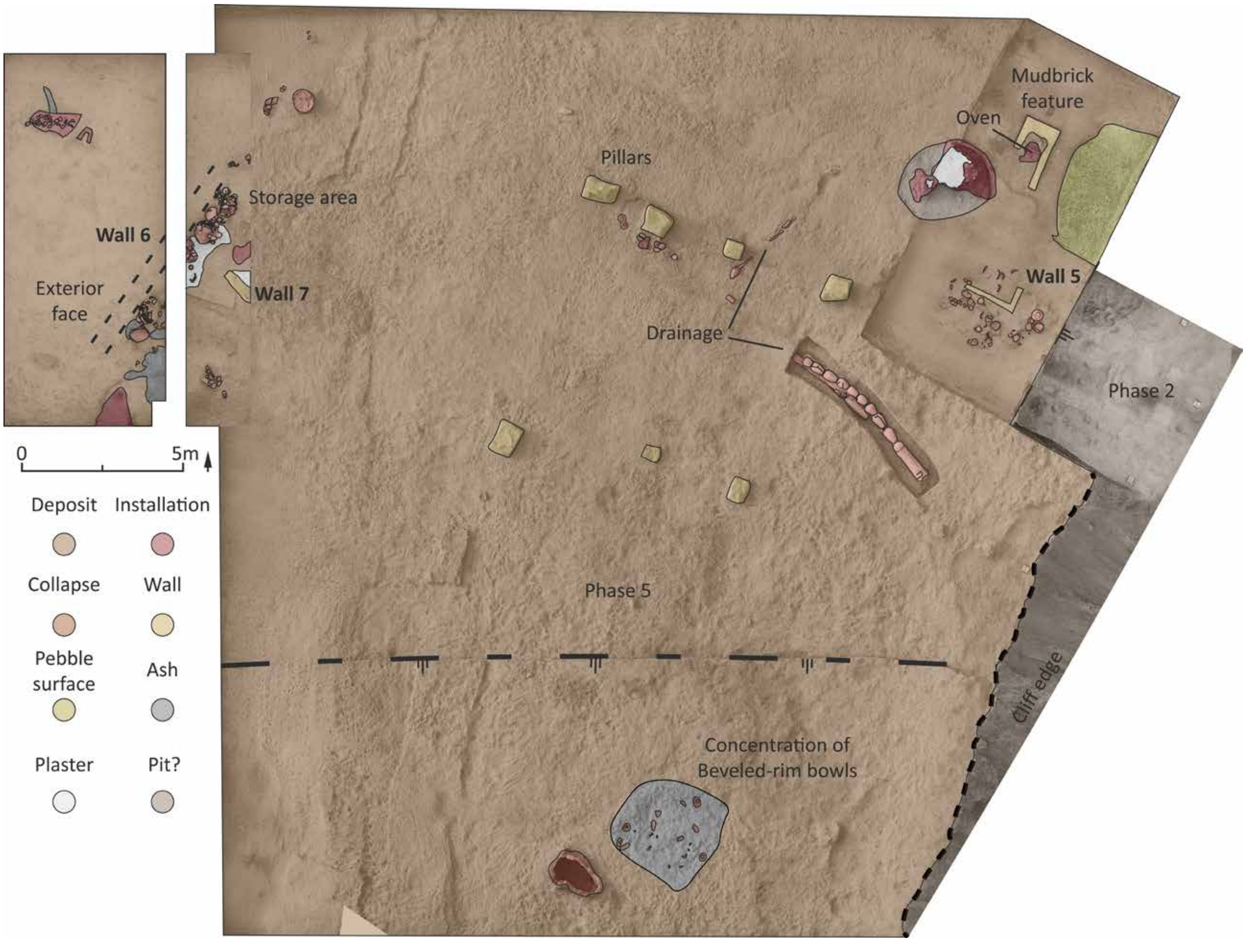


Figure 3.17 Annotated orthoimage of Area I in Phase 5 (AA21 and Z19).

Qala.[89] A further drain was constructed using nine large jars, whose bases and rims had been lobbed off and that had been stacked horizontally, as well as a large ceramic cylinder c. 1 m in length.

To the south of the pillars was located an ashy midden deposit full of BRBs (Figure 3.18.E). To the east stood a raised platform with a carefully constructed, hard mud-plaster surface that rested on a bed of medium-sized pebbles and body sherds (AA21/L10). At its base, the platform appears to have been surrounded by a circular, ashy deposit, which might suggest that its use involved it being surrounded by fire.

A food production and distribution area lay to the east. In the southern part, activities were centred around a one-brick-wide L-shaped wall feature (Wall 5), which was surrounded by large numbers of *in situ*, complete and fragmentary storage, cooking, and consumption vessels, including BRBs (Figure 3.20). To the south of Wall 5, bowls and cups dominated, mainly BRBs; to the north, a series of medium-sized storage jars were sunk into the ground. Also associated with this installation and fill contexts just above it was an ovoid stone with a flat and wide side that appears to have been smoothened through use and most likely presents a handstone for grinding grain on a grinding slab. Two elongated lithic tools with square sections and rounded extremities may have been used as pestles for food processing (Appendix V.1).

Further north, we were able to trace a pebbled floor (AA21/L11) that would have originally led from the area around Wall 5 to a U-shaped mud-brick feature (AA21/L15-17), which appears to have contained an irregularly shaped oven (AA21/L18). A circular clay installation on the southern edge of the preserved pebble floor may have served as a base for a beam to hold up a roof. Taken together, this suggests that this was an outdoor or semi-outdoor space, possibly a courtyard, used for the preparation and consumption of food.

To the west of AA21, a test sounding of 2 × 10 m (Z19) was opened in 2019 and enlarged with a 5 × 10 m westward extension in 2022. About 50 cm below the topsoil, an

89 Vallet (2018, 11-12, Fig. 7).

Figure 3.18 A-B) *In situ* deposition close to Pillar I.2 in Phase 5, Area I, C) row of northern pillars (looking east), D) underfloor drainage systems, and E) midden deposit containing beveled rim bowls south of the pillared hall.

extremely hard and compact mudbrick collapse horizon was encountered. This covered the entire trench area, thinning out somewhat towards the north section. A northeast-southwest running wall (Wall 6) was impossible to distinguish from the mudbrick collapse during excavation but is visible in section. A series of *in situ* storage jars with bowls and cups strewn among them were buried immediately below the mudbrick collapse and aligned along Wall 6 (Figure 3.21). Small amounts of emmer were found inside one of the large jars, while another contained a greasy, and as yet unidentified substance that had become mixed with intrusive, post-depositional soil.

A wall (Wall 7), c. 1 brick in width, could be traced at the centre of the eastern part of the trench running westwards from the east section. To the south of this small partition wall was located an installation of medium-sized river pebbles on which rested the fragments of at least two partial ceramic vessels, one of which was a cooking pot. Also associated with this installation was a large stone tool, possibly a spherical weight, and a doughnut-shaped stone, which may have functioned as a loom weight or weight for a digging stick (Appendix V.1).

Overall, it seems that the area to the southeast of Wall 6 was an indoor space used for the production and storage of food. This is corroborated by the presence of charred plant remains from inside some of the large jars, while the majority of attested botanical remains from this area were likely brought into this structure as dung fuel (see Section 3.2.8 below). The area excavated to the north of Wall 6, may have been a courtyard area, whose floor surface yielded almost no artefacts, while the function of a larger installation of medium-sized river pebbles near the north section remains as yet unclear.

Matching the cultural character of the pillared hall structure and its small finds, the Phase 5 pottery assemblage too ties Shakhi Kora firmly into a culturally southern Uruk world. This includes technological choices such as the use of mineral temper.[90] Overall, this articulates well with an

90 Lewis (2023); Glatz *et al.* (2025).

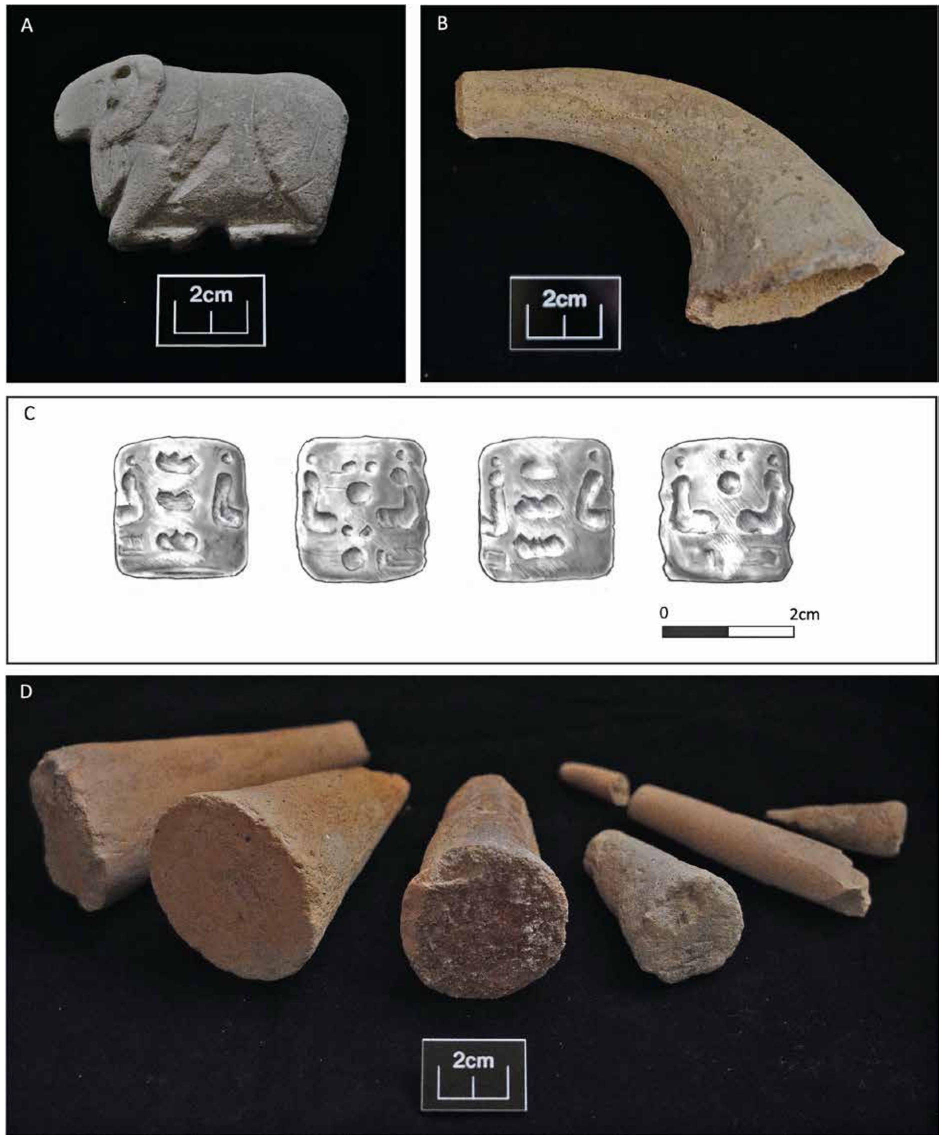


Figure 3.19 A) Reclining ram stone figurine from Area I, B) example of drooping spout, C) cylinder seal, and D) examples of clay wall cones.

absolute date range of between 3631-3377 cal. BCE obtained from a charcoal sample from the fill horizon just above the floor area in the eastern part of the Area I exposure (AA21/L2), and a charcoal sample from a storage vessel in the western part (Z19/L110) of c. 3646-3532 cal. BCE.

In terms of formal types, thinner-walled bowls (Figure 3.22.1-2), for instance, become more prevalent, while BRBs continue to form a dominant feature of the assemblage (Figure 3.22.3-5). The base of a likely conical cup was recovered near Wall 5. Drinking cups with open or slightly tapering upper bodies (Figures 3.22.6 and 3.25) are another new feature of Phase 5. Exact parallels for the cups are difficult to identity, while a more general resemblance can be found, for instance, at Late Uruk Farukhabad[91] and in the lower Diyala (see below). This is also the case for a range of small to medium closed and spouted containers, including a small juglet with everting rim and low carination (Figure 3.22.7), and a bottle with pointed base (Figure 3.22.8) that most closely resembles an ED I example from House 9 at Khafajah.[92] A further spouted juglet (Figure 3.22.9) can be compared to examples from Middle Uruk Nineveh[93] and Farukhabad,[94] as well as Late and Terminal Uruk phases from the Eski Mosul region.[95] A larger jar with a ring base and upward-pointing spout on the shoulder (Figure 3.22.10) also finds comparisons in the LC5 Eski Mosul and Nineveh

91 Wright (1981, 102, Fig. 47.b).

92 Delougaz (1952, Pl. 183.C546.620).

93 Gut (2002, Fig. 17.12).

94 Wright (1981, Fig. 92.b).

95 Rova (2014a, Pl. 2.1-6).

Figure 3.20 A) Phase 5 food preparation and distribution area in Area I, B) discrete clusters of different vessel types around Wall 5, C) collection of *in situ* complete and near-complete vessels east of Wall 5.

region,[96] in the Susa Acropole II Late Uruk,[97] and in the third millennium BCE lower Diyala.[98]

Also among the vessels surrounding Wall 5 were a complete globular jar with spout and strap handle (Figure 3.22.11), and a larger, squat holemouth jar with rim swellings and impressed decoration (Figure 3.22.13). Several complete and near-complete ovoid and globular jars with high shoulders and everted rims (Figure 3.23) can be compared to examples from across the Uruk world, including, for instance, Tell Rubeidheh,[99] Hacınebi,[100] and the Acropole I – Susa 17B Late Uruk to JN transition.[101]

The pottery assemblage from the western part of Area I (Z19) includes two large pierced noselug jars with incised cross-hatched decoration on the shoulder as well as several BRBs (Figure 3.24). Scattered between the jars and BRBs were also two distinctive drinking cups (Figure 3.25), which are similar but not identical to a cup from the food production area further east, and that find comparisons

96 Rova (2014a, Pl.2.2 and 6).
97 Steve and Gasche (1971).
98 Delougaz (1952, Pl. 185.C557.422).
99 Killick (1988, Fig. 32).
100 Stein (2002, Fig. 11.C-F).
101 Le Brun (1978, Fig. 25.12-14).

Figure 3.21 Floor assemblage in the western storage area in Area I (Z19).

in a cup from the Protoliterate phase at Khafajah[102] and in several examples from JN contexts at Tell Gubba VII.[103]

Vessels with drooping spouts (Figure 3.19.B) and clay wall cones from both surface and stratified contexts (Figure 3.19.D) further reinforce an LC4/5 date for Phase 5. A small cylinder seal, which was found in the ploughsoil above the pillared hall, depicts a variation of the classic late fourth millennium BCE theme of schematic figures sitting on what might be stylised reed mats or platforms, and engaging in food and craft production (Figure 3.19.C). The dots between the figures may be stylised pots being manipulated, while the rows of ovals with pointed ends behind them may be churns made from animal skins.[104]

102 Delougaz (1952, Pl. 32.a).

103 Ii (1993, Nos. 959-961).

104 Breniquet (2016, 14-18, Figs. 3a, 4b); for a comprehensive catalogue of comparative material, see e.g. Rova (2014b).

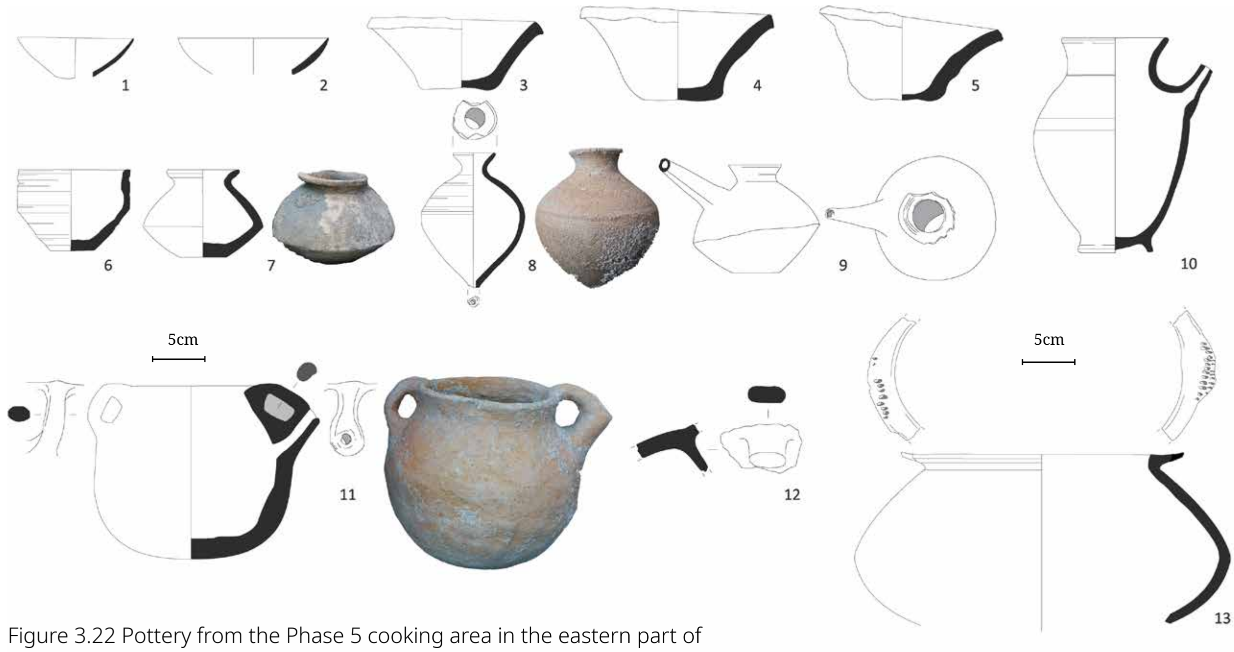


Figure 3.22 Pottery from the Phase 5 cooking area in the eastern part of Area I (AA21).

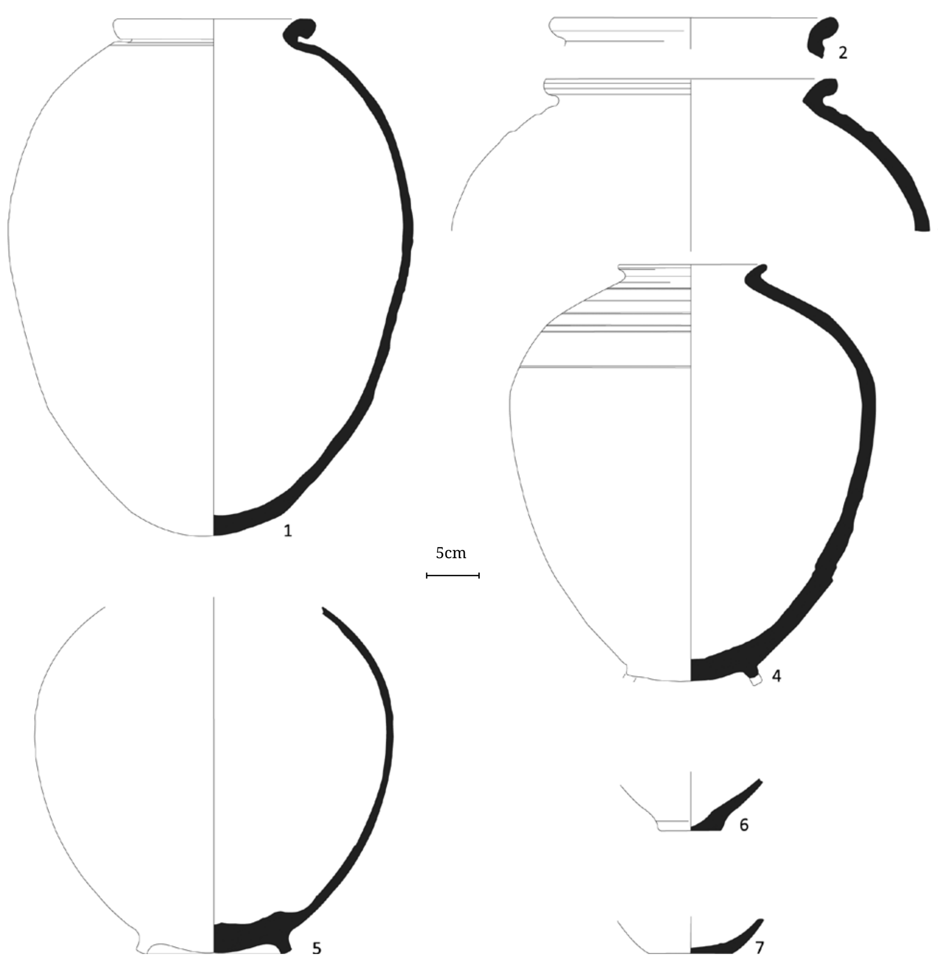


Figure 3.23 Phase 5 storage vessels from the eastern part of Area I (AA21).

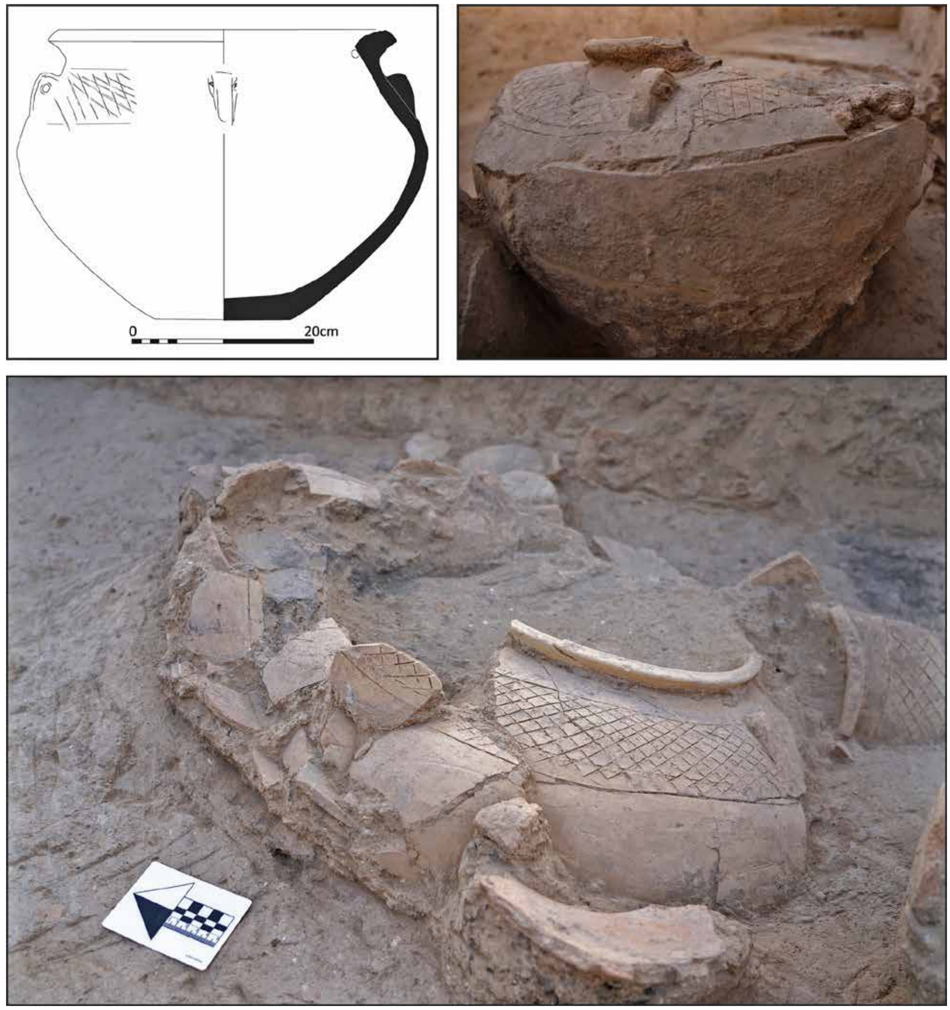


Figure 3.24 Pierced noselug jars from Area I (Z19).

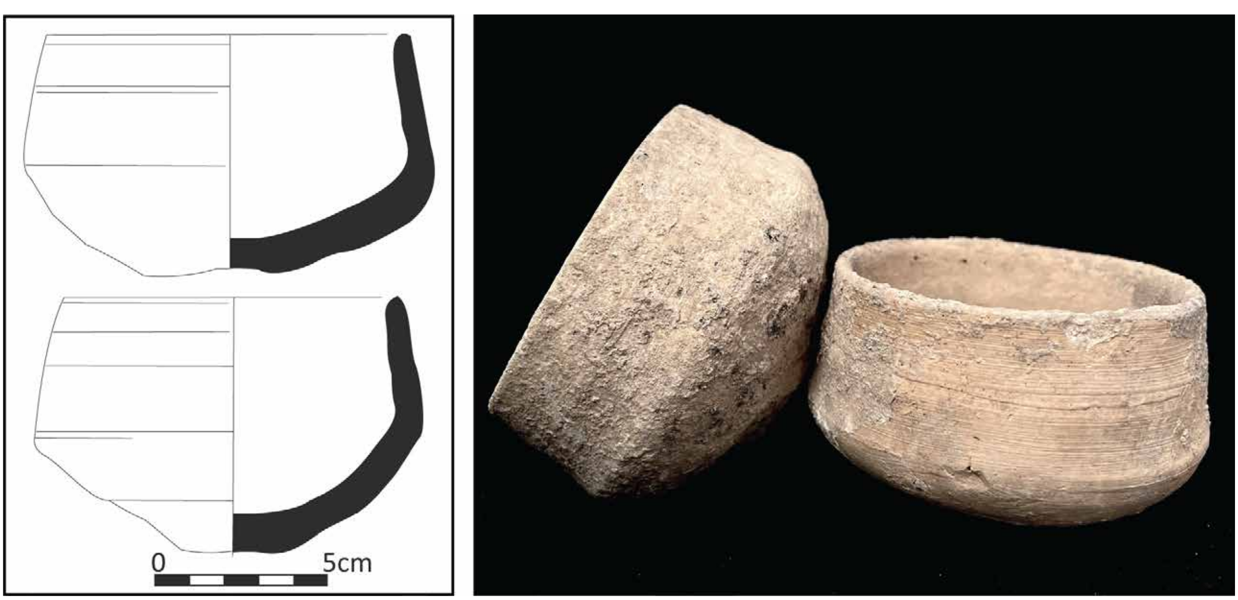


Figure 3.25 Drinking cups from Area I (Z19).

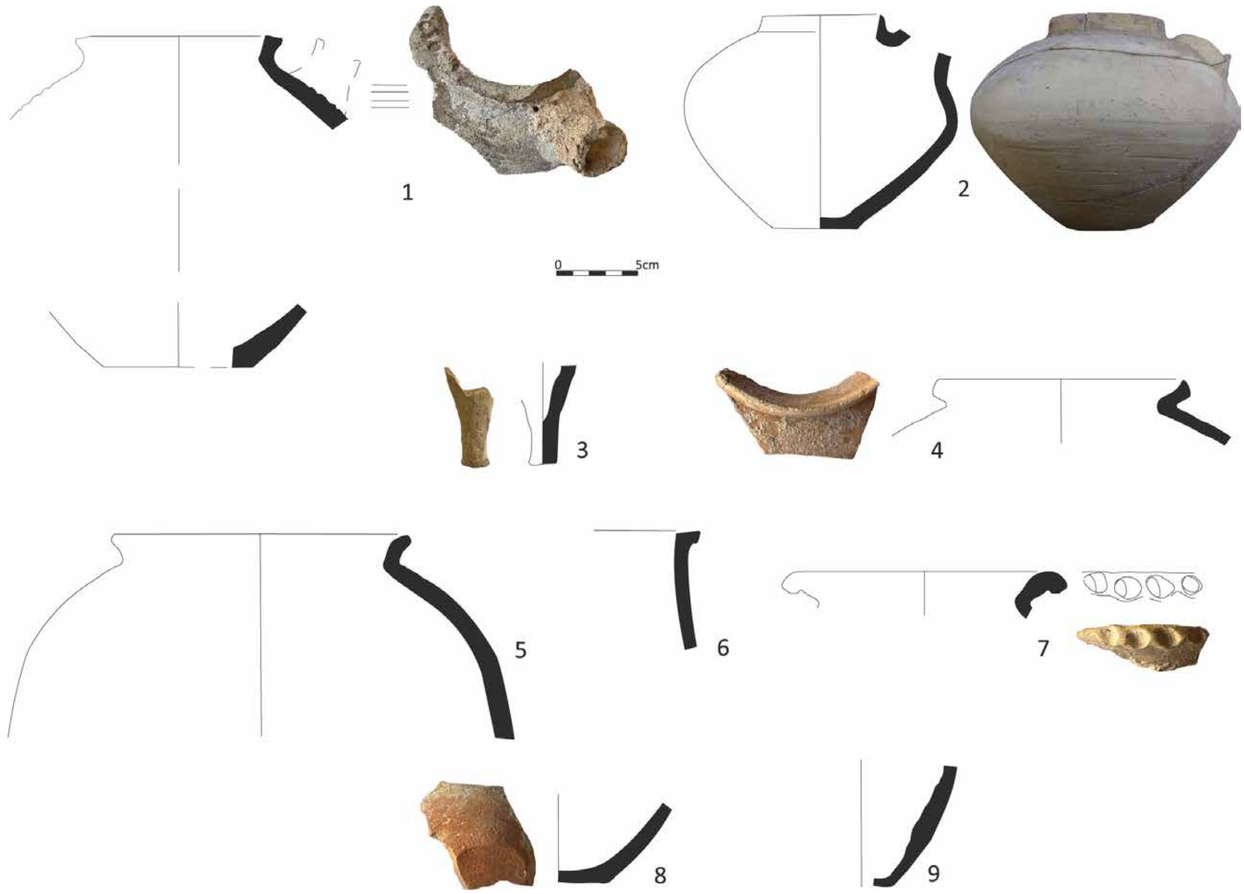


Figure 3.26 Examples of Phase 6 pottery.

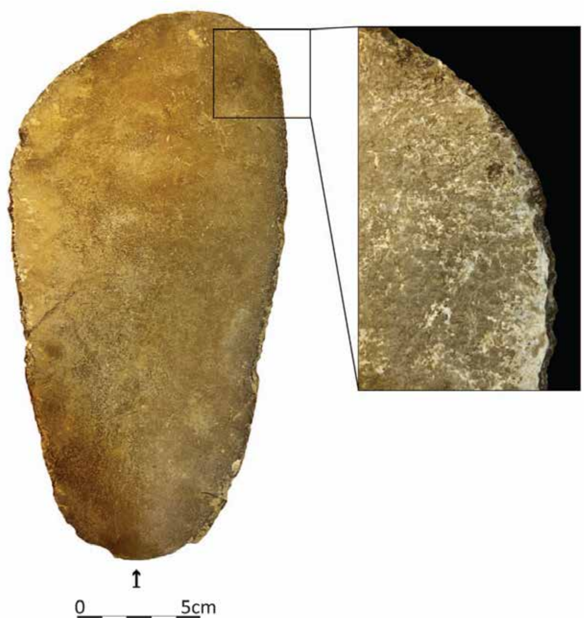


Figure 3.27 Tabular scraper from Phase 6 (AA21).

3.2.6 Phase 6

The substantial Phase 5 occupation in Area I is superseded by at least one later occupation phase, which may itself have several subphases as indicated by the remnants of consecutive floors, preserved only in small patches that partially overlay Phase 5 remains. No other architectural features have as yet been found associated with the Phase 6 occupation, and our evidence to date consists mainly of ceramic vessels dating to the final fourth and early third millennium BCE.

Among the recovered vessels are three small, squat jars with rounded short spouts (Figure 3.26.1-2) with parallels at Tell Gubba in the Hamrin,[105] the lower Diyala,[106] at Farukhabad,[107] and in the Early Periods at Susa.[108] The assemblage also contained the bottom of a solid-footed goblet (Figure 3.26.3), an ED I type fossil

105 Ii (1993, Figs. 23-24).
106 Delougaz (1952, Pls. 19.e, g, l, 38.f).
107 Wright (1981, 103, Fig. 48.g, h).
108 Le Breton (1957, Fig. 10).

(see also Chapter 4.2).[109] A flaring-rim jar (Figure 3.26.4) compares to examples from Tell Rubeidheh[110] and Farukhabad,[111] a high-shouldered jar rim (Figure 3.26.5) straddles the final LC and early JN transition,[112] and a jar rim with straight neck and horizontally everted rim (Figure 3.26.6) compares to examples from Nineveh and western Iran.[113] A fragment of a vessel with pie-crust rim also formed part of this ceramic assemblage (Figure 3.26.7).

3.2.7 Chipped stones

Found among this collection of ceramic vessels was a tabular scraper (Figure 3.27), a large cortical flake (length = 21.9 cm; width = 11 cm) of ovoidal shape. It is the product of direct percussion from a large and rounded limestone block from a fluvial deposit and shows direct marginal and almost continuous retouch. Tabular scrapers were likely used as tools for skinning, butchering, the scraping of bones and hides, and hide curing.[114] Mainly found in the Levantine and upper Mesopotamian desert zones as well as south-eastern Anatolia,[115] tabular scrapers are rare in southern Mesopotamia and the example from Shakhi Kora is the first attested in the Zagros piedmont region.

The remaining chipped stone assemblage from Shakhi Kora is as yet somewhat limited with 25 artefacts analysed to date, but some preliminary observations can nonetheless be made (Table 3.4, Figure 3.28).

Macroscopic examination of the Shakhi Kora chipped stone industry suggests that most artefacts were produced from siliceous sedimentary rocks (SSR), especially cherts.[116] One artefact was made from limestone, while obsidian artefacts were recovered from Phase 3 (AA21/L9) and Phase 5 (Z19/L12). With regards to implements produced from SSR, two distinct macroscopic groups can be distinguished on the basis of the cortical parts preserved on the artefacts' natural surfaces. This includes pebbles and cobbles available in the close vicinity of the site, and cherts of an as yet unknown geographical origin bearing no cortex. The first group roughly corresponds to cherts of light and dark grey shades and spotted/shaded structures, which were mainly used to produce flakes. The second group is represented by blades and consists of high-quality homogeneous cherts, sometimes featuring spotted or mottled structures. This group exhibits colours ranging from light grey to whitish with darker inclusions.

Categories	Z19	AA21	TT1	Total
Blades				
unretouched	3	6		9
retouched	2	6		8
Flakes				
unretouched	4		3	7
retouched		1		1
Total	9	13	3	25

Table 3.4 Composition of the Shakhi Kora chipped stone assemblage from Area I.

Blades	Z19	AA21	Total
Entire		1	1
Fragm/ret			
proximal	1	5	6
mesial	3	5	8
distal	1	1	2
Total	5	12	17

Table 3.5 Blades from Area I at Shakhi Kora.

Flakes include cortical, angular, laminar, and simple flakes made from chert, limestone, and obsidian. They are mostly small in size and fragmented. Blades are more common, with a total of 17 artefacts analysed so far. The distribution of either flakes or blades does not allow us to identify knapping activities or other specific behaviours, nor can we as yet identify diachronic or contextual technological changes. The summary in Table 3.5, thus, treats analysed blades as a single assemblage for now.

The majority of blades, 12 in total, come from AA21, while Z19 produced five artefacts. Two blades recovered from Z19 are made from obsidian (Figure 3.28.21-22), the remainder are made of chert. Only one blade, a crested 5.6 cm long item produced using direct or indirect percussion, from the Phase 3 floor (AA21/L20) is complete (Figure 3.28.6). Longer items are attested, but they are incomplete.

Morpho-technical attributes including regularity, size, profile, cross-section, shape, as well as the chronology of previous removals on the dorsal surface, butts, and bulbs allow the identification of two main groups of blades. They include blades detached by direct or indirect percussion (11 pieces), which exhibit a regular silhouette, triangular or trapezoidal section, unidirectional and subparallel previous removals on the dorsal surfaces. A second group consists of six blades produced using the

109 Delougaz (1952, Pls. 146.B.007.700, 148.B076.700, B077.700a, B077.700b); Ii (1993, Nos. 928-934); for a recent summary, see Benati (2019).
110 Killick (1988, Figs. 67-68).
111 Wright (1981, Figs. 44.l, 48.c, 50.l, 51.d, e, 52.j).
112 Delougaz (1952, Pl. 182.C544.520; C544.540); Wright (1981, Figs. 42.b, g; 48.i; 66.a, d); Killick (1988, Figs. 30.41, 43, 50, 31.63-65).
113 Sumner (1988, Fig. 3.D-M); Gut (2002, Fig. 15.7-10).
114 Barket and Bell (2011); Yerkes *et al.* (2016).
115 Manclossi and Rosen (2022).
116 Moscone *et al.* (2020) for terminology.

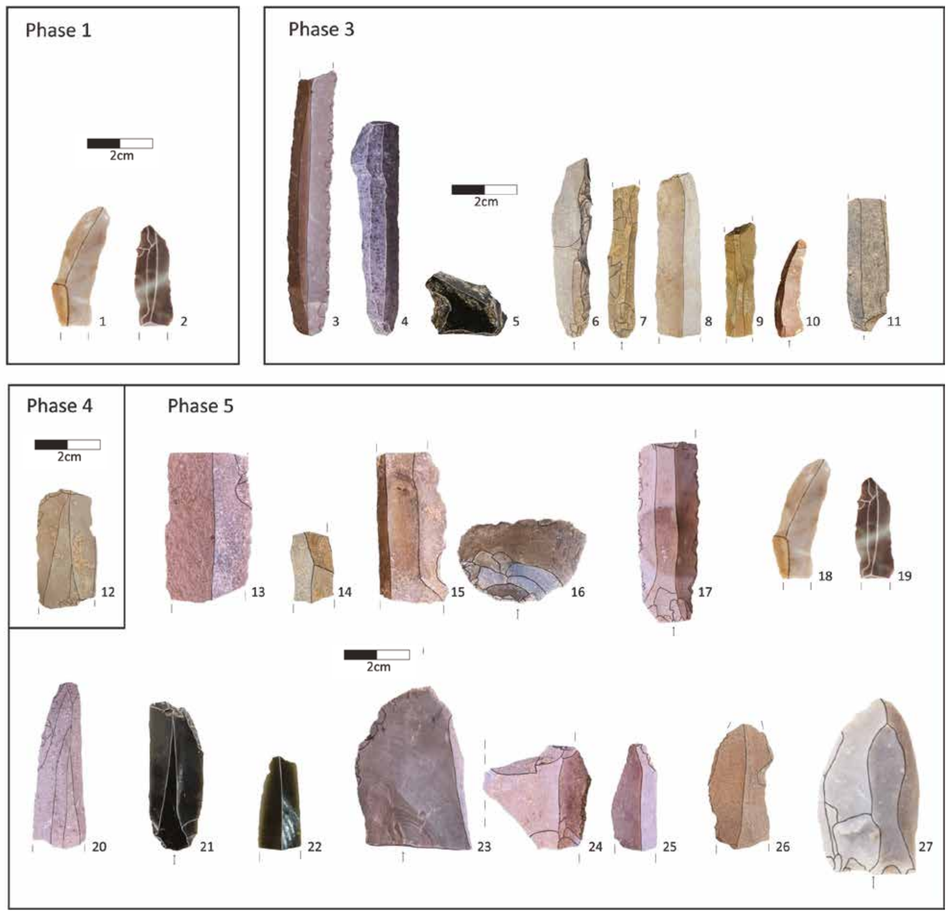


Figure 3.28 Shakhi Kora chipped stone assemblage.

pressure technique. The latter are very regular and exhibit trapezoidal sections, parallel ridges on the dorsal surfaces and, when present, a small butt associated with a flat or pronounced bulb.

In addition to variables such as raw material, type of core preparation, and the skill of the craftsperson, the distribution of blade width measurements can provide insights into the production techniques and tools used to produce pressure blades.[117] Pressure blades made from chert are on average wider than those made from obsidian. The latter have a frequency peak around 15 mm which would be consistent with the adoption of a short crutch in a sitting position or a long crutch in a standing position.[118] Shakhi Kora chert blades peak around 12 mm and 20 mm, suggesting that some may have been produced using the short crutch device (see, e.g. Figure 3.28.3), while the long crutch would be appropriate for larger blades (Figure 3.28.15). Eight of the blades recovered bear some form of retouch, while a few exhibit a fracture surface and a truncation on the opposite end, which constitutes clear evidence for intentional breakage aimed at realising segments (Figure 3.28.12). In some cases, a direct and marginal retouch is present on one edge, potential damage caused during use (Figure 3.28.3). Longer blade fragments are characterised by the presence of a localised direct and invasive retouch.

The technological dualism between blades and flakes, also visible in the raw material composition of the Shakhi Kora assemblages, might reflect an internal functional differentiation.[119] Use-wear analysis has yet to be carried out, but comparisons with upper Mesopotamian lithics suggest that blades present a specialised toolkit aimed at realising regular blanks to be hafted into composite tools (e.g. sickles), with or without segmentation, and used for cutting plants.[120] Macroscopically identifiable bitumen residues and glossy bands on the edges of blades from LC assemblages in the Tigris region also present clear evidence for use in agricultural activities.[121] Conversely, flakes without modification are produced *ad hoc* for use in domestic activities.[122]

117 Pelegrin (2012).
118 Ibid.

119 Rosen (1997); Manclossi and Rosen (2019).
120 Anderson and Chabot (2001); Van Gijn (2003); Lemorini (2010).
121 Manclossi (2019); Peyronel *et al.* (2019).
122 van Gijn (2003).

Some aspects of the Shakhi Kora chipped stone assemblage recovered so far fit well into the wider picture of lithic practice in the western Zagros piedmont region. This includes the ratio between SSRs and obsidian, which is similar to that of Helawa,[123] Surezha,[124] Gurga Chiya,[125] Logardan and Girdi Qala.[126] The use of local pebbles and cobbles for flake production and high-quality homogeneous cherts of as-yet-unknown origin(s) for blades is also a common feature in the wider region. No traces of knapping have been identified so far on Shakhi Kora, but some of the blades, such as a crested blade (AA21/L21) and several blade fragments (AA21/L8-9), could be connected to core initialisation and knapping surface management.

At the same time, significant differences can also be observed, which point to the existence of several regional communities of practice and exchange networks. For instance, pressure blades appear in Helawa during the LC2, even if they represent only a small part of the assemblage.[127] A similar trend is also attested at the nearby site of Surezha.[128] In both cases, blades are produced off-site and gradually replace a local tradition of blades and laminar flakes produced using direct percussion. From the LC3, the lever pressure system becomes more prevalent, which produces larger items up to 30 mm in width that are made from non-local cherts.[129] By contrast, at Girdi Qala and Logardan pressure blades are produced using the crutch device in its long and short variants, while the lever system is rarely employed.[130] The chert raw materials used at Shakhi Kora share some similarities with the Girdi Qala and Logardan assemblages, but are completely distinct from the Helawa industry, pointing to the existence of multiple, and as yet mainly unidentified, production locales and regional distribution networks for pressure blades. To date, only one LC-to-EB pressure blade production centre has been identified at Jebel Zawa in the Dohuk region.[131] Here, bigger and smaller blades were produced from the same reduction sequence using the pressure technique and starting from very large nodules,[132] possibly shifting pressure mode or using a flexible device during advanced stages of production.[133]

123 Peyronel *et al.* (2019).
124 Stein (2018).
125 Wengrow *et al.* (2016).
126 Manclossi (2019).
127 Peyronel *et al.* (2019).
128 Stein (2018).
129 Ibid.; Peyronel *et al.* (2019).
130 Manclossi (2019).
131 Conati and Moscone (2018).
132 Moscone *et al.* (2020).
133 Ibid.

3.2.8 Food and food practices

Local and regional communities of practice in which the inhabitants of Shakhi Kora partook, especially those associated with the production and consumption of food, and with the management of livestock are also beginning to emerge from preliminary organic residue and stable isotope analyses, alongside zooarchaeological and archaeobotanical research.

3.2.8.1 Lipid and stable isotope analysis of ceramic vessels

Pilot lipid and stable isotope analyses to date have focused on BRBs, an iconic vessel type that is conventionally associated with south Mesopotamian/Uruk contact and with the emergence of centralising institutions and associated new foodways. The precise purpose and use of BRBs has been a topic of debate for over a century,[134] but most widely accepted have been interpretations that associate BRBs with the distribution of rations. This hypothesis was first formulated by Nissen following a mass find of 1520 BRBs in a sounding at Uruk-Warka.[135] The ration hypothesis also hinges on the identification of the archaic pictogram GAR = NINDA as a BRB,[136] and on the sign $GU_{7,}$ which combines a BRB and a human head and means ‘to eat’, to stand for ‘ration’ in Archaic texts.[137] Assumptions about their mass-production and deliberate standardisation based on vessel volume further added weight to this interpretation.[138]

Developing the hypothesis of BRBs as ration containers further, Pollock proposed that BRBs formed part of a fundamental and centrally orchestrated transformation of food consumption, aimed at producing new types of subject positions.[139] This involved the disruption of earlier kin-based social relationships as expressed in household-centred food preparation and consumption, and their replacement with ‘fast-food’ hand-outs to state-dependent workers, who would have been eating ‘on the job.’ This new mode of consumption would have strengthened a new and state-centred understanding of community.[140] What exactly those rations were that may have been distributed in BRBs, has also been the subject of much discussion. Most popular in recent decades have been hypotheses that link BRBs with the production of leavened bread,[141] either to

134 Potts (2009, 1-2).
135 Nissen (1970, 137).
136 Potts (2009, 3).
137 Green *et al.* (1997, 153-154).
138 Johnson (1973); but see Beale (1978); Frangipane (1989).
139 Pollock (2003, 28).
140 Ibid., 32.
141 Schmidt (1982); Millard (1988); Chazan and Lehner (1990); Wengrow (2001, 171).

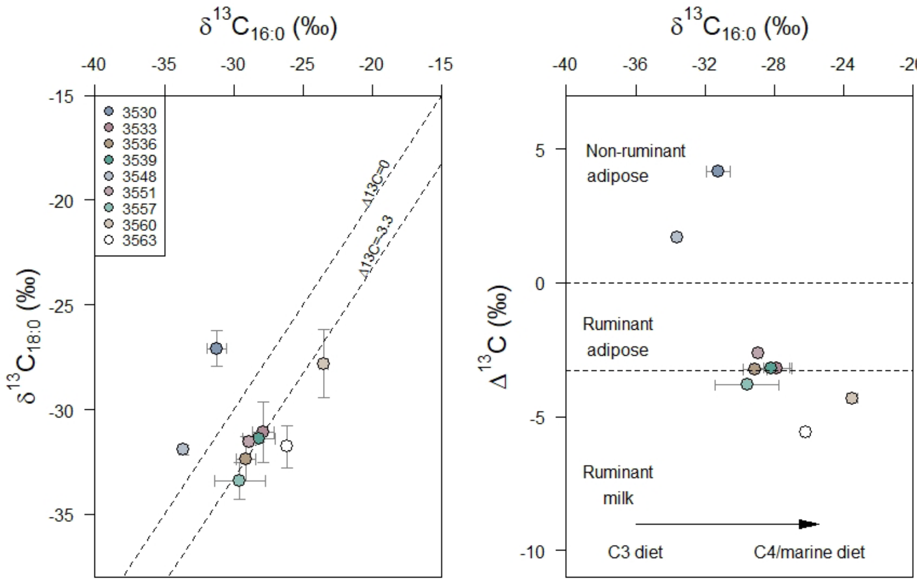


Figure 3.29 Stable carbon isotope measurements of $C_{16:0}$ and $C_{18:0}$ fatty acids obtained from pottery sherds: plot of $\delta^{13}C_{16:0}$ and $\delta^{13}C_{18:0}$ values with SD (left) and plot of $\Delta^{13}C$ ($\delta^{13}C_{18:0} - \delta^{13}C_{16:0}$) values against $\delta^{13}C_{16:0}$ values (right) with SD obtained from ceramic matrices (cf. Perruchini *et al.* 2023, Fig. 7).

feed state-dependent workers[142] or to supply bureaucratic elites with distinctly formed bread-loaves.[143]

At Shakhi Kora, BRBs make up a large proportion of the ceramic assemblages from Phase 2 onwards, alongside other coarse bowl types. The majority of BRBs have been recovered in food production, distribution, and discard areas in Area I, which appears to have housed a sequence of institutional households. A potential association with supra-regional, centralising food practices, moreover, is suggested by the striking parallels between the upturned BRBs found stacked along Wall 1 in the Phase 3 exposure of AA21 with LC contexts at Chogha Mish.[144]

Organic residue and compound-specific stable isotope analyses allow us to begin to address questions regarding the function and contents of BRBs at Shakhi Kora, which in turn provide us with an empirical base from which to tackle broader issues regarding the identities of those who produced and used BRBs at the site, and what social and political ends they may have served from their first appearance in the LC2/3 to the strongly Uruk-related cultural milieu of Phase 5.

Organic residue analysis on LC pottery has been limited to date and focused on individual vessels, including an LC jar from Godin Tepe in western Iran, which contained beerstone,[145] the identification of wine in a Late Uruk spouted jar from Uruk-Warka,[146] and beeswax in a BRB from Tepe Sofalin.[147] BRBs from sites in the Syrian Middle Euphrates were analysed by pyrolysis coupled to gas chromatography and mass spectrometry,[148] with results that only very cautiously appear to support the bread hypothesis.

Lipid residues from 10 BRBs from Phase 3-5 contexts at Shakhi Kora were recently analysed using gas chromatography-mass spectrometry (GC-MS) and gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS), as well as fatty acid and compound-specific $\delta^{13}C$ analyses (Figure 3.29).[149] The combined data of the fatty acid ratios and compound-specific $\delta^{13}C$ analyses indicate that BRBs at Shakhi Kora were used to serve and consume a range of different foods, including meats, and possibly also dairy and seed/plant-based products.

Of particular interest are six vessels, which produced ruminant stable carbon isotope signature $\Delta^{13}C$ values, while the fatty acid ratios of an additional bowl also point to animal fats. In terms of vessel functionality, no ketones and, thus, no evidence of heating, were identified in our lipid extracts. Although preservation issues can never be excluded, the persistent absence of ketones in the Shakhi Kora samples strongly suggests that BRBs were not used as cooking vessels or baking moulds but functioned in the serving or distribution of foods and their consumption.

The presence of meat-based foods in the majority of the analysed Shakhi Kora BRBs raises interesting questions regarding their preparation, and how a meat-based content articulates with state-centred ration hypotheses. Recent discussions on food and food practices in LC southern

142 Potts (2009).
143 Goulder (2010).
144 Delougaz and Kantor (1996, 50, Pl. 15.A-C).
145 Michel *et al.* (1993).
146 Badler *et al.* (1996).
147 Mayyas *et al.* (2012).
148 Sanjurjo-Sánchez *et al.* (2018).
149 For a detailed discussion of methods and results, see Perruchini *et al.* (2023).

Mesopotamia, for instance, have pointed to the scarcity of fire installations in institutional contexts, suggesting that large-scale state-organised food distributions did not involve large amounts of cooked foods, but that they would instead have focused on foods prepared with other methods such as brewing, drying, and pickling.[150] Heat-based food preparation, as indexed by hearths and ovens, by contrast, would seem to have been concentrated in houses and perhaps in temple complexes. In the case of the latter, Pollock suggested, food production would have been focused on festivals and on nourishing the gods and their servants.[151]

There is clear evidence for heat-based cooking activities in Phases 2, 3, 4 and 5 at Shakhi Kora. Several small to medium jars recovered from associated floor surfaces show signs of secondary burning suggestive of their use as cooking vessels. It is also possible that the oven inside the U-shaped feature associated with Phase 5 in the eastern part of Area I may have been used for roasting meats, although we have as yet no further evidence to support this proposition.

A preliminary study of the zooarchaeological assemblage from Shakhi Kora identified the remains of caprines, with goats dominating over sheep, and some cattle (see also Section 3.2.8.2 below and Appendix VI.3). Ruminant animals, thus, make up a significant proportion of the mammalian faunal assemblage at the site. There were also two fragments of pig, which are non-ruminant animals. The faunal assemblages associated with Area I food production and distribution contexts also point to marrow and grease extraction, a butchery practice where bones are broken down to access the marrow and fragments are subsequently boiled to extract the fat. The high frequency of bones showing signs of marrow and grease extraction supports the identification of excavated contexts as cooking and consumption locales, with animals probably being slaughtered elsewhere. It is, therefore, likely that the relevant BRBs contained stews based on, or flavoured with, bone and marrow.

Rather than containing breads or cereal-based rations, which would have been of comparatively low cost to produce and distribute to large numbers of consumers, at least some BRBs at Shakhi Kora contained meals produced at potentially greater economic expense. On the one hand, this may point to special occasions, or more distinguished consumers. On the other hand, it could point towards differences in the local economy and a greater focus on pastoralism at the site. In the latter scenario, animal products would have been more widely available and perhaps incorporated more regularly into daily meals than in southern Mesopotamia. The use of bone and marrow moreover presents a careful extraction of all available calories from slaughtered animals rather than the festive cuts of meat one would expect to be served at special social occasions. This would, thus, favour a quotidian and possible ration scenario. It is also possible that the proportions of animal products in these broths and stews, especially the meat content, would have varied according to social context and occasion. A larger study of BRBs and other vessel categories attested at Shakhi Kora is currently underway to test these hypotheses. For now, we can say that our preliminary results support a multi-functional explanation of BRBs and point to the appropriation and transformation of both meaning and function of this vessel type among local communities.

3.2.8.2 Animals, animal diet, ecology, and mobility

As mentioned above, a preliminary assessment of the zooarchaeological assemblage from Shakhi Kora identified the remains of caprines, with goats dominating over sheep, followed by cattle, pig, dog, and deer (Appendix VI.3). In order to add to our understanding of the interrelationships between animal diets, mobility, seasonality and social practice, we conducted pilot stable isotope analyses on animal tooth enamel and bone collagen (Appendix VII).

Stable isotopic analyses of archaeological animal tooth enamel and bone collagen can be used to answer a range of archaeological and palaeoenvironmental questions. During the formation of skeletal structures, isotope values related to water and food consumed are recorded and archived, and their analysis can provide insights on human and animal diets, ecology and spatial mobility. Tooth enamel is not remodelled and isotope values represent discrete time periods during the earlier stages of an animal's life when that tooth was forming, whereas the turnover of bone results in values representing a longer time-averaged period.[152]

As tooth enamel mineralises, it records isotopic values related to water and food consumed. These isotope values can be measured for the period of the animal's life during which tooth growth occurs by taking serial enamel microsamples along the tooth crown.[153] Isotopic analyses can return a range of insights pertaining to the seasonality of the climate (oxygen isotope composition – $\delta^{18}O$), the diet of the animal (carbon isotope composition – $\delta^{13}C$), and lifetime movements in relation to underlying geology (strontium isotope ratios – $^{87}Sr/^{86}Sr$).

Stable carbon isotope ($\delta^{13}C$) values of herbivore tooth enamel reflect the $\delta^{13}C$ values of the plants that they consumed as that part of the tooth was forming. The $\delta^{13}C$

150 Pollock (2012, 2015b); D'Anna and Jauß (2015); Jauß (2015).

151 Pollock (2015b).

152 Lee-Thorp (2008).

153 Sharp and Cerling (1998); Fricke and O'Neil (1999); Balasse (2002); Zazzo *et al.* (2010); Henton (2012).

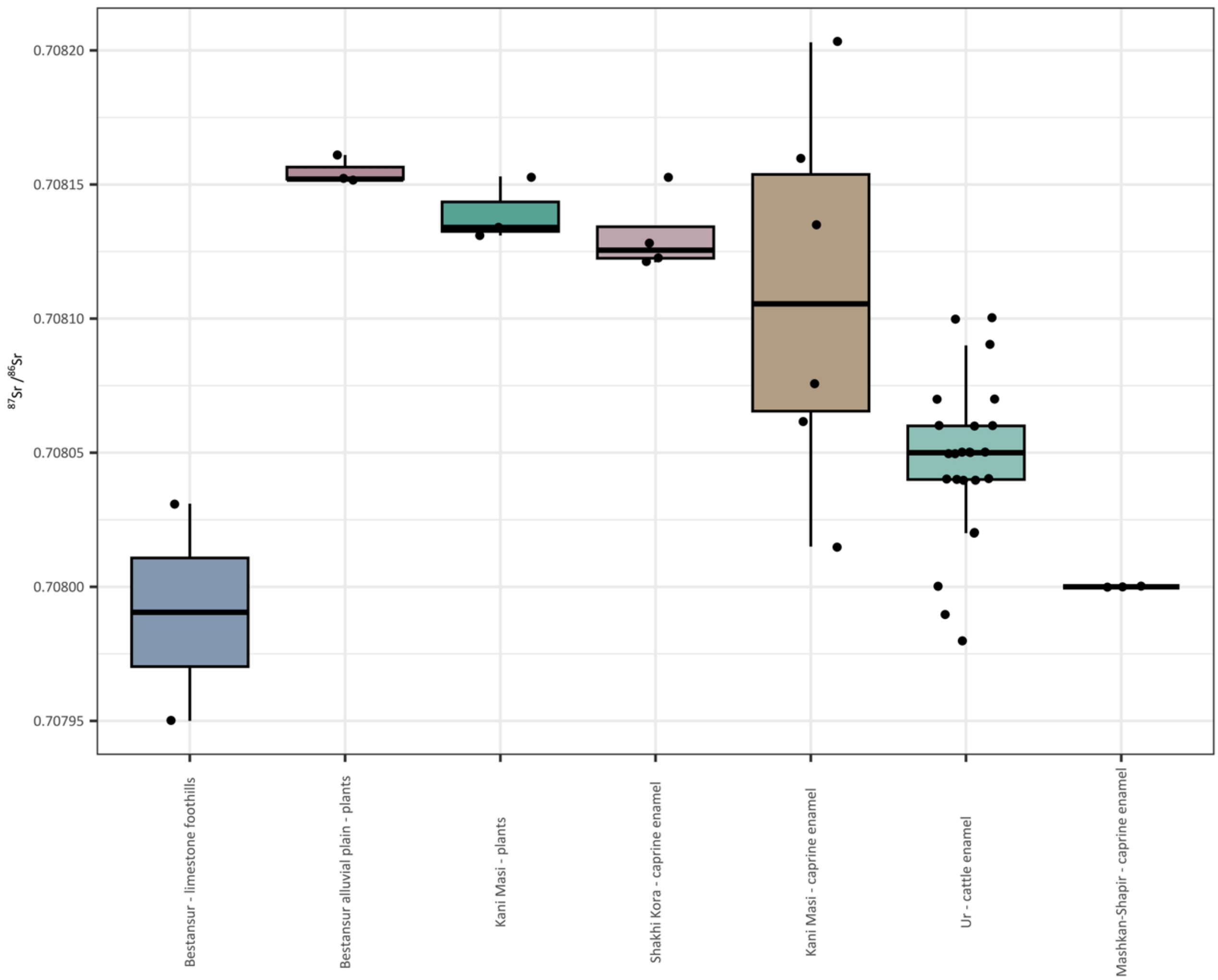


Figure 3.30 Strontium isotope ($^{87}Sr/^{86}Sr$) results from Shakhi Kora and Kani Masi (SRP046) caprine tooth enamel (Table VII.5) compared to published regional values of modern plants (Elliott *et al.* 2015), cattle tooth enamel from Ur (Greenfield *et al.* 2022), and caprine tooth enamel from Maskhan-Shapir (Kenoyer *et al.* 2013).

values therefore give information on diet.[154] The $\delta^{13}C$ values of plants vary due to photosynthetic pathways and environmental conditions, with modal $\delta^{13}C$ values for modern C_3 and C_4 plants of -26.5‰ and -12.5‰, respectively.[155] Based on isotopic analysis of both modern and ancient plant remains from Çatalhöyük, for example, Pearson *et al.* established a mean value of -23‰ for C_3 plants and -12‰ for C_4 plants.[156]

The oxygen isotope composition of local precipitation varies seasonally according to ambient temperature at mid- and high latitudes,[157] and stable oxygen isotope ($\delta^{18}O$) values of tooth enamel may be used to infer $\delta^{18}O$ values of ingested waters which can retain seasonal fluctuations, although evapotranspiration may enrich values in hot and arid climates.[158]

Strontium (Sr) isotopes taken up by animals are related via plants and soil to the underlying geology and hydrology of the locations where they consumed food.[159] Measured strontium isotope compositions, expressed as the $^{87}Sr/^{86}Sr$ ratio, vary according to the age and rock type of underlying geology. As the high-crowned (hypsodont) teeth of ungulates grow progressively, incremental analysis along their growth axis preserves a record of changes in these isotopes and thus have the potential to explore past movements relative to the underlying

154 Cerling and Harris (1999).
155 Vogel *et al.* (1978).
156 Pearson *et al.* (2007).
157 Gat (1980).
158 Kohn *et al.* (1998); Sharp and Cerling (1998); Levin *et al.* (2006).
159 Bentley (2006).

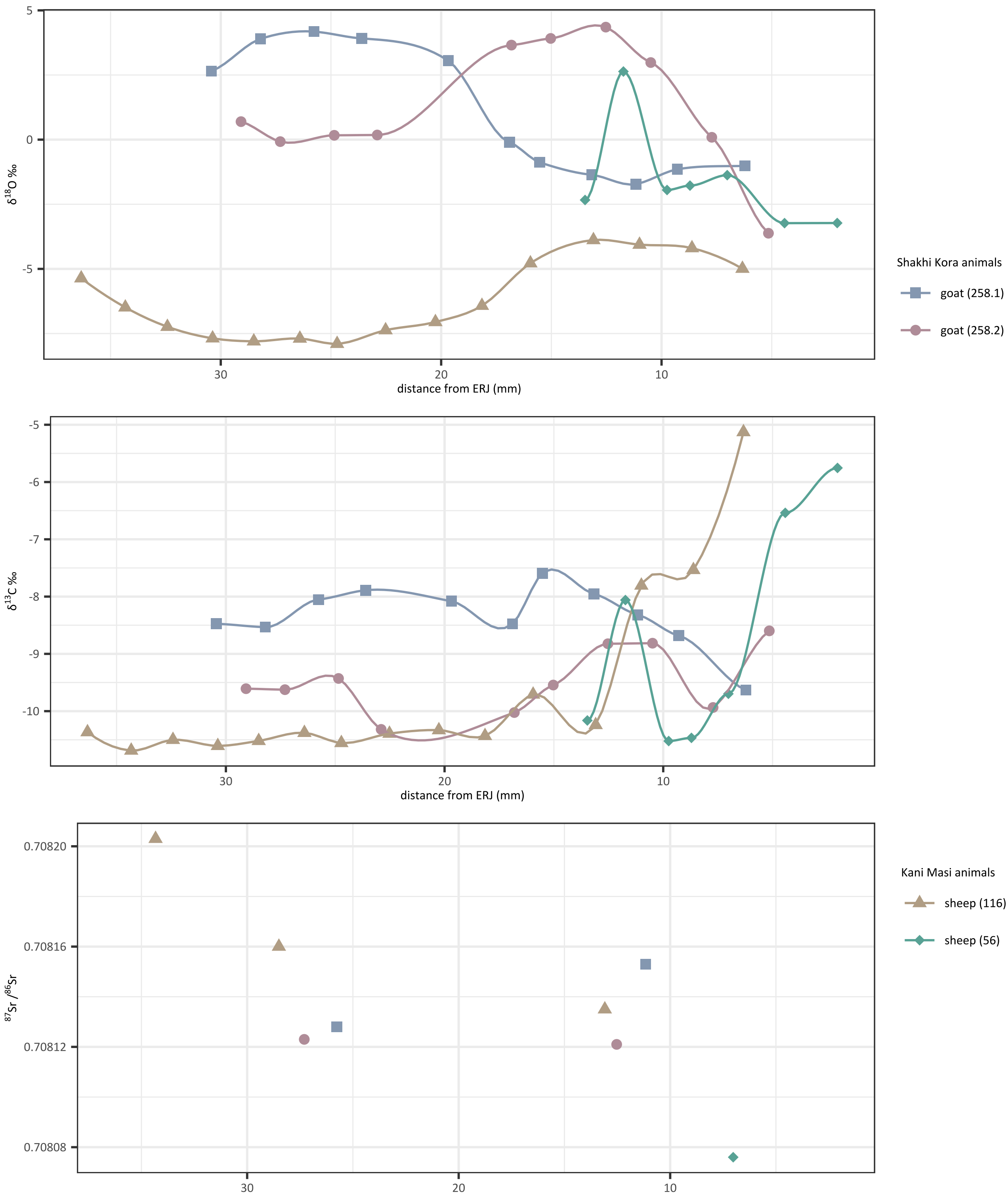


Figure 3.31 Sheep and goat sequential enamel oxygen (top), carbon (middle), and strontium (bottom) isotope results (see Table VII.4 for specimen data and values).

geology.[160] Stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope analysis of collagen can also provide useful insights on diet, aridity, and spatial movements.[161]

In order to explore possible movements in relation to geology, we assessed the local biologically available strontium isotope ratios through consideration of underlying geology of the study sites and also Sr values from modern plants collected in the vicinity. Both Shakhi Kora and Kani Masi (SRP046, see Chapters 5.2 and 6.2) are relatively closely situated (c. 4 km apart) on Quaternary polygenetic sediments.[162] To assess the local bioavailable strontium, we analysed strontium isotope ratios from three samples of modern plants collected from around the site of Kani Masi (generating a mean $^{87}Sr/^{86}Sr$ value of 0.70814; Table VII.5). This fits within the expected range for Quaternary geology and the identified values provide a conservative central range for a local signature for biologically available strontium isotope ratios (Figure 3.30; future analyses may more fully define the local range and variation in values).

Animals reared solely in the area around Shakhi Kora or Kani Masi would be expected to generate Sr values that match the local control data for bioavailable strontium. Animals that moved away from the underlying geology of these sites (during the period of tooth formation), or had originated from areas distant to these sites, would be expected to show signatures representative of their different spatial life histories. For example, strontium isotope values from sites further south – from Ur and Mashkan-Shapir within the alluvial basin of the lower Tigris-Euphrates river system – provide lower $^{87}Sr/^{86}Sr$ values from both archaeological animal and human tooth enamel analyses of <0.70810.[163] Movements between spatially separated areas of similar geology might make it difficult to identify lifetime movements from strontium isotope compositions. The Sr values identified from plant samples at Kani Masi (Table VII.5), for example, also compare favourably with those from the Quaternary alluvial plain around the Tanjero river near Bestansur, some 90 km to the north in the Shahrizor plain.[164]

We analysed nine bone collagen samples from Shakhi Kora. Unfortunately, collagen is poorly preserved in the material and no samples produced usable results (Table VII.2).

Figure 3.31 illustrates the two sequentially sampled goat lower third molars (M_3) from Shakhi Kora (compared to two from Kani Masi, SRP046). Both samples (258.1, 258.2) were recovered from Phase 3 in Area I (AA21, Table VII.4). For the two specimens, tooth enamel $\delta^{18}O$ values range from -3.6 to -4.2 ‰. As discussed above, oxygen isotope data can be used to infer the seasonality of formation of teeth. Under natural conditions, goats and sheep reproduce seasonally in subtropical, middle and high latitudes. This is regulated by environmental variables and in particular photoperiod, but also other factors such as available nutrition.[165] This is confirmed by Redding in his study of Southwest Asian sheep and goat husbandry – for example, he states that in wild goats, births occur from January to March, which is also the case in modern unimproved goat breeds in the region.[166] In caprines, the M_3 develops between around c. 9-10 months and c. 20-22 months, thus the tooth captures approximately the second year of life.[167] As both sheep and goat are seasonal breeders, as described above, extension of the breeding season in herds can be detected by offsets in the cyclical variation in intratooth oxygen isotope curves. This is clearly visible in the two Shakhi Kora sequences, with one (goat 258.1) being significantly offset compared to the seasonal maxima in $\delta^{18}O$ values in the other teeth from both Shakhi Kora and Kani Masi. The manipulation of animal breeding to extend the birth periods of livestock may represent attempts to intensify aspects of animal husbandry production in the LC. Interestingly, the manipulation of breeding seasons in herd management practice is indicated in later textual evidence,[168] and the Shakhi Kora evidence would suggest a significantly earlier emergence of these practices in the region of modern-day Iraq. This practice is also identified isotopically at Köşk Höyük, Türkiye, where more complex and intensive animal management practices are seen in the Middle Chalcolithic.[169]

For the two Shakhi Kora specimens, tooth enamel $\delta^{13}C$ values range from -10.3 to -7.6 ‰ (Appendix VII.3). The two goat lower third molars (M_3), samples 258.1 and 258.2, produced ranges of 2.0 ‰ and 1.7 ‰ respectively, with no clear seasonal pattern (Figure 3.31). Given the expected off-set of 14.1 ± 0.5 ‰ between tooth enamel and dietary intake,[170] we would expect an estimated $\delta^{13}C$ dietary range between -24.7 and -21.7 ‰. This suggests that the caprine diet was primarily made up of C_3 plants (see discussion above).

As laid out above, analyses of strontium isotope ratios in two sheep and goat M_3 tooth enamel samples from Shakhi Kora were undertaken to investigate potential lifetime movement(s) of the animals. Figure 3.30 compares the strontium isotope values from the Shakhi Kora caprine teeth with the limited published bioavailable strontium values from modern plant and archaeological tooth enamel samples in a broad transect of eastern and southern Iraq. Although it is difficult to define precise local Sr ranges and

160 Ibid.; Montgomery (2010).
161 Pearson *et al.* (2007); Lee-Thorp (2008).
162 Barwary and Slaiwa (2014).
163 Kenoyer *et al.* (2013); Greenfield *et al.* (2022).
164 Redding (1981, 91); Elliott *et al.* (2015, Fig. 1).
165 Donet *et al.* (1982); Chemineau *et al.* (1988); Amoah *et al.* (1996).
166 Epstein and Herz (1964); Redding (1981, 91).
167 Zazzo *et al.* (2010).
168 Oppenheim and Hartman (1945, 169).
169 Makarewicz *et al.* (2017).
170 Cerling and Harris (1999).

regional variability without more detailed mapping,[171] the data show that the Shakhi Kora caprine Sr values are consistent with locally raised signatures.

3.2.8.3 Plant remains

The recovery of botanical samples has been limited to date at Shakhi Kora. The samples analysed derive from the contents of ceramic jars and ashy deposits associated with cooking activities and are generally poor in botanical content (Appendix IV.2). Some cereal grains have been observed, including emmer wheat (grain and glume base), einkorn wheat (grain), barley (grain), and a single fig seed, as well as some wild taxa, primarily grasses, with a minor component of small leguminous seeds. The mixture of food crops and wild taxa found in the jars may reflect the by-products of crop cleaning. They could have been stored in the jars deliberately, as seen elsewhere on LC sites,[172] though the Shakhi Kora assemblage is currently too small to draw any firm conclusions regarding their character or intended use. The cereal remains from the cooking area in Area I/Z19 are very degraded and are likely to be remains of dung fuel. Similarly limited conclusions can be drawn about other aspects of agricultural practice. All attested cereal crops can be grown in the immediate vicinity of the site. As winter crops, which are sown in late autumn/early winter to take advantage of the seasonal rainfall, they could be grown without the need for irrigation.

To sum up, our preliminary analyses presented in this section have started to yield a diverse array of datapoints with which we can begin to sketch a picture of the relationships and practices Shakhi Kora's inhabitants engaged in with regards to agricultural and pastoral strategies, as well as of the social dimensions of food production and consumption at the site. The analysis of lipids derived from ceramic vessels, archaeobotanical, zooarchaeological, and stable isotope results, all point to strong local characteristics, whose more intensive investigation presents a central focus of ongoing research.

3.3 The lower Sirwan region in the Late Chalcolithic

In this section, we present the results of surface survey to date in order to gain a regional-scale picture of LC settlement and landscape practices and to contextualise the insights gained from excavations at Shakhi Kora.

Surface collections are, as we have already discussed, often difficult to date with precision due to the lack of congruence between ceramic developments and epochal transitions that are recognised and defined at the archaeological macro-scale or in historical sources. The fourth millennium BCE is no exception. Many ceramic forms are produced and consumed over several centuries. It is therefore not possible to match surface collections with precision to the occupation phases identified at Shakhi Kora or the five-phased Santa Fe periodisation, however modified.

As a result, we confine ourselves to drawing broad distinctions between an earlier and a later phase, which approximate to the LC1/2 and the early part of the LC3 on the one hand, noting that there is very limited evidence for the LC1 in the SRP surface collections, and the later LC3-5 on the other. While it is possible to draw these broad distinctions at sites with sufficient or sufficiently distinctive surface assemblages, others can only very generally be ascribed an LC date. We also need to keep in mind that, in light of recent excavation results at Girdi Qala and Logardan, Shakhi Kora, and elsewhere, we can no longer ascribe BRBs solely to the later phases of the LC. The traditional distinctions between chaff-tempered = local and mineral-tempered = Uruk pottery can similarly no longer be applied wholesale.[173] Moreover, and on the other end of the chronological spectrum, some vessels from Phase 5 at Shakhi Kora, which is radiocarbon dated to the LC4/5, find their best comparisons in final-fourth-to-early-third millennium BCE assemblages, suggesting an earlier onset of some of these traditions than traditionally expected. A similar issue is hinted at in the relationship between ceramic and small finds at Tell Rubeidheh in the Hamrin.[174] Finally, there are a number of surface collections, especially from upland sites, whose formal and technological characteristics resemble but do not quite map onto material from stratified assemblages. We have included these finds in the discussion below to illustrate the uncertainties involved in the recognition and dating of surface assemblages from areas with few or no excavated sites. We present lithic material here, whose earliest possible dates fall into the fourth millennium BCE.

Of the 230 sites visited to date, 16 can be assigned to the first half of the fourth millennium BCE based on their surface pottery, 26 to the later phase, and several more produced pottery or chipped stone assemblages dating more generally to the LC (Figure 3.32, Table 3.6). Taken together, this points to a rather significant settlement increase from the preceding Early-to-Middle Chalcolithic (see Chapter 2.4.4). There is also a significant overall shift in settlement locales, with just over half of Ubaid sites (re-)occupied at some point during the LC. It is not possible on the basis of the majority of surface collections to determine whether sites with both Early-to-Middle and Late Chalcolithic occupations are inhabited

171 Holt *et al.* (2021).
172 Hald and Charles (2008).
173 Vallet *et al.* (2017, 74-75); Lewis *et al.* (2020).
174 Crawford (1988).

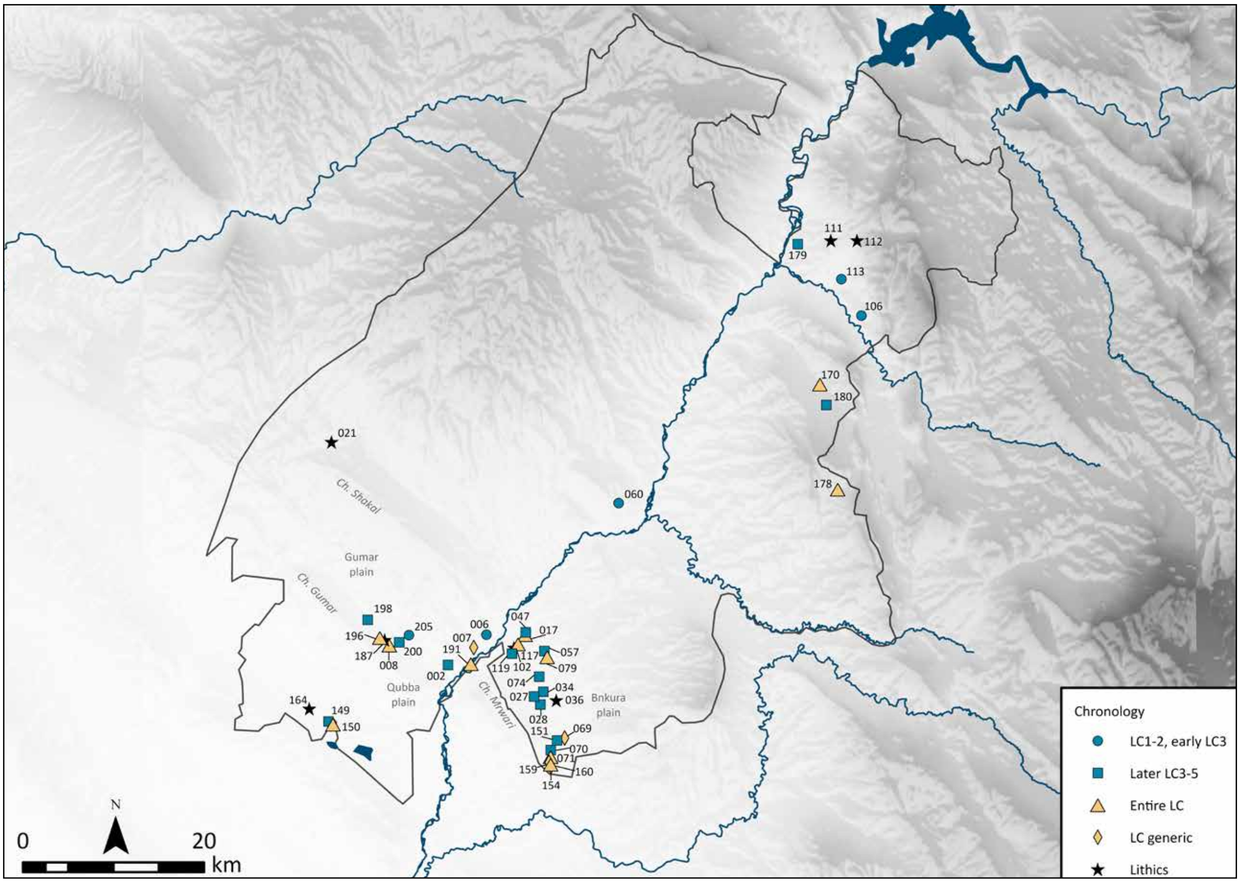


Figure 3.32 Map of Late Chalcolithic sites in the lower Sirwan region (DEM GTOPO30 ©USGS).

Figure 3.33 SRP149 and SRP150 on (left) a CORONA image (3 August 1969, ©Corona Atlas of the Middle East) and (right) a modern satellite image (ESRI Living Atlas ©Maxar Technologies).

Site	LC1-3	LC3-5	LC g.	LITH	Site	LC1-3	LC3-5	LC g.	LITH
SRP002		x			SRP112				NEO-BA
SRP006	x				SRP113	x			
SRP007			x	NEO-CHA	SRP117	x	x		
SRP008	x	x		LC	SRP119		x		
SRP017	x	x		LC-EB	SRP149		x		
SRP021				LC-BA	SRP150	x	x		LC-EB
SRP027		x			SRP151		x		
SRP028		x		NEO-IA	SRP154			x	
SRP034		x			SRP159			x	
SRP036				NEO-IA	SRP160	x	x		
SRP047		x			SRP164				LC-EB
SRP057		x			SRP170	x	x		
SRP060	x				SRP178	x	x		
SRP069			x	NEO-BA	SRP179		x		
SRP070		x		LC	SRP180		x		
SRP071	x	x			SRP187				NEO-BA
SRP074		x			SRP191	x	x		
SRP079	x	x		LC-EB	SRP196	x	x		NEO-LC
SRP102				CHA-BA	SRP198		x		NEO-LC
SRP106	x				SRP200		x		
SRP111				CHA-BA	SRP205	x			NEO-BA

Table 3.6 Late Chalcolithic sites in the lower Sirwan region (see also Appendix I).

continuously, or present more intermittent bursts of re-occupation and re-use. A more or less continuous occupation may be most convincingly suggested for Pira Faqira (SRP008), Tepe Gumar II (SRP196), and Ezadin Tepe (SRP205), which are all located in the Gumar plain.

3.3.1 Right bank

Starting in the south, evidence for occupation in the LC comes from two large mounds located in the middle part of the Qubba plain. The surface assemblage from Qubba Qala (SRP149, Figure 3.33), a c. 5 ha large site with a prominent rectangular high mound, is dominated by Middle Islamic glazed sherds, but also shows signs of an Uruk-related LC occupation. This includes a beaded rim holemouth jar (Figure 3.34.1) with parallels, for instance, at Kani Shaie Vd.[175] Bead-rim jars also have a wide distribution across northern Mesopotamia and are attested, for instance, at Tell Brak HS6 level 1,[176] Hamoukar Area Z,[177] and Hammam et-Turkman VB.[178] A globular band-rim jar rim with incised triangular decoration (Figure 3.34.2) finds regional parallels in the middle Diyala and the Bazian basin.[179]

Finds from the nearby c. 10 ha multi-period mounded complex of Qubba Tepe (SRP150, Figure 3.33) include BRB fragments (Figure 3.34.3-5), band-rim jars with simple (Figure 3.34.6) and thickened and everted rims (Figure 3.34.7), as well as a bowl with upturned lip (Figure 3.34.8), which may date to the earlier LC phase and finds comparisons, for instance, at Kani Shaie Vd, Gerdi Resh, and Nineveh,[180] along with a club-headed bowl fragment (Figure 3.34.9), and a bowl with pronounced rim (Figure 3.34.10).[181] The surface chipped stone assemblage from Qubba Tepe consists of 16 artefacts, including one core (Figure 3.35.5), 12 flakes (Figure 3.35.1-4, 6-10, 12-14), and three bladelets (Figure 3.35.11, 15-16). The subconical blade core reduced by direct or indirect percussion and the bladelet fragments fall into an LC-to-EB date range (see also Appendix III).

175 Renette *et al.* (2021, Fig. 10.16).
176 Matthews (2003, Fig. 3.16.6).
177 Al-Quntar and Abu Jayyab (2014, Fig. 6.15).
178 Akkermans (1988, Pl. 107).
179 Killick (1988, Figs. 69.45, 50, 70.63-65); Nannucci (2012, Figs. 5.58-63, 6.64-68); Renette *et al.* (2021, Figs. 9.17, 19, 13.10).
180 Hijara (1976, 77); Gut (1995, P.113.S271); Renette *et al.* (2021, 20-21, Fig. 10.2).
181 Renette *et al.* (2021, 20-21, Fig. 10.13).

Figure 3.34 Late Chalcolithic pottery from the south-western plains.

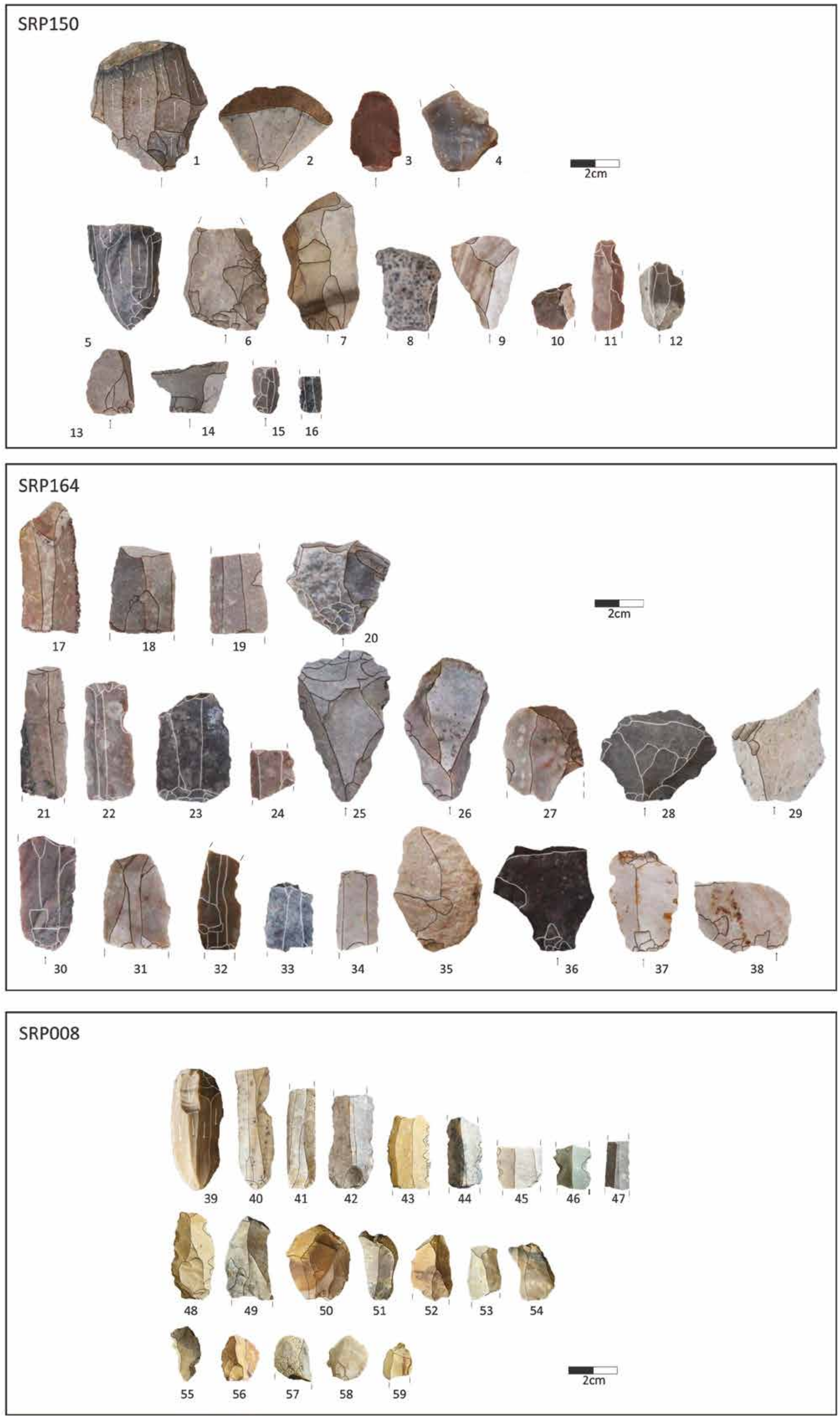


Figure 3.35 Chipped stone assemblages from SRP150, SRP164, and SRP008.

Figure 3.36 Views of sites SRP002, SRP117, SRP079, SRP074, SRP027, and SRP060.

The chipped stone surface assemblage from nearby Tell Nergz (SRP164), which includes a total of 22 artefacts, can also be attributed to the LC-to-EB. It is composed of seven flakes (Figure 3.35.26-29, 35-38), six blades (Figure 3.35.17-19, 24, 30, 32), and seven retouched artefacts (Figure 3.35.20-23, 25, 33-34). While cores are completely lacking, it is worth noting a flake with double patina reused as a core for the production of small flakes (Figure 3.35.20). The assemblage consists of chert raw materials with flakes produced from small local pebbles, while blades bear no cortex and display a greater variety of raw materials ranging from homogeneous to spotted and/or mottled varieties, pointing towards the exploitation of different chert sources. Blades are present as fragments, mostly mesial ones, and retouched artefacts. The only proximal fragment has a reduced butt and shows overhang preparation (Figure 3.35.30) that finds comparisons at Pira Faqira (SRP008), Tepe Gumar II (SRP196), and Yalanci Tepe (SRP198) in the Gumar plain, and Kalay Mira II (SRP069) in the Bnkura plain. The retouched items are characterised by truncations realised through abrupt retouch mostly delineating a straight edge.

Three cases exhibit truncations on both the distal and proximal ends (Figure 3.35.21-23), while others represent fragmentary objects (Figure 3.35.33-34). Four blades are very regular and might have been produced using the pressure technique using a long crutch device.[182]

Following trends already established during the Late Neolithic and Early-to-Middle Chalcolithic, we find the largest scatter of LC sites on the Gumar plain. The most substantial evidence for LC occupation here comes from the c. 2 ha site of Pira Faqira (SRP008), which also has a more limited occupation in the mid-to-late Ubaid (Chapter 2.4.4.1). Surface collections and a small, 2 × 2 m test sounding produced evidence for both the early and later LC phases, including club-headed bowls and bowls with externally thickened rims (Figure 3.34.11-12), a hand-made bowl with parallels in Phase 2 at Shakhi Kora (Figure 3.34.13), as well as numerous BRB fragments (Figure 3.34.14-15). Also numerous are jars with simple and more elaborate angled necks (Figure 3.34.17-24), grey ware holemouth jars (Figure 3.34.26-28), and conical spouts, some of which may point towards the later half of the fourth millennium BCE (Figure 3.34.29-31). A radiocarbon date from a charcoal sample produced a date range between 3955 and 3770 cal. BCE (Appendix II.1), which aligns with radiocarbon dates and ceramic assemblages of Shakhi Kora Phases 1-2 (see Section 3.2.1-2 above). The site also produced pottery dating to the final fourth millennium BCE (see Chapter 4.2.1).

The chipped stone surface assemblage of Pira Faqira (SRP008), which consist of 21 artefacts, confirms the LC character of the site (Figure 3.35). All of the chipped stone from the site has been realised in chert raw materials. The neocortex on flakes and laminar flakes attests the exploitation of secondary sources present in local alluvial deposits (see e.g. Figure 3.35.50, 57). Blades, which were produced using chert from a range of different sources, are all incomplete and represented by mesial and proximal fragments (Figure 3.35.40-47). Their regularity suggests the items were produced using pressure or indirect percussion techniques. Of particular interest is a large blade mesial fragment with a trapezoidal section (max. width = 2 cm) (Figure 3.35.42). The only core present in the collection indicates that bladelet production took place on site: the item shows a single prepared platform associated with a unidirectional conical extraction surface (Figure 3.35.39). The morphology of the removals indicates indirect percussion or a very controlled direct percussion method. Together these characteristics date the assemblage to the Chalcolithic, and perhaps more narrowly to the LC (see Section 3.2.7 above).

The low mound of Tepe Charmu (SRP002, Figure 3.36) produced a bowl dating to the middle of the fourth millennium BCE (Figure 3.34.32). Tepe Gumar II (SRP196), which is also occupied in the Ubaid, produced a club-headed bowl (Figure 3.34.33), a shallow burnished red ware bowl (Figure 3.34.34), a jar with flaring rim (Figure 3.34.35), and two grey ware holemouth jars that point to a date in the LC2 and early LC3 (Figure 3.34.36-37). The holemouth jar with folded rim suggests continuity in occupation into the later fourth millennium BCE (Figure 3.34.37).[183] Yalanci Tepe (SRP198), whose main occupation dates to the Late Neolithic and Early-to-Middle Chalcolithic (Chapter 2.4.2-3), also produced two BRB fragments and a number of jar and bowl rims associated with the middle centuries of the fourth millennium BCE. The lithic assemblage ranges from the sixth to the fourth millennium BCE in date. The surface assemblage of Ezadin Tepe (SRP205), which is similarly occupied in the preceding Ubaid, includes a simple bowl (Figure 3.34.38) and numerous grey ware jars (Figure 3.34.39-41), as well as a lithic assemblage with a very broad Neolithic-to-Bronze Age date range (see Chapter 2.4.1 and Appendix III).

The small, 0.9 ha, low mound of SRP200 produced a classic Uruk high-shouldered jar (Figure 3.34.42), which is widely attested throughout Mesopotamia, including the lower and middle Diyala,[184] a jar with everted rim with parallels at Tell Hassan in the Hamrin (Figure 3.34.43)[185] and at Farukhabad in the Deh Luran,[186] a basin with everted rim (Figure 3.34.44), for which comparisons are also attested in the Bazian region,[187] and a jar with simple everted rim (Figure 3.34.45).

Only two sites with very limited LC surface assemblages have been recorded to date to the north of Shakhi Kora on the right bank of the Sirwan. The c. 1 ha multi-period low mound of Tepe Qalah (or Imam Shekh Langar, SRP006), in addition to Late Neolithic pottery and lithics, also produced a fragment of a jar with short, flaring rim (Figure 3.34.46) with comparisons at Kani Shaie[188] and Girdi Qala,[189] which suggests a date in the first half of the LC. The surface collection of Shekh Langar (SRP007), a c. 0.7 ha artefact scatter on a natural rise, includes a coarse, hand-made holemouth jar with incised band with potential parallels at the LC site of Tepe Badamyar Rabat in the Urmia region (Figure 3.34.47).[190] The lithic industry from the site falls into a Neolithic-to-Chalcolithic date range.

3.3.2 Left bank

Moving now to the left bank of the Sirwan, the Bnkura plain also hosted a small scatter of LC settlements. With one notable exception (SRP117), LC sites identified to date

182 Pelegrin (2012, mode 4).

183 Killick (1988, Fig. 68.33); Renette and Ghasrian (2020, Fig. 4.18).

184 Delougaz (1952, Pl. 63.64); Killick (1988, Fig. 73.98).

185 Nannucci (2012, Fig. 6).

186 Wright (1981, Fig. 98).

187 Renette *et al.* (2021, Fig. 8.10, 13).

188 Ibid., Fig. 8.15-16.

189 Vallet *et al.* (2017, Fig. 18.1).

190 Abedi *et al.* (2019, 418, Fig. 4).

Figure 3.37 Late Chalcolithic pottery from the northern Bnkura plain.

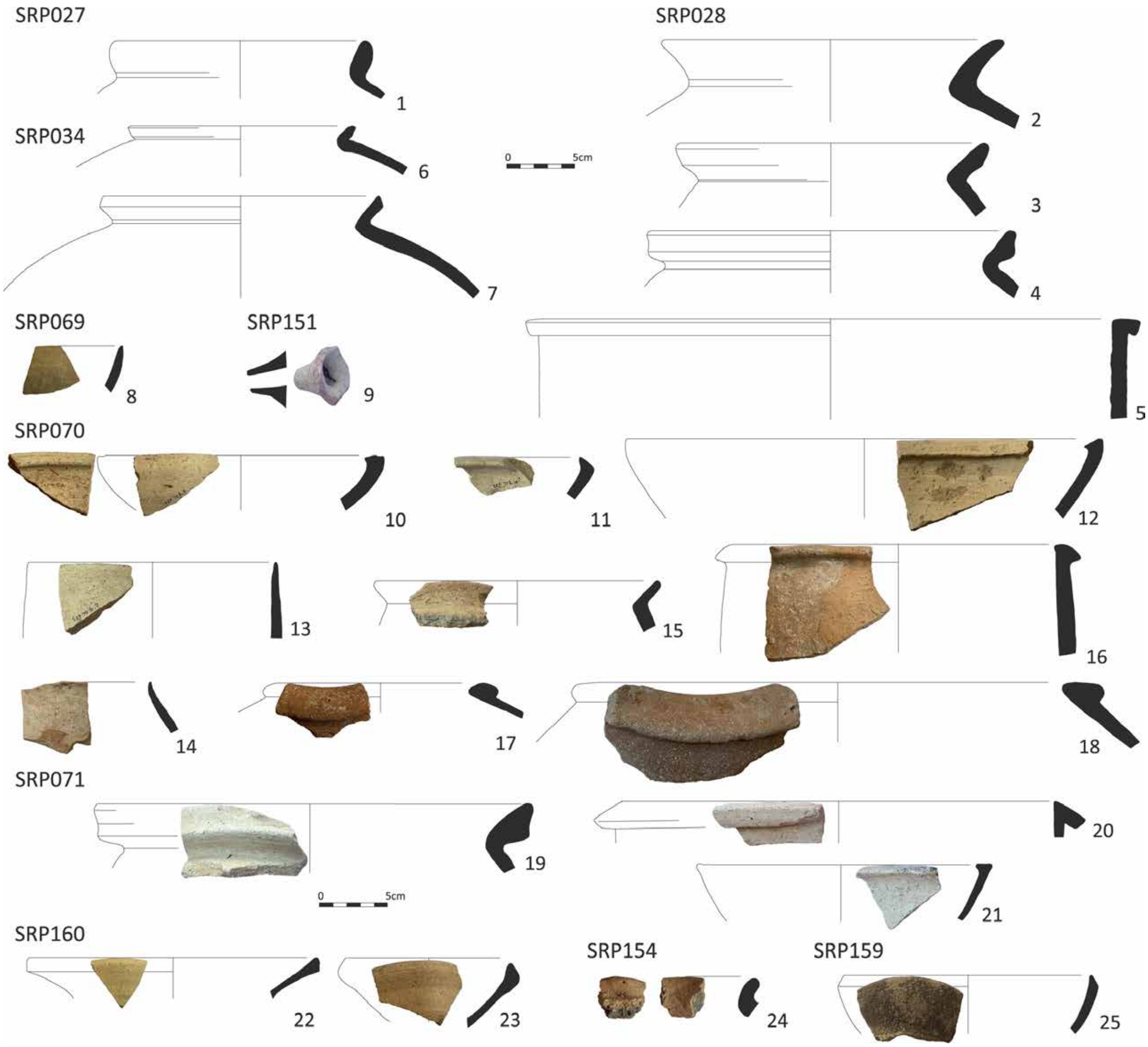


Figure 3.38 Late Chalcolithic pottery from the southern Bnkura plain.

in this part of the research region predominantly date to the mid-to-late fourth millennium BCE, which may suggest a somewhat later wave of settlement than on the right bank.

SRP117, is a small c. 1 ha low mound located 7 km southwest of Kalar, close to the left bank of the Sirwan (Figure 3.36). The site is today located in an agricultural area and subject to extensive damage through ploughing. The fourth millennium BCE surface collection from SRP117 points to a substantial LC2/3 occupation, while BRBs, elongated spouts, and a jar fragment with incised decoration suggest continuity into the mid-to-late fourth millennium BCE (Figure 3.37.1-3). A plum-coloured painted sherd, a stone vessel fragment, and a metal blade point to occupation also in the late-fourth-to-early-third millennium BCE (Chapter 4.2.2). LC forms include bowls with simple (Figure 3.37.4-5)[191] and internally bevelled rims (Figure 3.37.6-9),[192] as well as bowls with thickened rims and light carinations (Figure 3.37.10-12).[193] All of these bowl types are also attested at Shakhi Kora (SRP191) in Phases 1-3, where few examples of grey ware, however, have been found. Attested jars at SRP117 include small and medium-sized band-rim (Figure 3.37.13-20) and flaring-

191 McAdam and Mynors (1988, Fig. 28.8); Nannucci (2012, Fig. 3); Carter *et al.* (2020, Fig. 6.5-7); Renette *et al.* (2021, Fig. 9.7).

192 Rothman (2002b, Pl. 22.2829); Peyronel and Vacca (2020, 3-11); Renette *et al.* (2021, Fig. 9.6).

193 For very general comparisons, see e.g. McAdam and Mynors (1988, Fig. 28.17); Peyronel and Vacca (2020, Fig. 14.20).

neck (Figure 3.37.21-25) jars of varying sizes and rim articulations, which also compare well with the Shakhi Kora assemblage. Similar to the early phases at Shakhi Kora, the surface assemblage of SRP117 is characteristic of the wider western Zagros piedmont zone and most closely associated with the early fourth millennium BCE traditions of northern Mesopotamia, while some south Mesopotamian types are also present.

A small number of BRBs and a possible wall-cone fragment were collected on the nearby site of SRP119 (Figure 3.37.26-27), a small c. 0.3 ha and 2.5 m low mound, where several large jar rims and baked square mudbricks point to a main occupation during the second and early first millennium BCE (see Chapter 11). To the north along the Kalar-Jalawla road, the mound cluster surrounding the imposing multi-period site of Tepe Imam Mohammed (SRP017) also yielded some evidence for occupation during the LC. The surface collection from Tepe Imam Mohammed includes LC4/5 spouts as well as an example, which can be assigned a date in the LC5 or JN (Figure 3.37.28),[194] and several jar rims suggesting occupation from the LC2/3 (Figure 3.37.29) and into the LC4/5 (Figure 3.37.30). A BRB variant from nearby Tapa Yahudi (SRP047, Figure 3.37.33) finds broad comparisons at Kani Shaie.[195] Surface lithics date to the LC and the EB.

A BRB fragment (Figure 3.37.34) from Gakul (SRP057), a c. 1.4 ha large and c. 3.5 m low mound, suggests some activity, perhaps settlement, in the more central parts of the Bnkura plain in the mid-late fourth millennium BCE. The mound is today surrounded by agricultural fields, a modern irrigation canal, and is cut by a dirt road. The nearby site of Gakol Kale (SRP079, Figure 3.36) is c. 0.6 ha in size and has been heavily disturbed in the process of the construction of a square enclosure, which yielded medieval glazed wares, and more recent ceramic and glass fragments. Several BRBs (Figure 3.37.35-36) and an everted-rim jar (Figure 3.37.37),[196] as well as a possible grey ware bowl fragment suggest that Gakol Kale was occupied in the middle centuries of the fourth millennium BCE. Tapa Sawz Bulagh (SRP074, Figure 3.36) produced an LC3/4 red ware jar rim (Figure 3.37.38).[197]

In the more southerly part of the Bnkura plain, small quantities of band-rim jars (Figure 3.38.1) have been recorded at the multi-period sites of Sayid Sikhi II (SRP027, Figure 3.36). Mrwari (or Sayid Sikhi III, SRP028), which has a substantial Ubaid occupation, produced band-rim jars (Figure 3.38.2-4) and a large basin similar to examples from Kani Shaie (Figure 3.38.5).[198] The surface collection from the 1.5 ha site of Tapa Ghaydan (SRP034) includes two large globular jars with band rims (Figure 3.38.6-7). All three sites are located in the central part of the Bnkura plain, in what are today extensive agricultural fields crossed by irrigation canals. A substantial seasonal stream, which originates in the uplands to the northeast, also feeds this part of the plain.

Further southeast, the surface collection of the small, c. 0.5 ha, low mound of Kalay Mira II (SRP069) comprised mainly Neolithic and Early Chalcolithic materials. A bowl with simple tapering rim (Figure 3.38.8) is attested from the late Ubaid or early LC[199] and throughout the fourth millennium BCE.[200] The nearby site of SRP151 produced a LC3-5 spout fragment (Figure 3.38.9).

Another small cluster of LC sites is located at the southern tip of the plain, seemingly controlling movement to and from the Alwand river valley further east, one of the main routes connecting the Zagros highlands with the middle Diyala and Mesopotamia beyond. Here the site of Mala Kunar I (SRP070), a c. 4 ha sprawl of several distinct mounded rises, sits on top of a natural hill. The site is heavily disturbed by earthmoving activities, some potentially military in nature, and is today used as a chicken farm. The large surface collection from Mala Kunar I (SRP070), in addition to smaller quantities of Neolithic and Early-to-Middle Chalcolithic pottery, is dominated by forms typical of the LC3-5, as well as the final fourth and early third millennium BCE. This includes bowls with internal rims (Figure 3.38.10-12), jars with tapering rims (Figure 3.38.13-14), band-rim jars (Figure 3.38.15), a jar with externally profiled rim (Figure 3.38.16), and jars with folded rims (Figure 3.38.17-18). Interestingly, the relatively large surface collection from Mala Kunar I does not include any BRBs or other Uruk-related vessels.

The chipped stone assemblage from Mala Kunar I (SRP070), which includes a total of 32 lithic artefacts, also dates to the LC (Figure 3.39). The assemblage is composed of two flake cores (Figure 3.39.15, 24), 17 flakes and laminar flakes (Figure 3.39.12-14, 16-21, 23, 25-32), 11 blades and bladelets (Figure 3.39.1-11), and two retouched artefacts (Figure 3.39.2, 22). The assemblage shows similar techno-morphological features and raw material sources to Pira Faqira (SRP008) and SRP069. The Mala Kunar I blades and bladelets are mostly characterised by small modules produced from percussion and perhaps pressure techniques (Figure 3.39.3-11). One larger blade fragment may not represent a full production stage but may relate to core surface maintenance (Figure 3.39.1). Two flake cores were used to produce flakes and laminar flakes: the larger item has been set on a nodule fragment, collected from

194 Wright (2013, Fig. 4.11.g).

195 Renette *et al.* (2021, Fig. 15.10).

196 Nannucci (2012, Fig. 7.99); Renette *et al.* (2021, Fig.10.18).

197 Baldi (2018, 131, Fig. 3).

198 Renette *et al.* (2021, Fig. 8.11).

199 Wengrow *et al.* (2016, Fig. 12.12).

200 Killick (1988, Fig. 67.4, 11); Nannucci (2012, Fig. 2.8, 14); Renette *et al.* (2021, Figs. 8.5, 15.2).

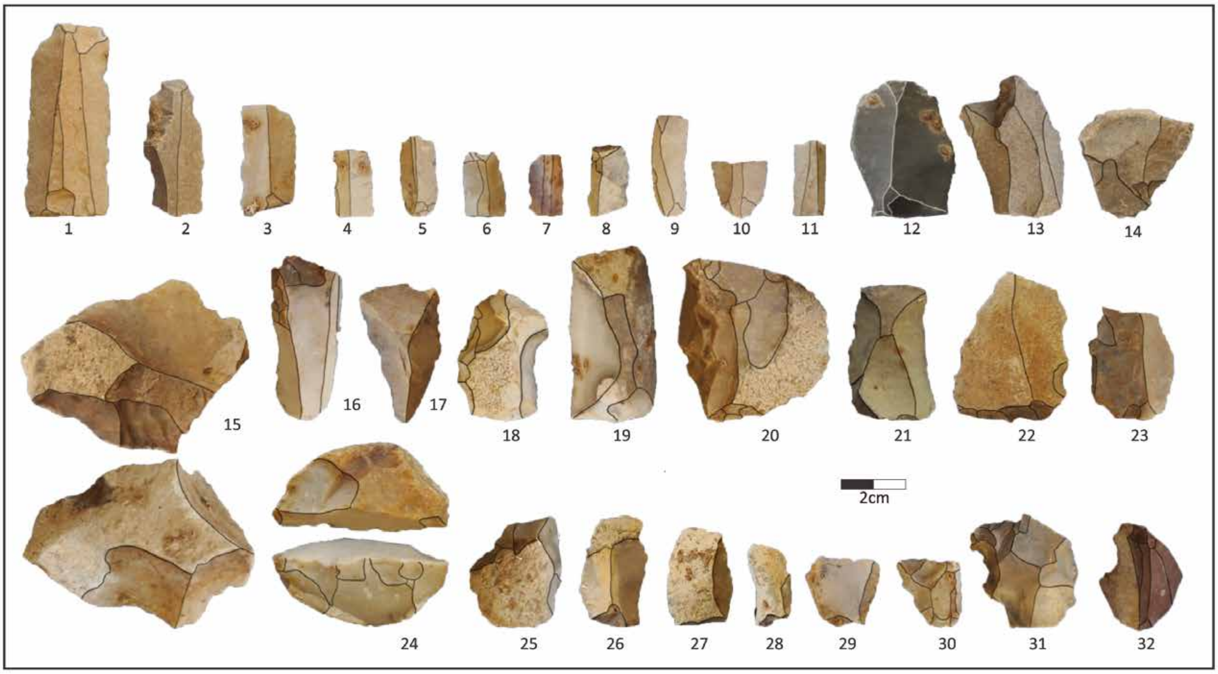


Figure 3.39 Chipped stone assemblage from SRP070.

alluvial secondary deposits, and shows two opposed and independent surfaces exploited by using a unidirectional strategy on one face and a radial strategy on the youngest one (Figure 3.39.15). The second core has been set on the lateral surface of a half-broken pebble and shows an orthogonal strategy (Figure 3.39.24). Flakes are of different sizes and do not reveal recurrent patterns. Retouched artefacts include a unifacial pointed tool (Figure 3.39.2), and a retouched flake (Figure 3.39.22). The presence of both non-standardised flake production and bladelets with very few large blades suggests a date in the LC.

The neighbouring site of Mala Kunar II (SRP071) produced several jar rims dating to the early-to-mid fourth millennium BCE (Figure 3.38.19-20),[201] a bowl with thickened rim (Figure 3.38.21) dates to the LC3-5.[202] Surface collections from the nearby site of SRP160, a small c. 0.3 ha and 5 m high mound, produced a rim fragment of a platter (Figure 3.38.22),[203] and a bowl with upward-pointing and thickened rim (Figure 3.38.23), which is similar, if with a more pronounced thickening, to examples from Tell Hassan.[204] A coarse hand-made jar rim fragment (Figure 3.38.24) from SRP154 may also be LC in date, as may be a thin-walled bowl with tapering, upward-pointing rim (Figure 3.38.25) from SRP159 that can be compared to an example from Kani Shaie Vc.[205]

3.3.3 Uplands

Moving north along the Sirwan river, SRP060 (Figure 3.36), a c. 0.9 ha large multi-period artefact scatter on a gravel hilltop overlooking the river valley, produced a series of early LC jar rims similar to those from Tepe Imam Mohammed (SRP017).

In the eastern upland zones, three settlements yielded varying numbers of sherds that may be assigned to the fourth millennium BCE. Moving from south to north, evidence for a fairly substantial LC occupation comes from the c. 20 m high, steep-sided mound of Tepe Dar (SRP178, Figure 3.40), which is located on the Iraq-Iran border. The LC pottery assemblage from Tepe Dar includes what looks to be a local variant of a hammerhead bowl (Figure 3.41.1) and deep bowls with lightly everted rims (Figure 3.41.2). Jars have band rims (Figure 3.41.3-5), holemouth (Figure 3.41.7)[206] and everted rims (Figure 3.41.8).[207] Also attested are large,

201 Wright (1981, Fig. 44.a); McAdam and Mynors (1988, Fig. 31.57, 59); Nannucci (2012, Fig. 6.76, 79, 81); Alizadeh (2014, Pl. 150.D); Carter *et al.* (2020, Fig. 6.4); Lewis *et al.* (2020, Fig. 3b.6, 11); Renette *et al.* (2021, Figs. 10.21, 15.16).

202 Nannucci (2012, Fig. 2.12).

203 Emberling *et al.* (2002, Fig. 15.d-g).

204 Nannucci (2012, Fig. 4.31-33).

205 Renette *et al.* (2021, Fig. 12.9).

206 McAdam and Mynors (1988, Fig. 31.54, 55); Gut (2002, Figs. 12.3, 6, 15.7); Nannucci (2012, Fig. 5.47); Renette *et al.* (2021, Fig. 8.17).

207 Wright (1981, Figs. 43.l, 48.i); Rothman (2002a, Figs. 9.c, 10.p); Renette (2011, Fig. 8.18); Nannucci (2012, Fig. 7.89).

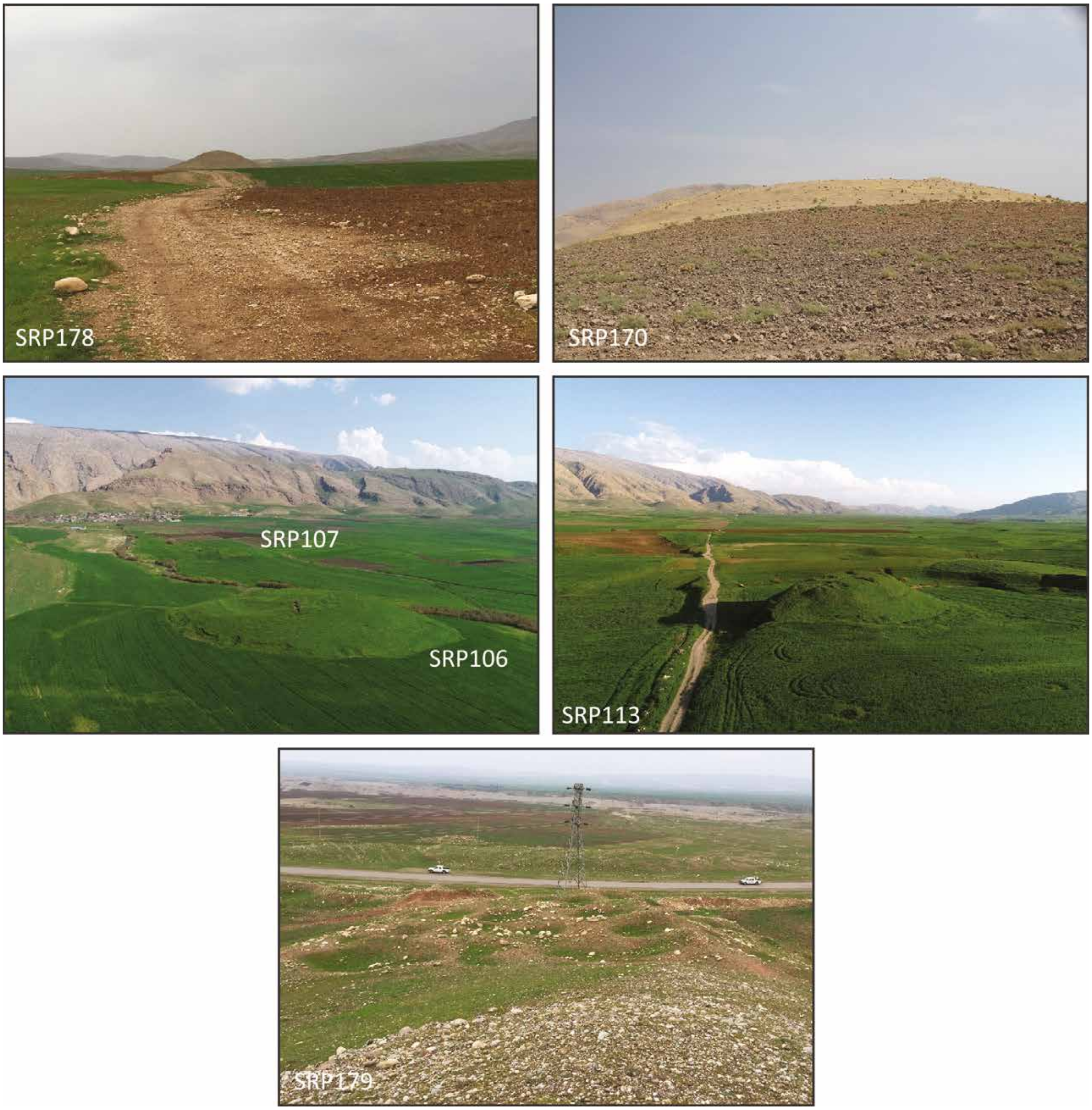


Figure 3.40 Views of SRP178, SRP170, SRP106, SRP107, SRP113, and SRP179.

hand-made basins (Figure 3.41.9-10), one of which has a large lug handle.[208]

A broadly contemporary occupation in the early fourth millennium BCE is also attested at Girdi Maskut (SRP170, Figure 3.40), a 1.1 ha large and c. 12 m high mound located at c. 450 m above sea level. Occupation at the site stretches over several millennia, with surface finds including a cross pendant and glass bracelets. LC finds include a likely club-headed bowl (Figure 3.41.11), and a band-rim jar (Figure 3.41.12). The nearby site of Tepe Qaburstan (SRP180) which appears to have been occupied already during the Early-to-Middle Chalcolithic and was settled more densely in the third millennium BCE, produced a short spout (Figure 3.41.13), which can be assigned a date in the LC3.[209]

208 McAdam and Mynors (1988, Fig. 28.11); Nannucci (2012, Fig. 2.10); Renette *et al.* (2021, Figs. 10.7-8, 12.8-9).

209 McAdam and Mynors (1988, Fig. 35.109, 110); Ii (1993, Nos. 647, 819); Renette *et al.* (2021, Fig. 13.21).

Figure 3.41 Late Chalcolithic pottery from northern and upland sites.

Tepe Shaho (SRP106, Figure 3.40) is a small, c. 1.1 ha, but prominent 25 m tall mound located in the Hawasan river valley at 398 m above sea level. Surface collections and a small test trench demonstrate that the site was occupied intermittently from prehistory to at least the Abbasid period. Tepe Shaho is located in a strategic position, which commands the entrance to the Darband-i Belula ravine (see also Chapters 5 and 13.5) to the north and provides oversight of communication along the Hawasan to and from western Iran and over a small but open and stream-fed plain. Bearing in mind that there may be unrecognised earlier materials at Tepe Shaho also, the earliest occupation phase that we can cautiously identify at the site dates to the early fourth millennium BCE. The assemblage includes a series of simple, hand-made and occasionally burnished bowls and platters (Figure 3.41.14-23), jars with simple everted rims and sometimes ledge handles just below the rim (Figure 3.41.24-26), more diagnostic LC1/2 jars with simple straight rims (Figure 3.41.27),[210] and internally angled jars (Figure 3.41.29),[211] as well as a high shoulder jar.

The early fourth millennium BCE may also be attested at the small, mounded site of Tepe Ama Husen (SRP113, Figure 3.40) in the form of a jar with everted rim (Figure 3.41.33). SRP179 (Figure 3.40) is situated on a natural spur that is cut by the modern road which runs along the left bank of the Sirwan and was investigated following reports of looting. Surface survey identified sporadic remnants of stone foundations and a low density ceramic scatter, which includes an LC band-rim jar (Figure 3.41.34), while a second jar (Figure 3.41.35) suggests a somewhat later date in the early third millennium, with comparisons, for instance, at Tell Gubba.[212]

3.4. Conclusions

Excavations at Shakhi Kora and survey in the lower Sirwan region have begun to produce a regional settlement and culture history that aligns with, but also differs from, those of LC communities in other parts of the western Zagros piedmont zone, as well as from those documented in southern Mesopotamia and in the Euphrates basin.

Documented occupation at Shakhi Kora currently stretches from the LC2 to the JN/ED I. The site, which is at least 8 ha in size, is located on a geographically strategic point overlooking the Sirwan river and presents, at least initially, a local community in cultural terms. Pottery traditions attested in the earliest occupation phases connect it to other, broadly contemporary communities in the western Zagros piedmont zone, and to a wider north-Mesopotamian cultural sphere, albeit not wholesale and with regional idiosyncrasies. Absent from Shakhi Kora and all other SRP sites, with the possible exception of Tepe Dar (SRP178), for instance, are chaff-faced hammerhead bowls and casseroles, whose absences have also been noted at other piedmont sites.[213] Much of the LC pottery at Gurga Chiya in the Shahrizor plain is described as slipped and burnished,[214] while at Shakhi Kora and other sites in the SRP survey region such surface treatments are rare, which is more in line with recent reports from Kani Shaie.[215] The later LC3 and LC4 at Shakhi Kora (Phases 3 and 4) continue to be characterised mainly by local material culture, while BRBs and late variants of the WFPs dominate in quantitative terms.

Recent *chaîne opératoire* and provenience studies at Gurga Chiya and Kani Shaie documented the use of forming techniques and tempers rooted in the preceding local Late Ubaid for the production of Uruk-related vessels. This suggests that low intensity contact and movement of individuals, including craft specialists, rather than a colonial presence, underlies the appearance of such materials in the Bazian and Shahrizor regions.[216] Comparable analyses at Shakhi Kora have only just commenced, but from the patterns observed so far, it is highly likely that Shakhi Kora and the wider lower Sirwan region formed part of this sphere of long-term, low-intensity exchange and migration from at least the late LC2. Shakhi Kora, however, departs from this trajectory, during the LC4/5 when a step-change in local-Uruk relations appears to have taken place.

Pairs of upturned BRB stacks lined up along a wall in the Phase 3 building in Area I point to practices of use comparable to Uruk-related centres and, together with a range of other indicators, to the existence of a sequence of at least four institutional households at the site, of which the first three had a predominantly local cultural character. Pilot organic residue and stable isotope analyses of BRBs, for instance, point to their involvement in distinctly local food practices.

The prevalent food preferences at Shakhi Kora make it likely that animal husbandry played an important role – and perhaps a more important one than cereal cultivation – in local institutional economies. This finds tentative support in preliminary faunal stable isotope results. Cyclical variation in intratooth $\delta^{18}O$ isotope curves from the sequentially sampled tooth enamel of two goat lower third molars from Phase 3 contexts indicate that the breeding season of caprines was being deliberately manipulated to extend birthing periods. This herd management practice points to an

210 Ii (1993, No. 1035); Nannucci (2012, Fig. 8.104).

211 Wright (1981, Figs. 48.c-e, 49.a, f, g); Renette and Ghasrian (2020, Figs. 2.8, 4.13); Renette *et al.* (2021, Fig. 8.19, 20).

212 Ii (1993, No. 895).

213 Vallet *et al.* (2017); Renette *et al.* (2021).

214 Wengrow *et al.* (2016).

215 Renette *et al.* (2021).

216 Carter *et al.* (2020); Lewis *et al.* (2020); Renette *et al.* (2021).

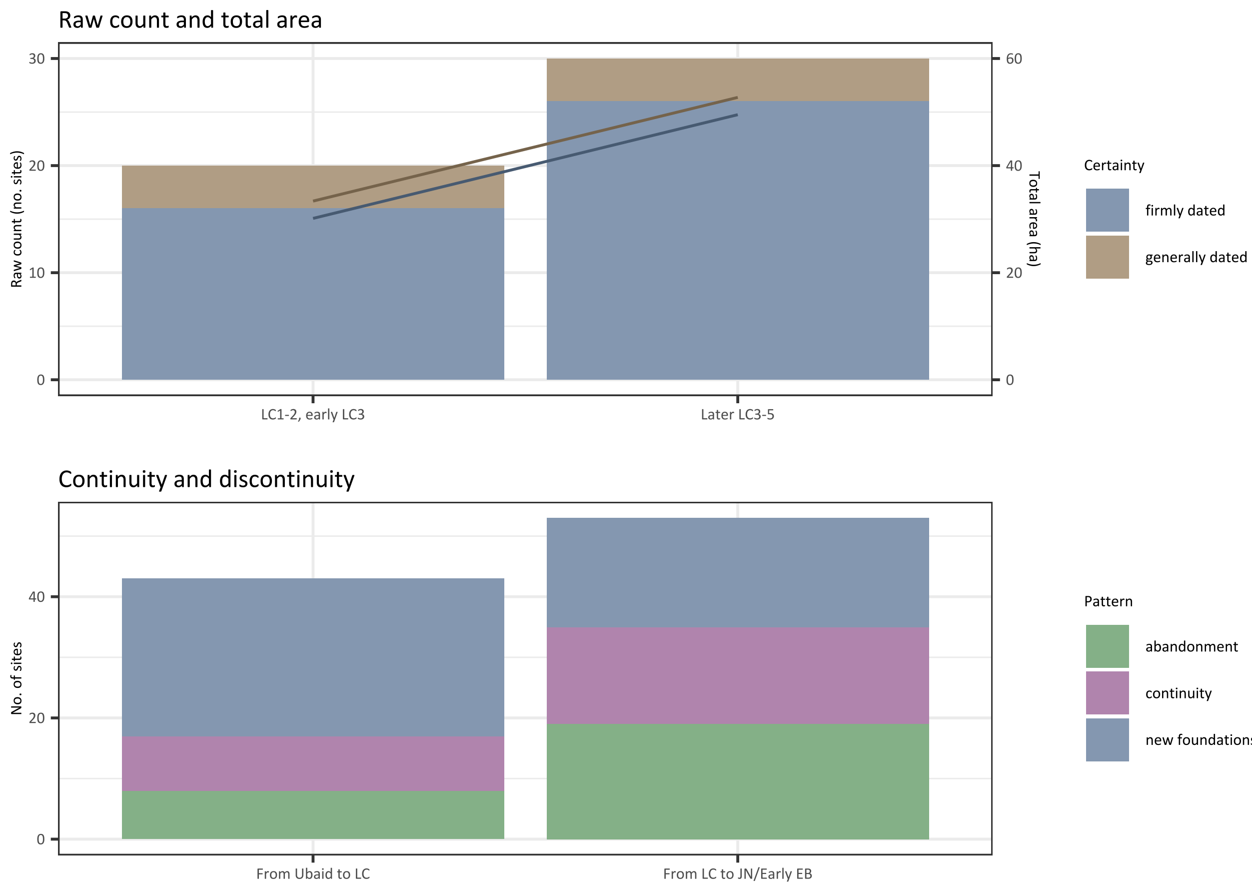


Figure 3.42 Fourth millennium BCE site counts, total settled areas, and patterns of continuity and discontinuity.

attempt to intensify aspects of animal husbandry production such as extending the period of milk production. At the same time, strontium isotope ratios measured in the tooth enamel point to grazing in the vicinity of the site, while $\delta^{13}C$ ranges indicate a diet of predominantly C_3 plants. Animals consumed by the Phase 3 institutional household at Shakhi Kora, thus, were not subject to transhumant or other mobile herding practices. The local isotope signatures also point to a potentially very limited geography of institutional power.

While cultural changes occurred gradually in Phases 1-4, a comparatively drastic shift takes place at the beginning of Phase 5 (LC4/5), when a large columned hall dominates the topographically highest point of the site, and a wide range of Uruk pottery types and other southern material culture, including a ram figurine, wall cones, and a cylinder seal are attested. Shakhi Kora's development differs here from other sites in the western Zagros piedmont zone, which are either abandoned in the LC4 or adopt a different cultural repertoire.[217] Despite architectural modifications and changes in the ceramic repertoire over time, however, the overall character of Area I remains constant from Phase 2 to Phase 5 and connected to large-scale food preparation, distribution, and storage, which point to complex cultural and functional ruptures and continuities over the course of the fourth millennium BCE.

The LC community at Shakhi Kora formed part of a regional network of mainly small villages that ranged around one to two hectares in size. The total number of sites with LC surface pottery and chipped stone assemblages increases significantly from the preceding Ubaid, which also translates into an increase in overall settled area (Figure 3.42). In more detail, site numbers from the Ubaid (18, all phases) to the early part of the LC (16, securely dated with ceramics), remain broadly stable, although only five sites with Ubaid surface assemblages produced early/general LC materials; five more were occupied again in the later LC. Early LC sites cluster in the southern plains on the right bank of the Sirwan as well as in the north-eastern Hawasan river valley and adjacent upland plains. Only one early LC site can be confidently identified in the northern Bnkura plain. Settlement numbers increase to a total of 26 securely dated sites in the later part of the period, the LC3-5.

217 D'Anna *et al.* (2022).

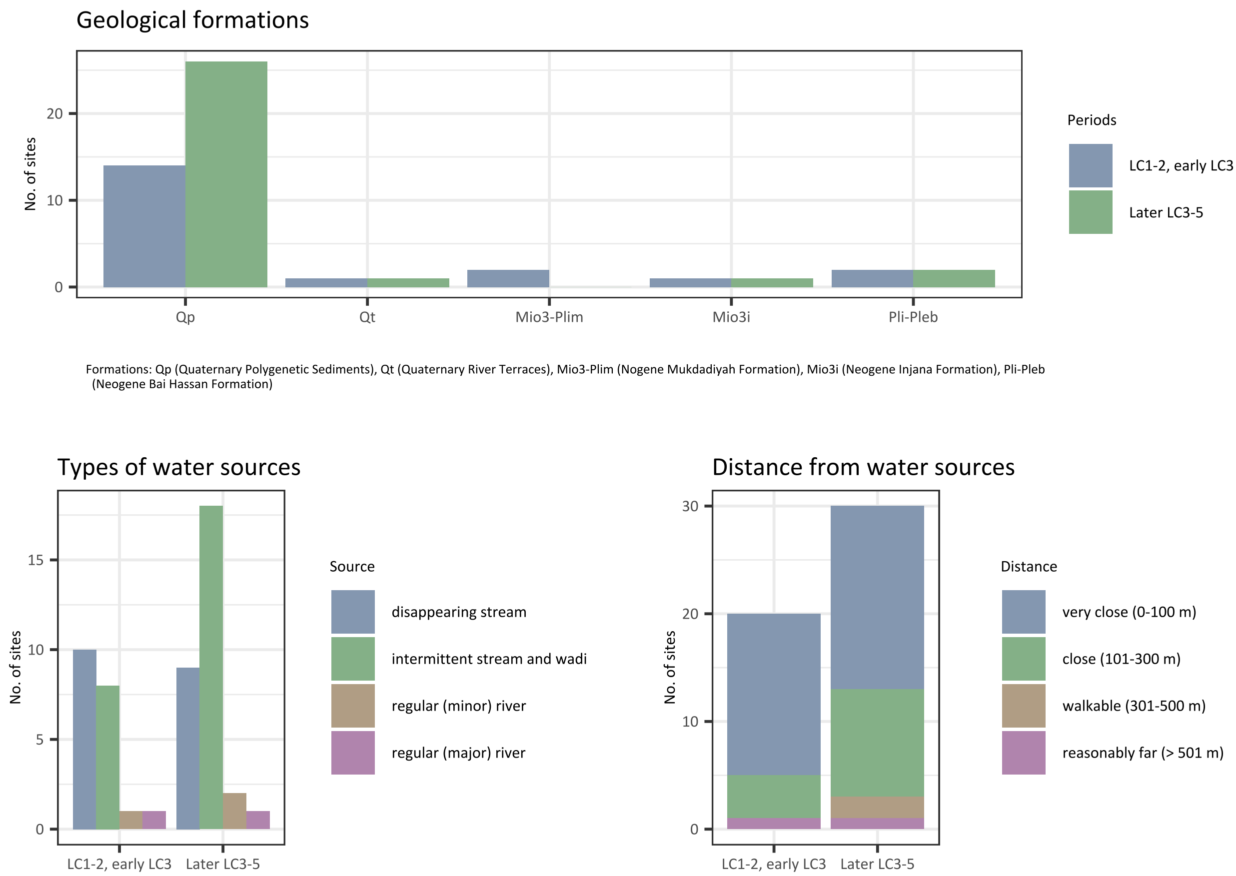


Figure 3.43 Soil quality and accessibility of water for fourth millennium BCE sites (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

Based on site size distributions and evidence for institutional households at Shakhi Kora, it is possible that some of the villages in the Shekh Langar and Gumar plains were connected to Shakhi Kora in social and economic terms, and perhaps also under its political sway. At least one other site, Mala Kunar I (SRP070), also could have acted as a central place. There are other sites, Qubba Qala (SRP149) and Qubba Tepe (SRP150) with larger overall site-sizes, but the amount of LC material recovered from them is comparatively small, and their extent in the fourth millennium BCE likely would have been much more limited. As a result, their overall site sizes were excluded from analysis. The locations of Mala Kunar I (SRP070) and Shakhi Kora (SRP191) suggest that the control or oversight of movement along the Sirwan and to and from the Alwand river valley respectively, played an important part in their establishment. Both sites also show limited evidence for earlier and later occupation. As in previous periods, sites in the southern plains are located on the most favourable soils and in the vicinity of seasonal/intermittent surface water (Figure 3.43). Rainfall was comparatively abundant during the early and middle centuries of the fourth millennium BCE, with only the southernmost four sites falling below the 300 mm isohyet (Figure 3.44).

Sites in the northern uplands range from very small to a maximum of two hectares in size, and, as in the Shahrizor plain to the north, there is no spatial hierarchy discernible. Soils in the upland zone are less amenable to agriculture than in the south, but many of the northern sites are strategically placed to take advantage of sparse agricultural resources and with regards to movement to and from western Iran. Millennia of (re-)occupation at some of these tall, mounded sites attest to the persistence of both these communication routes and the communities dotted along them. The very limited presence of Uruk-related material culture suggests that upland LC communities showed limited interest in southern material culture and likely operated outside of Uruk-related cultural and economic networks. It is similarly interesting that while the northern and central Bnkura plain was dotted with small LC3-5 sites that produced and used BRBs and other Uruk-related vessels, the large Mala Kunar I (SRP070), which controlled the narrow southern exit of the plain towards the Alwand river, one of the main routes into Iran, yielded a substantial LC assemblage but no Uruk-related materials.

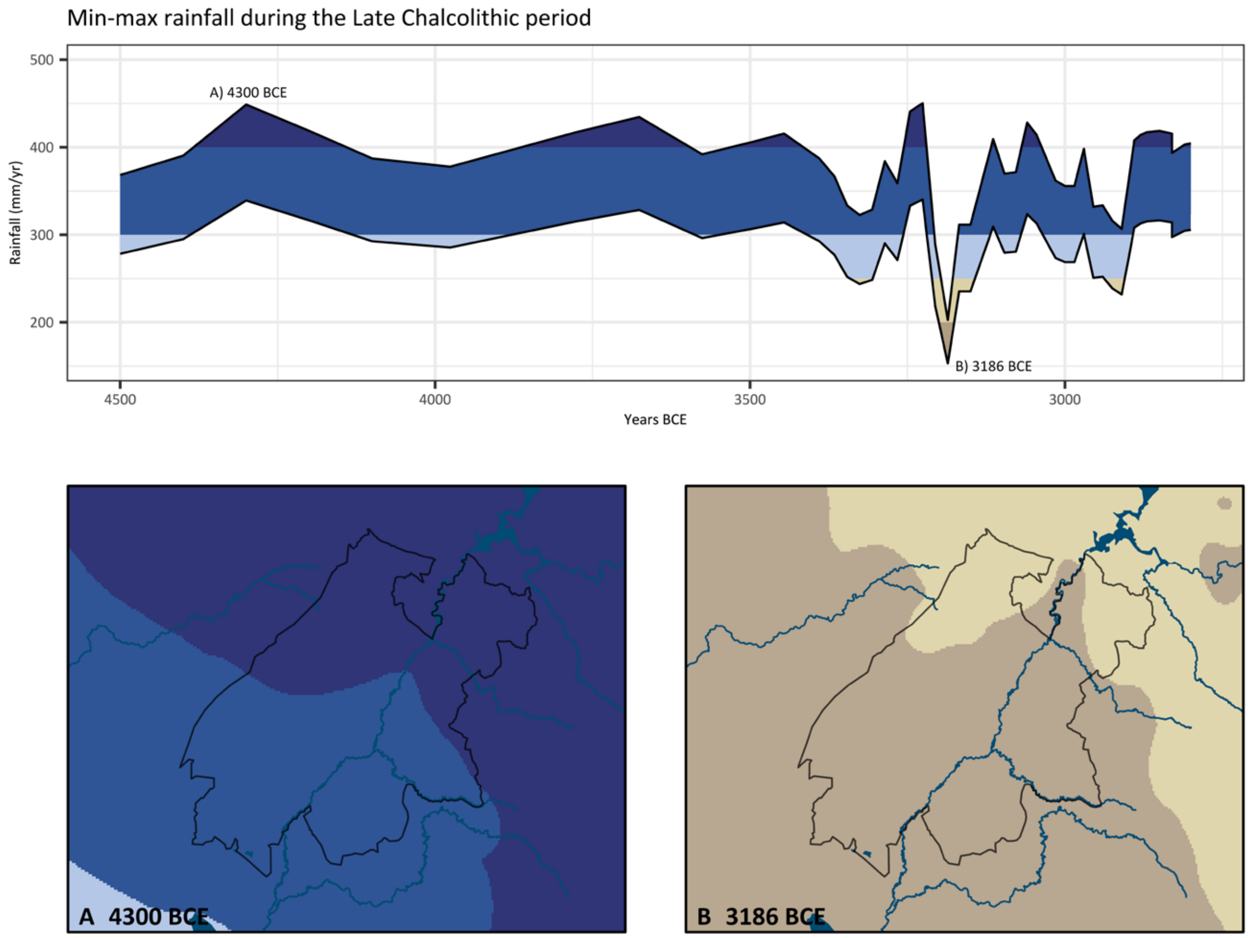


Figure 3.44 Mean rainfall for the fifth and fourth millennium BCE (cubic interpolation after Hewett *et al.* 2022). See Figure 1.4 for legend.

The main course of the Sirwan is thus emerging as the central axis for the adoption of Uruk-related material culture and the relationships with southern Mesopotamia that this assemblage might have enabled and reproduced. At present, our regional data do not provide any evidence that these connections expanded further east from the Sirwan valley into western Iran. As a result, the appearance of Uruk-related material culture at Godin Tepe VI in the Kangavar valley of highland western Iran seems unlikely to have been associated with the developments discernible in the Sirwan region.

The Phase 5 structure in Area I was abandoned seemingly quite abruptly, and with little time or concern for the clearance of the building, but equally with no signs of a violent attack or conflagration. The area then remained unoccupied for long enough to allow mudbrick walls to erode and collapse over *in situ* vessels and installations. It remains to be seen whether this abandonment can be identified also in other parts of the site, or whether it affected only areas associated with institutional households and their increasingly south Mesopotamian material culture. A radiocarbon date places the abandonment of the pillared hall complex to after c. 3631-3377 cal. BCE. This date range lies outside of the calibration plateau that affects radiocarbon readings between c. 3350-3000 BCE,[218] and should thus be considered reliable, if affected by a rather large error margin. The latter is mitigated by the relative chronological range of the cultural assemblage of Phase 5, which sits comfortably in the LC4/5.

As far as can be ascertained at this moment, the abandonment of Phase 5 structures in Area I, thus, took place sometime before the 5.2 ka BP global climate event, which resulted in a dramatic drop in precipitation that would have adversely affected regions dependent on rain-fed agriculture (Figure 3.44). The abandonment of the lower Sirwan valley's first, centuries-long, and both local and later Uruk-related experimentation with socio-political centralisation, therefore, cannot be explained by climate change as some have proposed for northern Mesopotamia.[219]

218 Petrie (2014, 147-150).
219 Weiss and Bradley (2001); Staubwasser and Weiss (2006).

Uruk colonies were abandoned in northern Mesopotamia, and some indigenous urban centres such as Tell Brak appear to have experienced a reduction in site size around c. 3200 BCE,[220] while the isotopic signatures of some cereal grains from northern Mesopotamia show signs of drought stress.[221] Other regional centres, however, continued to be populated, and other botanical evidence points to a shift to crops requiring wetter conditions, especially emmer,[222] which is also attested at Shakhi Kora in Phase 5. The archaeological picture is, therefore, more complicated and regionally varied than that evoked by generalised collapse scenarios.[223] There is certainly evidence for social and cultural changes taking place across northern and southern Mesopotamia at this time, but not a societal collapse. In the case of Shakhi Kora, the most plausible explanation for change lies in local decision-making and the rejection of increasingly hierarchical forms of social organisation.

Post-abandonment re-occupation at Shakhi Kora, Phase 6, was smaller in scale than the preceding Phase 5 at least in the areas exposed to date. In cultural terms, Phase 6, however, presents a local development that is anchored in earlier traditions. The pottery assemblage of Phase 6 presents a mix of shapes generally ascribed to the JN and the ED I, with links to the preceding Phase 5 and to the middle and lower Diyala basin. Shakhi Kora appears to have shrunk in terms of the spatial extent of its late-fourth-to-early-third millennium BCE community and it may have lost its potential LC status as a central place. The post-LC5 phase in the wider Sirwan region, however, was not a period of decline, but characterised by an increase in the number of small sites, which we discuss in the following Chapter 4.

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220 Ur *et al.* (2011).
221 Riehl *et al.* (2014).
222 Charles *et al.* (2010).
223 Lawrence *et al.* (2022).

4

The Final Fourth and Third Millennium BCE in the Lower Sirwan Region

4.1 Introduction

The Early Bronze Age (EB) along the fringes of the Mesopotamian plains and in adjacent uplands are generally envisaged as patchworks of regional and supra-regional cultural networks, whose constituent communities, reacting against the homogenising and centralising Uruk phenomenon, had – at least initially, and with some exceptions – limited appetite for steep hierarchies and socio-political integration. By contrast, core-centric themes of urbanisation, kingship, and imperial expansion dominate disciplinary narratives in the lowlands.

As we saw in the preceding Chapter 3, the Late Chalcolithic (LC) in the western Zagros piedmont zone is already characterised by significant regional and micro-regional diversity. This manifests itself in distinctive temporalities and degrees of cultural entanglement with northern and southern Mesopotamia, and with the Zagros highlands. The communities at Girdi Qala/Logardan and Shakhi Kora (SRP191), for instance, were already engaged in interactions with southern Mesopotamia during the later LC2. The nature and history of their respective relationships with the south, however, were different, as were the processes of cultural disentanglement, reconfiguration, and continuity in the later part of the fourth millennium BCE. Numerous LC sites such as Tell Rubeidheh, Tell Hassan, and Girdi Qala/Logardan are abandoned before the end of the LC4. Other communities, such as the one at Gird-i Shamlu, chose instead to abandon the use of south Mesopotamian material culture, and to participate in piedmont spheres of shared cultural practice in the LC5.[1]

Shakhi Kora is the only settlement to date in the western Zagros piedmont region with a substantial Uruk-related LC4/5 occupation (Phase 5). Finds associated with the subsequent Phase 6, which we present in detail in Chapter 3.2.6, as well as surface assemblages from other sites suggest that select southern and central Mesopotamian cultural connections endured here into the final fourth and third millennium BCE. At the same time, and as we outline in the sections below, settlement patterns transformed significantly following the LC, with local communities dispersing across the landscape in small and very small settlements. This settlement practice, and its inferred low-hierarchy socio-political model, endured, with a handful of exceptions, throughout the EB, and well into the second millennium BCE, adding a further, locally idiosyncratic cultural and socio-political trajectory that finds limited fit with the *topoi* traditionally evoked to narrate the Bronze Age of greater Mesopotamia (see also Chapter 1.3).

1 D'Anna *et al.* (2022).

Dates BCE	Period (Mesopotamia)	SRP Phasing
3200-2900	Jemdet Nasr (JN)	Early
2900-2750	Early Dynastic (ED) I	
2750-2600	ED II	Middle
2600-2350	ED III	
2350-2150	Akkadian	
2150-2120	Gutian	
2120-2004	Ur III	Final

Table 4.1 Periods and their approximate dates discussed in this chapter.

Site	Early	Middle	Final	LITH	Site	Early	Middle	Final	EB g.	LITH
SRP002	x	x			SRP107	x	x			
SRP004	x	x			SRP111					CHA-BA
SRP007	x	x	x		SRP112					NEO-BA
SRP008	x				SRP113	x	x	x		
SRP009				EB	SRP117	x				
SRP017	x	x	x	LC-EB	SRP138	x		x		
SRP021				LC-BA	SRP143	x				
SRP024		x			SRP144	x				
SRP025	x				SRP150		x			LC-EB
SRP028				NEO-IA	SRP151	x				EB
SRP036				NEO-IA	SRP152	x				EB-MB-LB
SRP044				From BA	SRP159	x				
SRP048		x	x		SRP164	x	x			LC-EB
SRP054	x				SRP165					EB
SRP057				From BA	SRP166	x				
SRP060	x				SRP170	x		x		EB
SRP061		x	x		SRP171	x		x		EB
SRP069				NEO-BA	SRP176	x				
SRP070	x				SRP178	x	x			
SRP071	x	x		EB	SRP180	x		x		
SRP079		x		LC-EB	SRP181/190	x	x			
SRP084	x				SRP184	x		x		
SRP087			x		SRP187					NEO-BA
SRP090	x				SRP191	x				
SRP092		x			SRP196		x			
SRP093	x				SRP201		x			
SRP094			x		SRP205					NEO-BA
SRP102				CHA-BA	SRP208	x			x	
SRP103				BA?	SRP211		x			
SRP106	x	x								

Table 4.2 Late fourth and third millennium BCE sites in the lower Sirwan region (see also Appendix I).

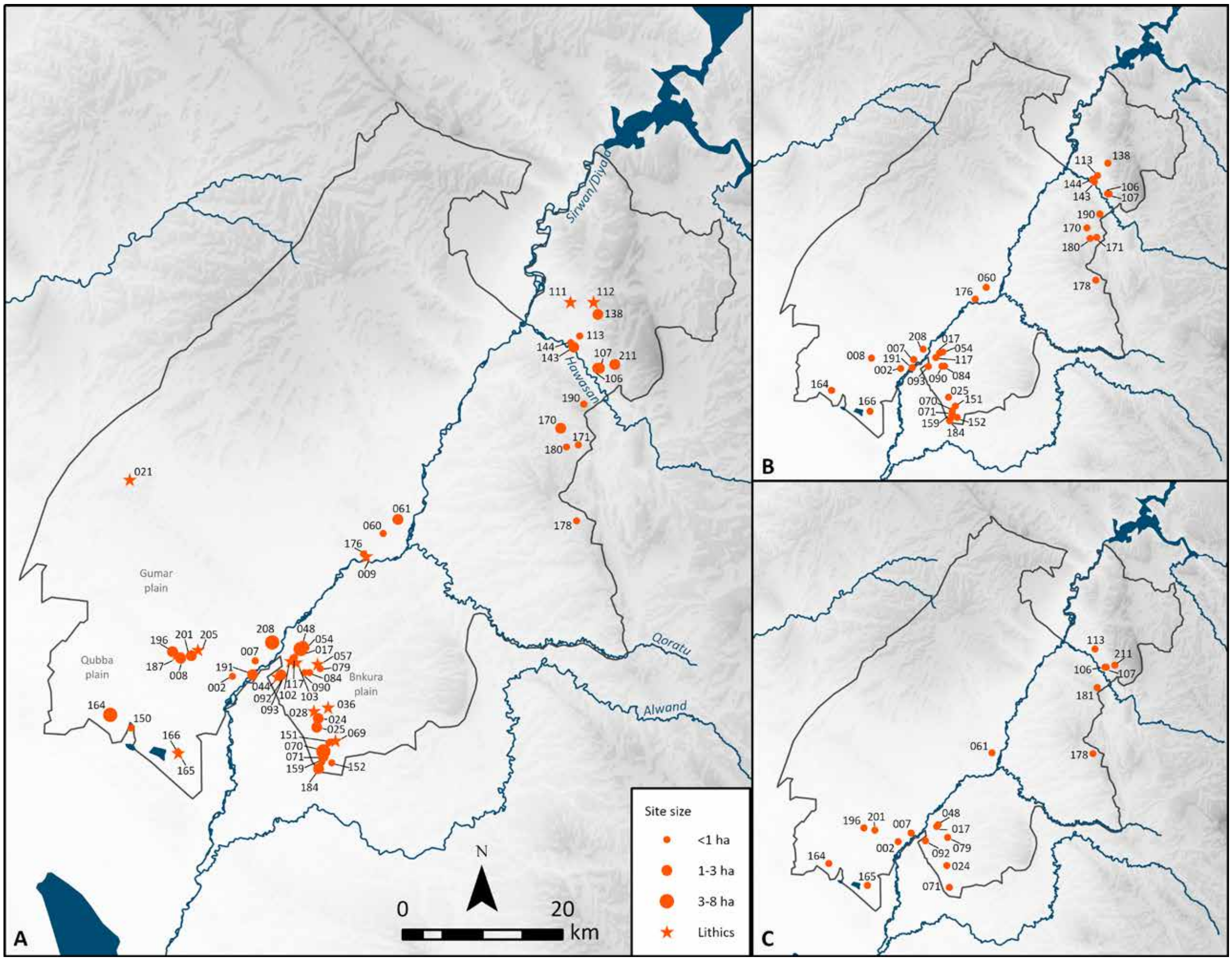


Figure 4.1 Map of late fourth and third millennium BCE sites in the lower Sirwan region: A) all phases, B) Early EB, and C) Middle EB (DEM GTOPO30 ©USGS).

In addition to Shakhi Kora, we have so far identified 33 sites dating to the late-fourth-to-early-third millennium BCE (Early EB) in the lower Sirwan region based on ceramic finds. Middle EB pottery is present at 20, and Final EB ceramics at 12 sites. Several more sites produced pottery or chipped stone assemblages that can be broadly assigned to the EB (Figure 4.1, Tables 4.1 and 4.2). Our broad chronological groupings aim to take account of the significant cultural continuities that characterise the EB in the wider region. As with previous periods, distinctive type fossils exist for some phases, but there is also considerable longevity in pottery traditions, which cut across the increasingly short, historic-dynastic temporal subdivisions that structure inquiries into the cultural and socio-political developments of the third millennium BCE.

For example, detecting the Akkadian period in the archaeological record, especially one reliant solely on surface ceramics, is fraught with difficulty due to continuity in pottery traditions from the Early Dynastic (ED) into the period of Akkadian state formation and expansion. The ceramic sequence developed in the course of the Diyala excavations by Delougaz[2] has been shown over the past half-century to be overly confident in the sharp distinction that it draws between the ED and Akkadian periods.[3] This includes distinctive vessel types such as the so-called goddess-handled jars, which are found in both ED and Akkadian period contexts, as well as plano-convex bricks, which continue to be used in domestic architecture throughout the later third millennium BCE. Other forms, such as ridge-shoulder jars, develop late in the Akkadian period and continue into the Ur III.[4] This affects the identification and dating of survey sites, where it is in fact not possible

2 Delougaz (1952).

3 Gibson (1982); Gibson and McMahon (1995; 1997).

4 McMahon (2012, 654).

Figure 4.2 Early Bronze Age (Early phase) pottery from the southern plains.

to distinguish confidently between late ED and early Akkadian, as Adams, for instance, did for the lower Diyala surface collections.[5]

As a result of these continuities in cultural practices and tastes, which also characterise the Jemdet Nasr (JN) to ED I and the ED I to ED II transitions, many survey sites can be assigned only coarse dates in the Early, Middle and Final phases of the EB. Another issue to note is that quite unlike earlier periods, the number of diagnostic pieces for the late fourth and third millennia BCE is small or very small at most SRP sites, often comprising only one or two sherds, and pointing to small-scale and short-term occupations. One site, Bardaswr Tapa (SRP009), produced only chipped stones and no diagnostic Bronze Age pottery.

Below we discuss the Early and Middle phases of the EB in the SRP research region in detail; final third and early second millennium BCE materials are presented in the following Chapter 5.4.1.

5 Ibid., 656.

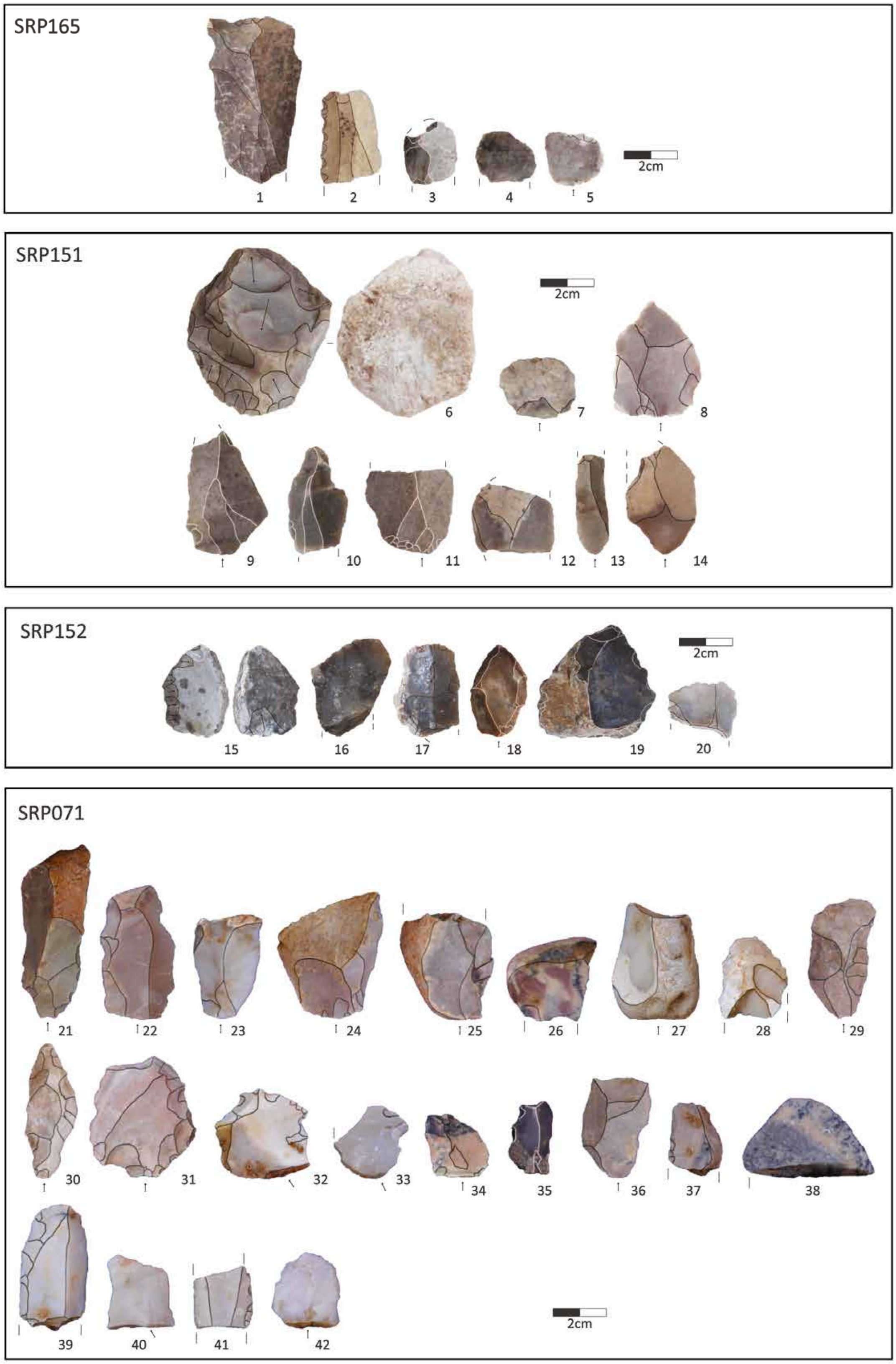


Figure 4.3 Chipped stone assemblages from SRP165, SRP151, SRP152, and SRP071.

Figure 4.4 Views of SRP208, SRP054, SRP090, SRP084-86, SRP176, SRP171, SRP144, and SRP138.

4.2 The lower Sirwan region in the Early phase of the Early Bronze Age

4.2.1 Right bank

Starting in the southwest, small amounts of late-fourth-to-early-third millennium BCE material are attested at the large, multi-period site of Tell Nergz (SRP164) in the Qubba plain, including a classic JN jar with everted rim that finds numerous parallels at lower Diyala sites (Figure 4.2.1),[6] and a body sherd with JN monochrome purple painted decoration (Figure 4.2.2).[7] The site also produced a sizeable lithics collection, which dates to the LC-to-EB (Figure 3.35). An everted jar rim (Figure 4.2.3) comes from the small, c. 0.4 ha site of SRP166 along with a painted fragment (Figure 4.2.4), which may be associated with the north Mesopotamian Ninevite 5 tradition.[8] The neighbouring site of Quba (SRP165) produced a small, chipped stone assemblage that can be dated to the third millennium BCE (Figure 4.3.1-5, also Appendix III).

Further north on the Gumar plain, Pira Faqira (SRP008), which has a substantial fifth and fourth millennium BCE occupation, also yielded a typical JN jar rim (Figure 4.2.5). Moving back towards the Sirwan, the small c. 0.5 ha site of Tepe Charmu (SRP002) produced a generic jar rim that is found from the JN to the ED III (Figure 4.2.6) with comparisons at, for instance, Girdi Qala/Logardan,[9] in the lower Diyala,[10] and in the Lurestan highlands.[11] A jar rim fragment from SRP004 dates to between the later fourth to the mid-third millennium BCE (Figure 4.2.7).[12]

The largest SRP assemblage dating to the final fourth and early third millennium BCE comes from the Phase 6 exposure at Shakhi Kora (SRP191, Chapter 3.2.6, Figure 3.26). Among the finds from Phase 6 is a collection of globular, spouted jars that are widespread during the late fourth millennium BCE in the lower Diyala and the Hamrin region, including at Tell Gubba Level VII. It also includes the base of a solid-footed goblet, a type ubiquitous at early third millennium BCE sites in central and southern Mesopotamia, and an important component of ED feasting.[13] A type fossil for the ED in the *Land Behind Baghdad* survey,[14] solid-footed goblets are otherwise absent from the SRP surface record. This may perhaps be indicative of a lack of interest in the commensal paraphernalia and practices of emerging centres in the lower Diyala basin. At the same time, lower Sirwan communities also appear to have had little interest in Scarlet Ware painted traditions, whose distribution points to a piedmont and highland-centred interaction zone.[15] The fugitive nature of the paint may be a factor limiting surface finds, but so far Scarlet Ware is attested at only one upland site (see Section 4.2.3 below).

To the north of Shakhi Kora, the site of Shekh Langar (SRP007), which is located on a natural hill, produced a small collection of early third millennium BCE jar-rims. They include an everted rim jar (Figure 4.2.8), a narrow-necked jar with everted and externally profiled rim (Figure 4.2.9),[16] and a straight-sided jar with internally profiled lip (Figure 4.2.10).[17] The c. 3 ha site of SRP208 (Figure 4.4), which is also located on a natural hill in what is today a heavily cultivated landscape, produced a classic JN jar with everted rim (Figure 4.2.11), as well as large quantities of pottery from later periods.

4.2.2 Left bank

The small low mound of SRP117, which was occupied during the LC (see Chapter 3.3.2), shows signs of continued use in the final fourth and early third millennium BCE. This includes a buff sherd with distinctive plum-coloured cross-hatched painted decoration (Figure 4.2.12), a squat-neck stone vessel fragment (Figure 4.2.13), a copper or bronze axe/adze blade (Figure 4.2.14), and several jar rims (Figure 4.2.15-16).[18]

The fragmentary limestone jar with squat shoulders and straight neck compares well with a collection of stone vessels from early third millennium BCE Telloh,[19] and from the JN period occupation at Ur, where stone vessels were common grave goods.[20] The flat, wide copper or bronze blade is c. 12 cm in length and up to c. 8 cm in width, with a tapering butt and flaring cutting edge (Figure 4.2.14). It may have functioned as an axe, adze, or chisel depending on how it was mounted.[21] Similar blades are attested in EB Lurestan cemeteries such as Cheshmeh Takht-i Khan 4, Mehr War Kabud 3,[22] Tanha (Badr), Bani Surmah,[23] and Mir Kahir.[24] A comparable blade was also found in an ED I tomb at

6 Delougaz (1952, Pl. 178.C514.370a-b).
7 Mackay (1931, Pl. LXV); Delougaz (1952, Pls. 3 As. 34:246, 23.L); Ii (1993, Nos. 530, 540).
8 Numoto (1991, 1992).
9 Vallet *et al.* (2019, Fig. 10.2).
10 Delougaz (1952, Pls. 32.e, 50.c, 142.a515.270).
11 Haerinck (2011, Pls. 2.5, 14.2).
12 Moon (1987); Ii (1993, No. 895).
13 Benati (2019).
14 Adams (1965, Fig. 11.3.B).
15 Carter (1987); Haerinck and Overlaet (2006; 2008); Renette (2011); Del Bravo (2014).
16 Delougaz (1952, Pl. 152.B.224.443).
17 Gibson (1981, Pls. 63.6, 63.11, 99.9); McAdam and Mynors (1988, Figs. 31.66, 32.70, 35.105); Ii (1993, No. 1033).
18 Delougaz (1952, Pl. 182.C.535.242); Gibson (1981, Pl. 71.11).
19 De Genouillac (1934, 50-51, Pls. 4, X).
20 Woolley (1955, 24, Pls. 34, 67).
21 Deshayes (1960, 51-84); Tallon (1987).
22 Haerinck and Overlaet (2010b, Fig. 10).
23 Haerinck and Overlaet (2006, Fig. 15).
24 Vanden Berghe (1979, Fig. 18, Pl. Xia).

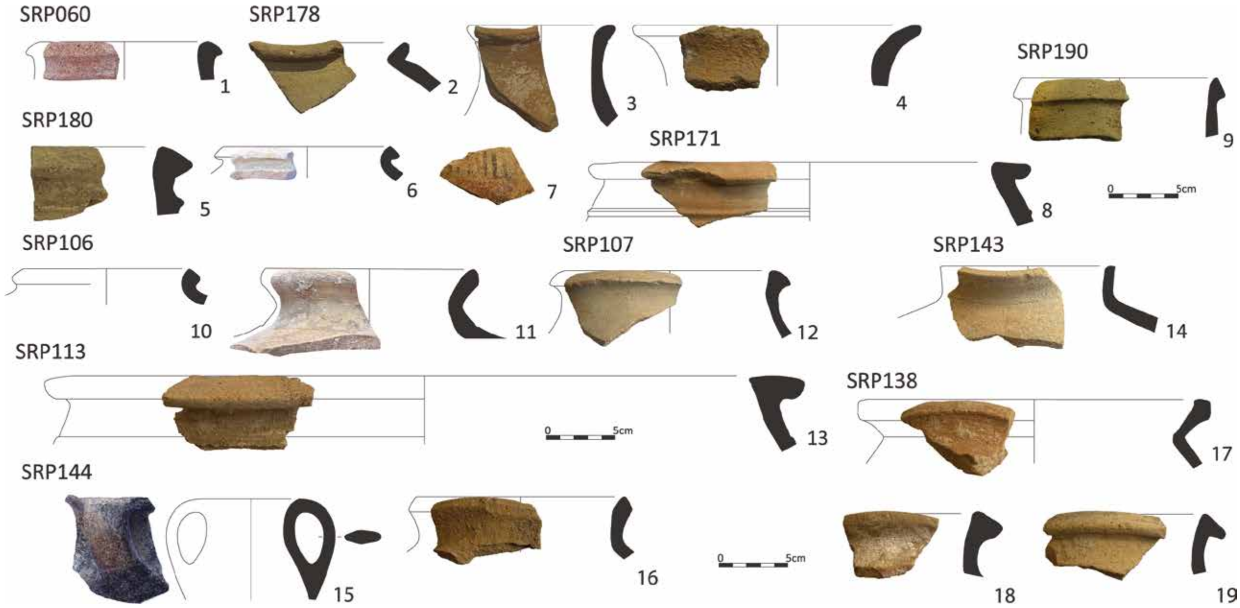


Figure 4.5 Early Bronze Age (Early phase) pottery from northern and upland sites.

Figure 4.6 Complete jar and bowl from SRP176 displayed in the Garmian Civilizations Museum.

Ahmad al-Hattu in the Hamrin,[25] as well as at Tepe Sialk on the central Iranian plateau,[26] at Farrukhabad,[27] and at Godin Tepe Level IV.[28]

The neighbouring site of Tepe Imam Mohammed (SRP017), which was occupied periodically since the Late Neolithic, also produced several jars, which can be assigned a date in the JN-ED I (Figure 4.2.17-18).[29] The site also produced a significant number of mid-to-late third millennium finds, which we discuss in Section 4.3.2 below. The small, c. 0.8 ha, site of Tepe Ali Pasha (SRP054, Figure 4.4), which is located close to Tepe Imam Mohammed, also produced two jar rims that may be dated to the transitional JN-ED I and that find comparisons in the Hamrin (Figure 4.2.19-20).[30] Further south along the river, surface collections at the c. 0.8 ha site of SRP093 include a classic JN jar with everted rim (Figure 4.2.21) and a neck-less jar with everted rim (Figure 4.2.22) that is attested in third millennium BCE contexts in the lower Diyala,[31] and in southern Mesopotamia.[32] A jar with simple, upward-pointing rounded rim finds comparisons in late fourth and early third millennium BCE Hamrin contexts (Figure 4.2.23).[33]

The c. 1 ha site of SRP090 (Figure 4.4) also produced a conical cup rim (Figure 4.2.24), two jars with simple upward-pointing rounded rims (Figure 4.2.25-26), and a jar with protruding lip that finds parallels in the Hamrin and the Deh Luran (Figure 4.2.27).[34] Late-fourth-to-early-third millennium BCE jar rims are also attested in small quantities at Taza Shar (SRP084, Figures 4.4 and 4.2.28),[35] and at Tepe Sawz (SRP025, Figure 4.2.29-30), whose main occupation dates to the Middle Bronze Age (see Chapter 5.4.2.2).

The site of SRP151 produced the string-cut base of a conical cup (Figure 4.2.31), as well as a lithic assemblage that can be assigned a date in the third millennium BCE (Figure 4.3.6-14), while that of Bawa Plawi (SRP152) dates to the third and second millennia BCE (Figure 4.3.15-20). Mala Kunar I (SRP070) produced a large LC assemblage, as well as jars with triangular and folded rims, which point to continuity in occupation during the JN-ED I. The nearby site of Mala Kunar II (SRP071) also produced third millennium BCE pottery, including a jar rim that finds parallels in the JN and ED I middle and lower Diyala (Figure 4.2.32),[36] as well as later third millennium BCE materials (see Section 4.3.2 below). The surface assemblage of Mala Kunar II includes 22 EB chipped stone artefacts (Figure 4.3.21-42), the majority of which are flakes produced from local river-borne pebbles and cobbles. Only one blade is attested, a mesial fragment with trapezoidal section (Figure 4.3.41). Five artefacts are retouched, including several denticulates (Figure 4.3.31-32) and flakes bearing semi-abrupt or abrupt retouch (Figure 4.31.22, 29, 39).

The relatively large, c. 5 ha, low mound of SRP159, also produced material that can be dated to the final fourth (Figure 4.2.33) and to the early third millennium BCE (Figure 4.2.34), and that can be compared to examples from Girdi Qala/Logardan, Tell Rubeidheh, and Uruk.[37] The tall mound of Tepe Bawa Mahmood (SRP184), which becomes a regional centre during the second millennium BCE (see Chapter 11.2.2), also shows signs of occupation during the final fourth and early third millennium BCE in the form of typical jars with everted rims (Figure 4.2.35-36).

4.2.3 Uplands

Moving north along the Sirwan, the small hill-top surface scatter of SRP060 produced a classic JN-ED I jar rim (Figure 4.5.1), in addition to several LC pieces (see Chapter 3.3.3). Along the Darbandikhan-Kalar road, roadworks threw up a series of complete and near-complete early third millennium BCE vessels, suggesting the presence of a cemetery (SRP176, Figure 4.4). The complete jar displayed today in the Garmian Civilizations Museum finds formal similarities in the Ninevite 5 tradition of northern Mesopotamia (Figure 4.6).[38]

To the east, along the Iraq-Iran border, the tall mound of Tepe Dar (SRP178) also shows signs of continuity in occupation, however intermittent, into the final fourth and early third millennium BCE. Surface finds include neck-less jars with folded and everted rims (Figure 4.5.2-4) with comparisons in northern Mesopotamia,[39] the Hamrin,[40] and in the Deh Luran.[41] To the north of Tepe Dar, the 1 ha low mound of Tepe Qaburstan (SRP180), which produced small quantities of Early-to-Middle Chalcolithic pottery, also yielded a number of JN jar rims (Figure 4.5.5-6), including one with abraded purple paint.[42] The assemblage also includes an abraded Scarlet Ware body sherd (Figure 4.5.7, not to scale). The site of Girdi Maskut (SRP170) produced a chipped stone assemblage that can be assigned a third millennium BCE date

25 Sürenhagen (1981, Abb. 15).
26 Ghirshman (1938, Pl. XCV S.535).
27 UMMAA 60793.
28 Rothman (2011, Fig. 5.32).
29 Delougaz (1952, Pl. 178.C515.373).
30 Ii (1993, Nos. 894-895).
31 Delougaz (1952, Pl. 194.D546.540b).
32 Moon (1987, Nos. 535, 555, 704).
33 Ii (1993, Nos. 817, 971, 1027, 1035); Nannucci (2012, Fig. 2.14-15).
34 Gibson (1981, Pl. 77.4); Ii (1993, No. 980); Wright (1981, Fig. 47.f).
35 Delougaz (1952, Pls. 178.C515.370a, C515.371).
36 Ibid., Pls. 164 B.664.570, 178 C.515.373; Ii (1993, Nos. 548, 562).
37 von Haller (1932, Pl. 19B); Killick (1988, Fig. 32.67); Baldi (2017, Pl. III.7).
38 Rova (2017, Fig. 21.3).
39 Rova (2014a, Pl. 2).
40 Nannucci (2012, Figs. 5.62-63, 6.66-70).
41 Wright (1981, Figs. 96.e, f, 98.a, c).
42 Delougaz (1952, Pl. 164.B.663.540a).

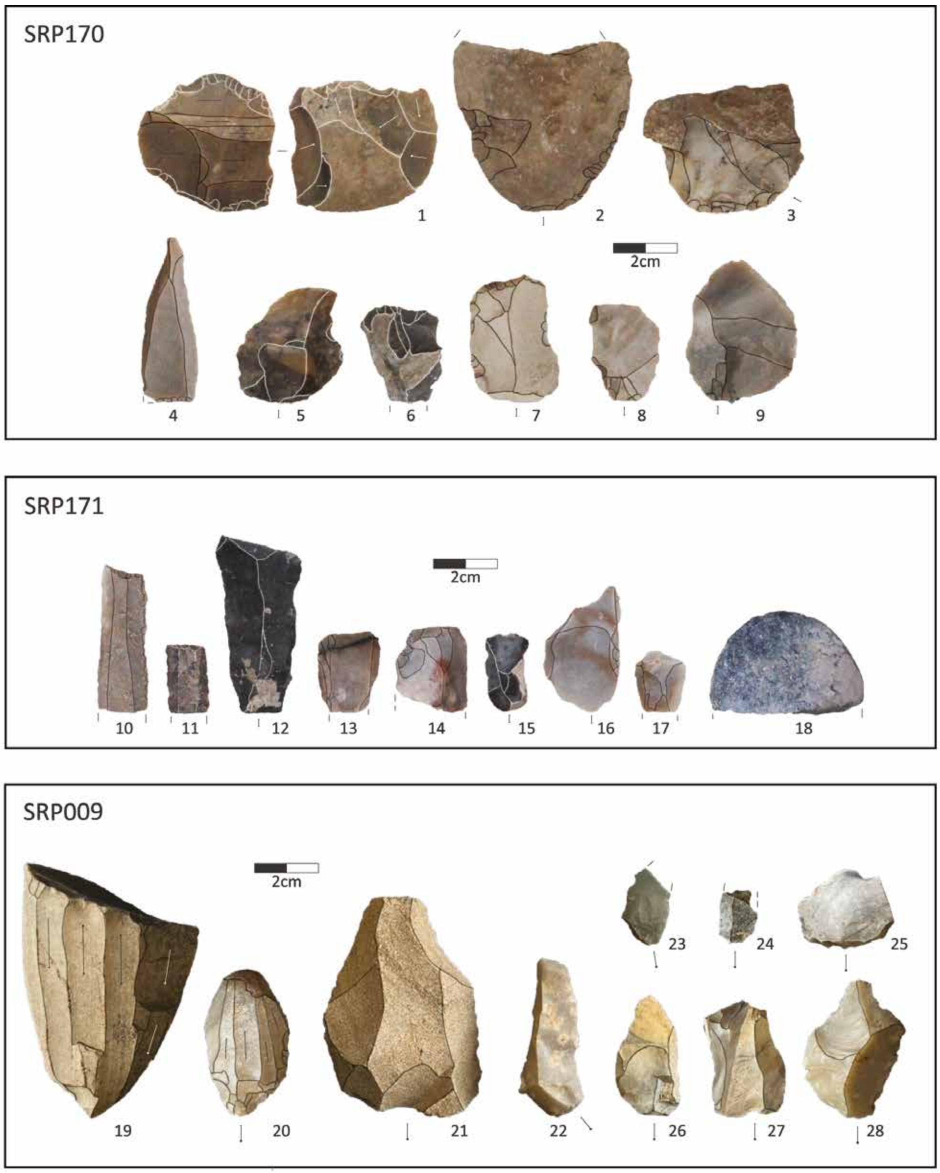


Figure 4.7 Chipped stone assemblages from SRP170, SRP171, and SRP009.

(Figure 4.7). This is also the case for the prominent upland high mound of Chia Raza Tepe (SRP171, Figure 4.4), which produced a JN jar rim (Figures 4.5.8 and 4.7.10-18).

Another JN jar rim comes from the surroundings of the cave of Ashkawti Manga Wakal (SRP190, Figure 4.5.9). The prominent mound of Tepe Shaho (SRP106) produced two jars dating to the late fourth and early third millennium BCE (Figure 4.5.10-11),[43] as did the adjacent SRP107 (Figure 4.5.12),[44] while Tepe Ama Husen (SRP113) yielded evidence for the early EB (Figure 4.5.13).[45] Moving southwest along the Shakhi Bamu range, Tepe Qalandari (SRP143), which overlooks the Hawasan river in the centre of the Maidan plain, is a large, mounded site with an extensive lower town. The site, which appears to have its main occupation phase in the first millennium BCE (see Chapter 11.4.3), also produced evidence for the early third (Figure 4.5.14).[46] The surface assemblage of SRP144 (Figure 4.4) includes a brown and black burnished jug with vertical handle (Figure 4.5.15), which finds parallels in the Hamrin and Lurestan,[47] and a jar with everted rim (Figure 4.5.16).[48] The hill-side ruin field of SRP138

43 Delougaz (1952, Pl. 176.C.486.320); Wright (1981, Fig. 51.h); Renette *et al.* (2021, Figs. 15-13).

44 Delougaz (1952, Pls. 155.B.514.270, 163.B.653.240); Wright (1981, Fig. 52.f); Ii (1993, Nos. 682-683).

45 Delougaz (1952, Pls. 167.B806.570, 178.C514.370a).

46 Ii (1993, Nos. 817, 971); Nannucci (2012, Fig. 2.14-15).

47 Haerinck and Overlaet (2010b, Fig. 3.15-17).

48 Delougaz (1952, Pl. 154.B.494.570); Wright (1981, Figs. 51.h, i, 54.i); Ii (1993, Nos 822, 905-908).

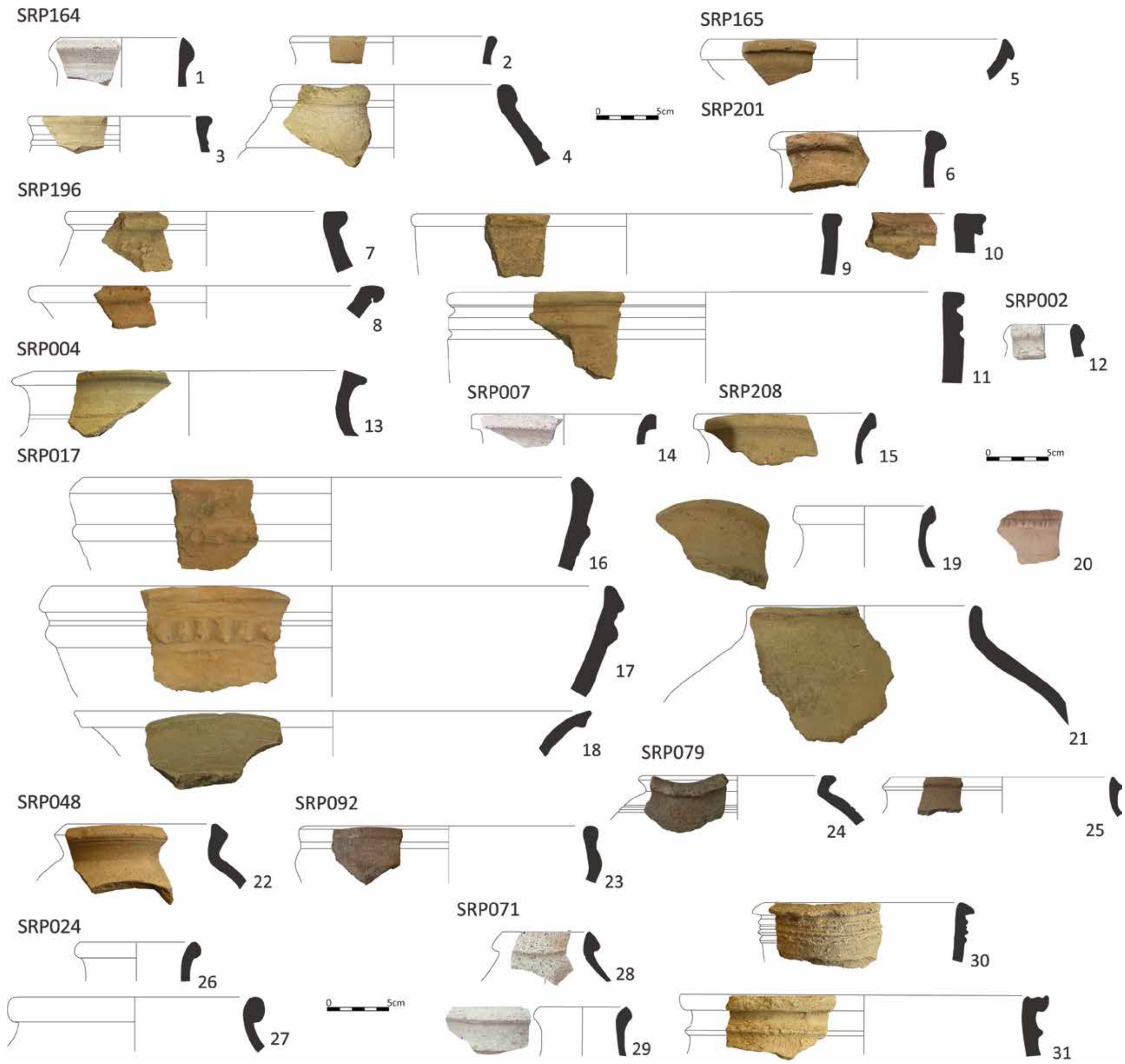


Figure 4.8 Early Bronze Age (Middle phase) pottery from the southern plains.

(Figure 4.4) near Horen also produced several JN-ED I jar rims with comparisons in the lower and middle Diyala region (Figure 4.5.17-19).[49]

4.3 The lower Sirwan region in the Middle phase of the Early Bronze Age

Sites with evidence for the Middle phase of the EB have proven – with few exceptions – to be more difficult to identify and date with confidence. We also include in this category sites assigned a more generic third millennium BCE date.

4.3.1 Right bank

In the plains that flank the Sirwan river to the west, EB surface materials are present at Tell Nergz (SRP164), including an ED jar (Figure 4.8.1), a jar with simple rounded rim (Figure 4.8.2),[50] and a jar with thickened triangular rim (Figure 4.8.3).[51] A large jar (Figure 4.8.4) is more difficult to find comparisons for, but may also broadly date to the third millennium BCE. The site of Quba (SRP165) produced a bowl with everted rim, which may date to the mid-to-late third millennium BCE (Figure 4.8.5).[52]

49 Delougaz (1952, Pls. 142.A.516.270, 155.B.514.270); Gibson (1981, Pl. 70.13-14, 21); Wright (1981, Figs. 53.a, 65.g); Ii (1993, No. 881).

50 Delougaz (1952, Pl. 161.B.576.220); Gibson (1981, Pl. 64.2-3).

51 Gibson (1981, Pl. 74-79); Zingarello (2017, Fig. 5.5).

52 Renette (2021, Fig. 4.6).

Figure 4.9 Views of SRP092, SRP024, SRP009, and SRP211.

In the Gumar plain, two sites have yielded pottery that points to a mid-to-late third millennium BCE occupation. This includes a jar rim from the low mound of SRP201 (Figure 4.8.6),[53] as well as a jar with thickened rim (Figure 4.8.7), a jar with folded rim (Figure 4.8.8),[54] and basins with squared rims from Tepe Gumar II (SRP196, Figure 4.8.9-11).[55]

A jar rim from Tepe Charmu (SRP002, Figure 4.8.12) dates to the ED III.[56] SRP004 produced the rim of a medium-sized jar (Figure 4.8.13) with comparisons at ED III Abu Salabikh,[57] lower Diyala[58] and Hamrin sites,[59] and at Logardan.[60] Another jar rim from Shekh Langar (SRP007, Figure 4.8.14) can be compared to sites in the lower Diyala and Nippur.[61] The surface collection of SRP208 also includes a generic third millennium BCE jar rim (Figure 4.8.15).[62]

53 Renette (2021, Fig. 4.5).
54 Romano and Al Hosseini (2019, Fig. 8.52); Renette (2021, Fig. 4.6).
55 McMahon (2006, Pl. 91); Renette (2021, Fig. 4.6).
56 Delougaz (1952, Pl. 164.B.663.540b); Moon (1987, No. 351).
57 Moon (1987, No. 433).
58 Delougaz (1952, Pl. 178.C515.371, C515.870).
59 Gibson (1981, Pls. 70.12-22, 71.1-10).
60 Zingarello (2018, 137, Fig. 3.3).
61 Delougaz (1952, Pls. 152.B.225.540, 155.B.515.470); McMahon (2006, Pl. 118.4).

4.3.2 Left bank

On the other side of the river, Tepe Imam Mohammed (SRP017) continued to be occupied in the mid-to-late third millennium BCE. Surface finds include two fragments of so-called fruit stands or stemmed dishes with impressed ridge bands below the rims (Figure 4.8.16-17). These vessels are common at late ED Mesopotamian sites, where they are often associated with burials,[63] while at Uch Tepe in the Hamrin such dishes are reported from ED I-II contexts.[64] A large bowl with overhanging beveled rim is most commonly ascribed a post-ED date (Figure 4.8.18).[65] An oval-rim jar fragment is generally dated to between the ED III and the Ur III at south Mesopotamian sites, and to the Akkadian period at Nippur (Figure 4.8.19).[66] Also present is a body fragment of a classic third millennium BCE

62 Renette (2021, Fig. 4.6); McMahon (2006, Pl. 118).
63 McMahon (2006, Pl. 77); Moon (1987, 162-163; 1982).
64 Gibson (1981, Pl. 76.10-16).
65 McMahon (2006, Pls. 84-85).
66 Ibid., Pl. 107.

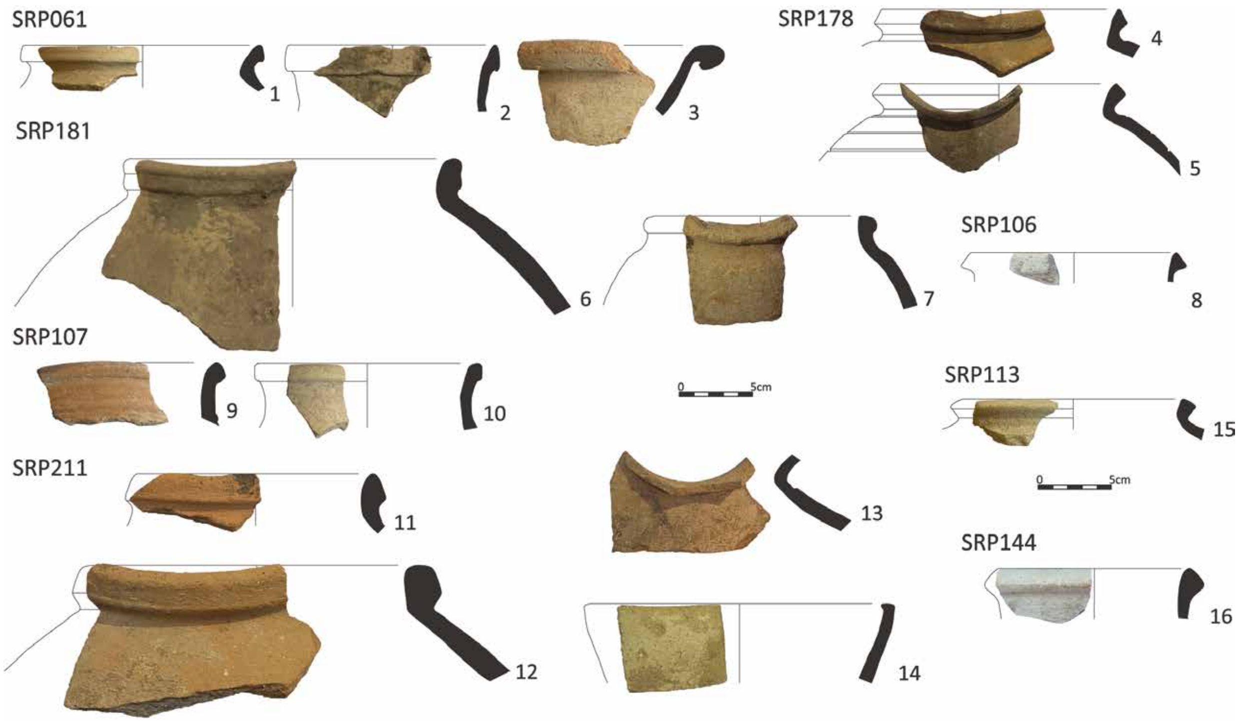


Figure 4.10 Early Bronze Age (Middle phase) pottery from northern and upland sites.

carinated jar with incised decoration (Figure 4.8.20).[67] Jars with short plain rims have a broad chronological range, but appear to peak in popularity at Nippur in the transitional and early Akkadian levels (Figure 4.8.21).[68]

The mound of Tapa Arab (SRP048) also produced evidence for occupation during the later third millennium BCE, including a jug with everted rim (Figure 4.8.22).[69] Surface finds from SRP092 (Figure 4.9), which forms part of the Kani Masi site cluster, include a carinated bowl that may be ascribed a post-Akkadian date (Figure 4.8.23).[70] In the centre of the plain, the site of Gakol Kale (SRP079), which was occupied during the LC, produced a jar with everted rim dating to the ED III-Akkadian period (Figure 4.8.24),[71] and another dating somewhat later to the Akkadian or Ur III (Figure 4.8.25).[72] SRP024 (Figure 4.9) produced two thickened-rim jars dating to the middle centuries of the third millennium BCE (Figure 4.8.26-27),[73] while Mala Kunar II (SRP071) shows signs of continued or recurrent occupation in the later ED and Akkadian periods. Relevant surface finds include a jar with triangular rim (Figure 4.8.28),[74] a jar with upward-pointing rim (Figure 4.8.29),[75] a jar with triangular rim and incised bands (Figure 4.8.30),[76] as well as a jar with a rectangular rim that runs into the early second millennium BCE (Figure 4.8.31).[77]

4.3.3 Uplands

Further north along the Sirwan, Bardaswr Tapa (SRP009, Figure 4.9) produced 10 chert artefacts that suggest a date in the third millennium BCE and point to strong links of lower Sirwan knapping specialists with south Mesopotamian communities of practice. Five of the artefacts are flakes, one is a surface maintenance flake coming from a bladelet core, and one is a blade core (Figure 4.7). The latter has a sub-conical shape and a single platform associated with a blade extraction surface which shows very regular removals. These features are the result of the pressure technique, and they find ready comparisons with ED blade cores from Abu Salabikh.[78] Blade removal size is

67 Delougaz (1952, Pls. 177.C.504.370, 178.C.515.561).
68 McMahon (2006, Pl. 98).
69 Delougaz (1952, Pl. 177.C.506.470b).
70 Renette (2021, Fig. 4.6).
71 Delougaz (1952, Pl. 177); Renette (2021, Fig. 4.4).
72 Renette (2021, Fig. 4.6).
73 Delougaz (1952, Pl. 195.D.555.540).
74 McMahon (2006, Pl. 107.13).
75 Ibid., Pl. 135.1.
76 Ibid., Pl. 78.1.
77 Gibson (1972, Fig. 46.25).
78 Payne (1980).

also consistent with third millennium BCE Abu Salabikh,[79] Larsa,[80] and Abu Tbeirah.[81]

Surface collections at the small mound of Qala Gawri (SRP061), which is today located in the centre of the village of Tazade and heavily built over by modern houses, produced several diagnostic pieces dating to the later third millennium BCE. This includes jars with everted rims, one dating to the Akkadian period (Figure 4.10.1),[82] a large coarse basin (Figure 4.10.2),[83] and another, somewhat later jar type (Figure 4.10.3).[84] Finds from Tepe Dar (SRP178) in the north-eastern uplands include several globular jars with everted rims that can be assigned a date in the ED II-III (Figure 4.10.4-5).[85] The cave site of Ashkawti Manga Wakal (SRP181) also produced two later third millennium BCE jars (Figure 4.10.6-7).[86]

Tepe Shaho (SRP106) in the Hawasan valley shows signs of continued occupation during the ED II-III (Figure 4.10.8),[87] while the adjacent SRP107 produced two third millennium BCE jar rims (Figure 4.10.9-10).[88] The ruin field of SRP211 (Figure 4.9) near the Darband-i Belula ravine yielded several sherds that can be dated to the middle of the third millennium BCE. This includes a jar with large ledge rim (Figure 4.10.11), and a globular jar with thickened rim (Figure 4.10.12), as well as a bowl with internal rim (Figure 4.10.14). The nearby Tepe Ama Husen (SRP113) appears also to have been occupied during the later third millennium BCE (Figure 4.10.15), as was perhaps SRP144 (Figure 4.10.16).

4.4 Conclusions

The results of surface survey to date suggest that the lower Sirwan region experienced an increase in settlements from 26 LC3-5 to a total of 34 sites occupied or in use during the JN/ED I according to ceramic finds (Figure 4.11). This is followed by a drop to 20 sites dating to the middle centuries of the third millennium BCE, and a further decline to 12 sites in the Final EB. Notable is the increased number of sites in the northern part of the survey region, which show signs of (re-)occupation throughout the final fourth and third millennia BCE.

Throughout the EB, most settlements are small to very small, ranging mostly from below one to two hectares in size, with little to suggest any form of regional-level socio-political integration or differentiation. A few larger sites, including Shakhi Kora (SRP191) and Mala Kunar I (SRP070), continue to be occupied from the preceding LC. The extent of the JN-ED I occupation at Shakhi Kora is still being investigated but appears to have been less extensive than during the LC, suggesting a significant transformation in community organisation in line with regional developments.

What can be gleaned at this stage of the Early EB in the lower Sirwan region, thus, appears to differ from developments in the lower and middle Diyala plains. Excavations at late fourth millennium BCE Khafajah revealed packed neighbourhoods that may have been woven together through temple-run communal cooking and food-distribution facilities.[89] In the subsequent ED I, Tell Asmar, Khafajah, and Tell Agrab were also home to sizeable communities, which at this time, however, show limited evidence for centralising institutions[90] or regional settlement distinctions despite an increase in the overall number of sites.[91] Further north, Tell Gubba[92] and Tell Razuk,[93] Tell Madhhur,[94] Tell el-Suleimah,[95] and Abu Qasim[96] produced intriguing round mudbrick structures. Interpretations of these sites have varied widely, but together with contemporary cemeteries at Ahmad al-Hattu[97] and Kheit Qasim,[98] they point to Early EB communities, whose members experienced some social and wealth differentiation, but lacked centralising institutions and regional spatial hierarchies.

Both Shakhi Kora and Mala Kunar I were abandoned after the Early EB, while Tepe Imam Mohammed (SRP017) likely emerges as a new, modest centre. It presents one of the few SRP sites more extensively settled in the mid-to-late third millennium BCE, while overall settlement numbers dwindle. In the northern uplands, site numbers also decrease, but unlike in the southern plains, long-established sites such as Tepe Dar (SRP178), Tepe Shaho (SRP106), SRP107, and Tepe Ama Husen (SRP113) continued to be (re-)occupied.

These settlement trends find a broad correspondence with developments in the Hamrin, where a peak in settlement in the ED I is followed by a falloff in sites dating to the Middle EB,[99] and contrast with the lower Diyala

79 Ibid.
80 Coqueugniot (2003).
81 Moscone (2019).
82 McMahon (2006, Pls. 103, 109); Renette (2021, Fig. 4.6).
83 Romano and Al Hosseini (2019, Fig. 8.52); Renette (2021, Fig. 4.6).
84 McMahon (2006, Pl. 112); Renette (2021, Fig. 4.7).
85 Ii (1993, No. 894); McMahon (2006, Pl. 111.2).
86 Woolley (1934, Pl. 261.162); Ii (1993, Nos. 1030-1031); McMahon (2006, Pls. 104.6, 121.4); Renette (2021, Fig. 4.4).
87 Delougaz (1952, Pls. 192.D.515.370, 193.D.525.370); Moon (1987, Nos. 573, 616).
88 McMahon (2006, Pl. 102).
89 Delougaz *et al.* (1967); Pollock (1999); Crawford (2004, 110).
90 Vallet (2001).
91 Adams (1965, 38-42).
92 Fujii (1981).
93 Gibson (1981).
94 Roaf (1984).
95 Al-Gailani Werr (1992).
96 Al-Kasar (1979, 171); Postgate and Roaf (1981).
97 Sürenhagen (1980).
98 Forest (1980).
99 Young and Killick (1988, 4).

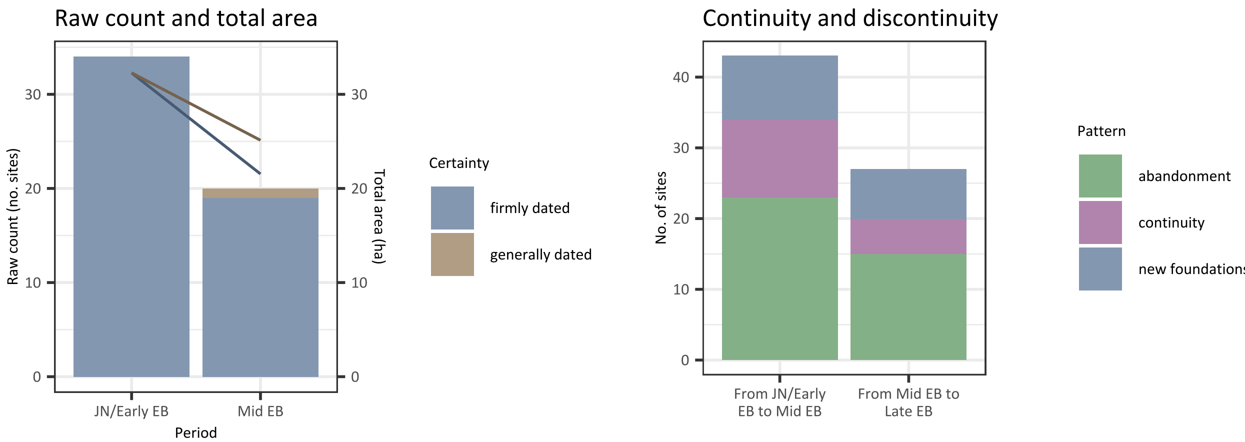


Figure 4.11 Late fourth and third millennium BCE site counts, total settled areas, and patterns of continuity and discontinuity.

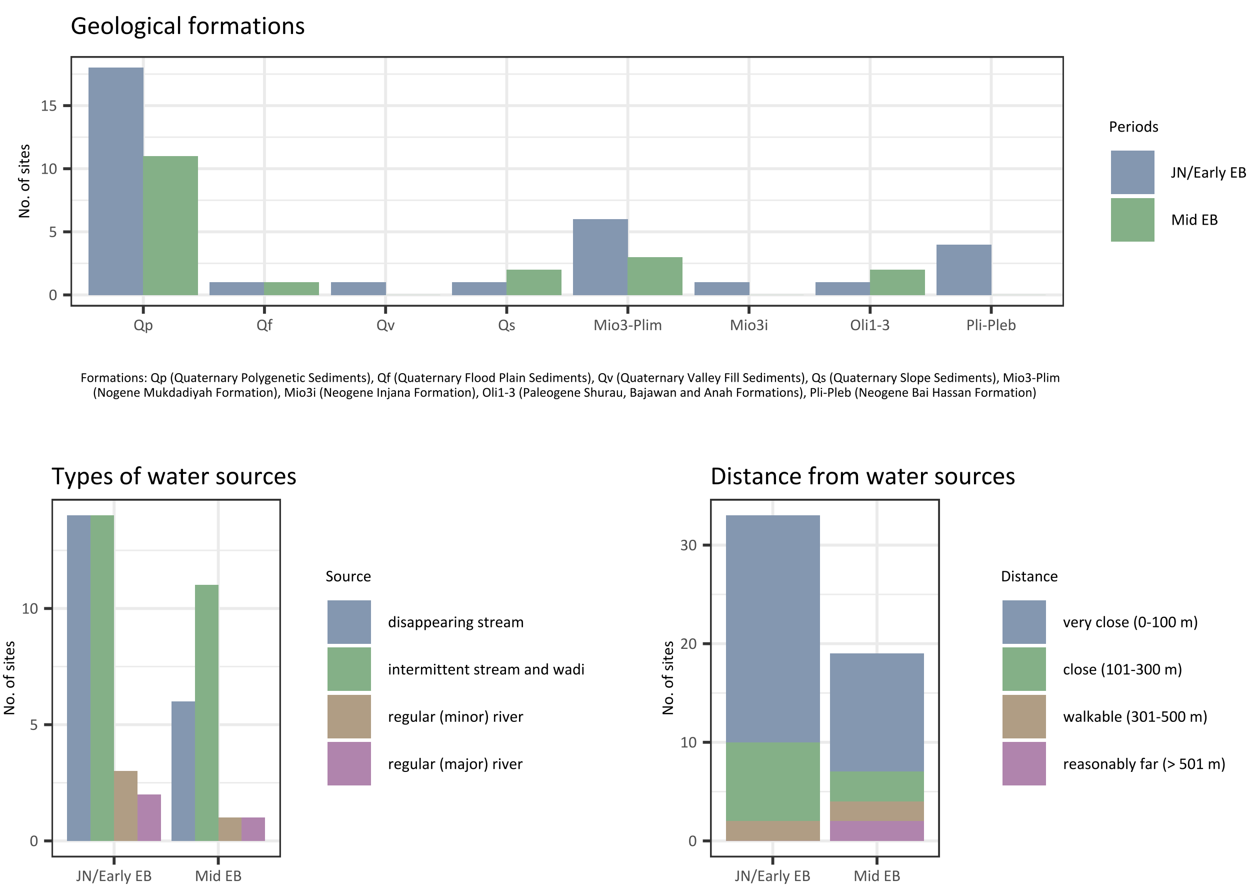


Figure 4.12 Soil quality and accessibility of water for late fourth and third millennium BCE sites (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

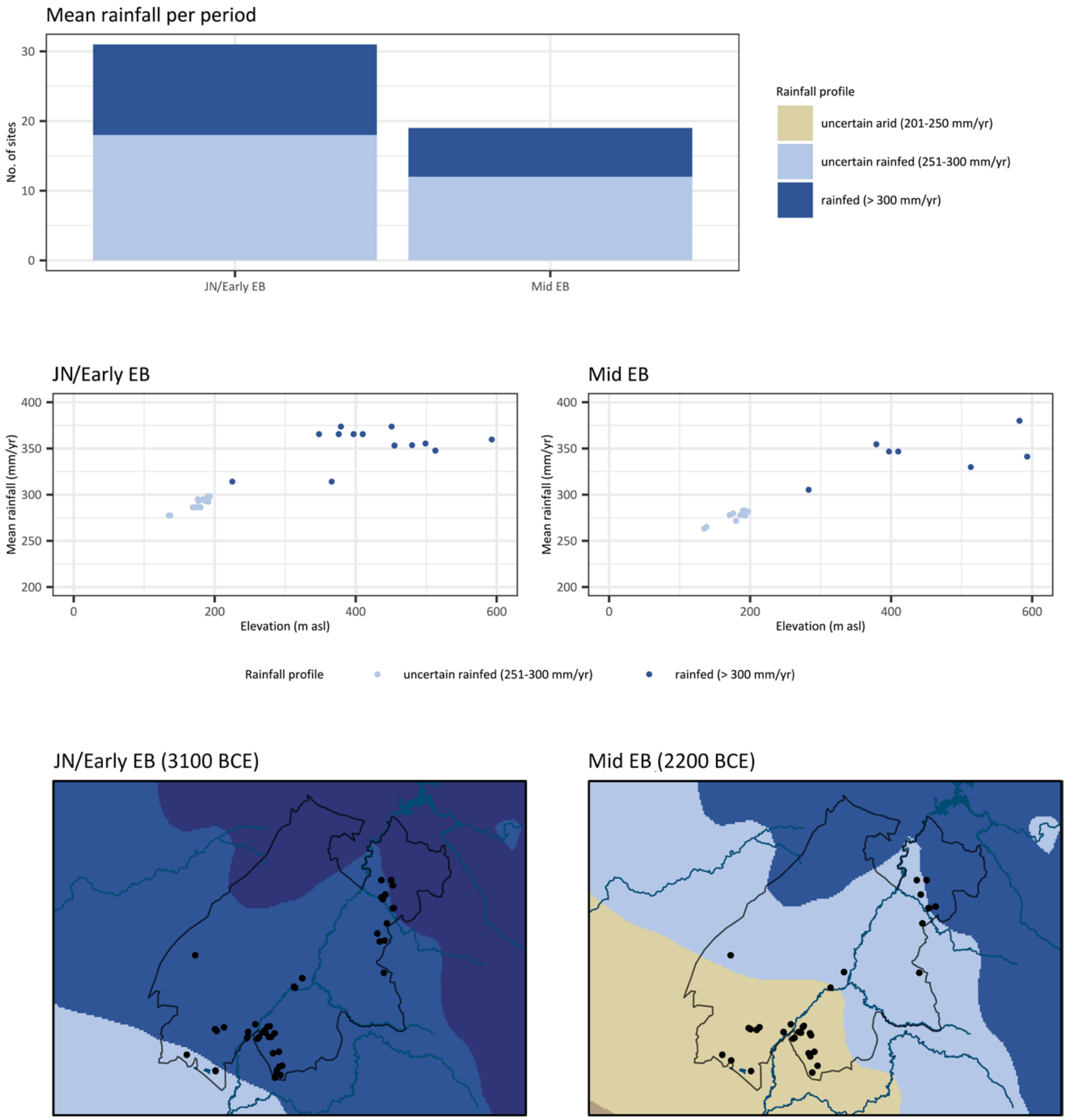


Figure 4.13 Mean rainfall for the late fourth and third millennium BCE (cubic interpolation after Hewett *et al.* 2022).

basin. The latter region experienced an unprecedented growth in the number of settlements surrounding the main, and often walled, urban centres of Khafajah, Tell Agrab, and Tell Asmar, as well as a peak in total settled area in the ED II-III. The region subsequently formed part of the central region of the Akkadian polity,[100] whose cultural and administrative practices at least extended into the Hamrin basin.[101] The SRP surface record certainly points to continued cultural connections with Mesopotamia in the later third millennium BCE, but there is no evidence at this point for the lower Sirwan region's inclusion into a wider Akkadian political sphere (see also Chapter 13.5).

As with previous periods, there is significant discontinuity in settlement locales from the LC to the

100 Adams (1965, 38-43).

101 Gibson (1982).

Early EB, and from the Early to the Middle EB, while both old and new settlements are located on the best agricultural soils available (Figure 4.12). The greater number of settlements near less fertile soils in the EB is due to the increase in upland sites. Sites also continue to be located near seasonal surface water rather than the main rivers.

Climatic conditions during the early part of the third millennium BCE were favourable, with almost all sites situated above the 300 mm isohyet. These conditions changed drastically around 2200 BCE, when the 4.2 ka BP global climatic event resulted in significant aridification across the region, to which some scholars attribute the collapse of the Akkadian empire.[102] Speleothem proxy data (Figure 4.13) suggests that the 4.2 ka climatic event would have pushed the 300 mm isohyet to the northernmost limit of the SRP research region. Even upland sites now fell into the so-called 'zone of uncertainty' for rain-fed agriculture, and all sites in the southern plains would have faced uncertain arid conditions until the return of a wetter period at the start of the second millennium BCE.

In the absence of stratified absolute dates for the third millennium BCE, it is currently not possible to assess to what extent the drop in SRP site numbers in the Middle EB may be attributed to the 4.2 ka event. The limited amount of pottery that can be assigned to the Akkadian period as well as the relatively low number of sites with Ur III materials, which we discuss in the following Chapter 5.4.1, however, make any direct link between climate change and observed settlement trends rather unlikely.

In summary, our data suggests that during the long third millennium BCE, lower Sirwan communities abandoned homegrown and south Mesopotamian centralising institutions such as those attested at fourth millennium BCE Shakhi Kora (SRP191) and (re)turned instead to small-scale and dispersed practices of settlement and forms of low-hierarchy community organisation. While northern settlements appear to be more stable, both larger and smaller sites in the southern plains are characterised by frequent settlement discontinuity. As we lack evidence for the causality of environmental factors, especially major climatic events, it seems most likely that it was local decision-making, and a deeply rooted preference for low-hierarchy social models – unconstrained by factors such as high-investment economic infrastructure, highly regulated land-tenure, and external control – that underwrote this settlement practice, which endured well into the second millennium BCE, as we discuss in the following Chapter 5.

102 Weiss (2017); but see, e.g. Lawrence *et al.* (2021).

5

The Later Third and Early Second Millennium BCE in the Lower Sirwan Region

5.1 Introduction

The early second millennium BCE in the lower Sirwan region is characterised by a significant increase in settlement numbers, which is carried almost exclusively by hamlets and villages (Table 5.1). Middle Bronze Age (MB) lower Sirwan settlement landscapes show no signs of spatial hierarchy or political integration north of the Gumar-Mrwari ranges. Chronologically, however, they broadly coincide, and seemingly stand in historical tension with, a series of landscape monuments in and around the Shakhi Bamu range and at Sarpol-e Zahab, which were commissioned by the rulers of the highland polities of Simurrum and Lullubum and by other local potentates. In concert, these two datasets raise questions about the nature of local socio-political organisation, and what forms of local and regional authority may be obscured by the use of Mesopotamian titularies in both upland monumental inscriptions and lowland texts.

The MB is well attested in the Hamrin basin[1] and in the Shahrizor plain,[2] including in stratified deposits at Tell Bakr Awa[3] and Gird-i Shamlu,[4] and at Tell Shemshara and Bazmusian in the Rania plain.[5] Overall, however, few piedmont settlements dating to the Late EB to MB I, the Ur III to Isin-Larsa historical periods, have been excavated and published to date.[6] In order to address this knowledge gap, we carried out three seasons of excavations on the summit of the c. 2 ha low mound of SRP094, and the adjacent burial ground of SRP189. Both sites form part of the Kani Masi site cluster, whose much more substantial Late Bronze Age (LB) settlement (SRP046) will be presented in Chapters 6-10. In this chapter, we first introduce the Kani Masi site cluster, then move to discuss the results of excavations at SRP094 and SRP189, before contextualising their findings in a wider regional-scale assessment.

5.2 The Kani Masi site cluster

The Kani Masi site cluster, which is located around 12 km south of the modern town of Kalar, was first documented by the SRP in 2013 (Figure 5.1).[7] It consists of a scatter of individual mounded features that sit on top of a relict Pleistocene terrace covered by alluvial and

1 Yaseen (1995); Eidem (1981); Bergamini *et al.* (2002-3).
2 Altaweel *et al.* (2012, 19, Fig. 6).
3 Miglus *et al.* (2013).
4 Al-Janabi (1961); Altaweel *et al.* (2012); Mühl (in prep).
5 Læssøe (1959); Al-Soof (1970).
6 For preliminary reports, see e.g. Vallet (2016); Tenu *et al.* (2019).
7 Glatz and Casana (2016).

Dates BCE	Period (Mesopotamia)	Period (Diyala)	SRP phasing
2120-2004	Ur III	Ur III	Final EB
2004-1750	Isin-Larsa	Ešnunnan independence?	MB I
1750-1600	Old Babylonian	Upheaval; Babylonian and Kassite incursions?	MB II

Table 5.1 Periods and their approximate dates discussed in this chapter.

Site	Trench	Years excavated
SRP094	K136	2017, 2018
SRP189	I113	2019

Table 5.2 List of excavation areas on SRP094 and SRP189.

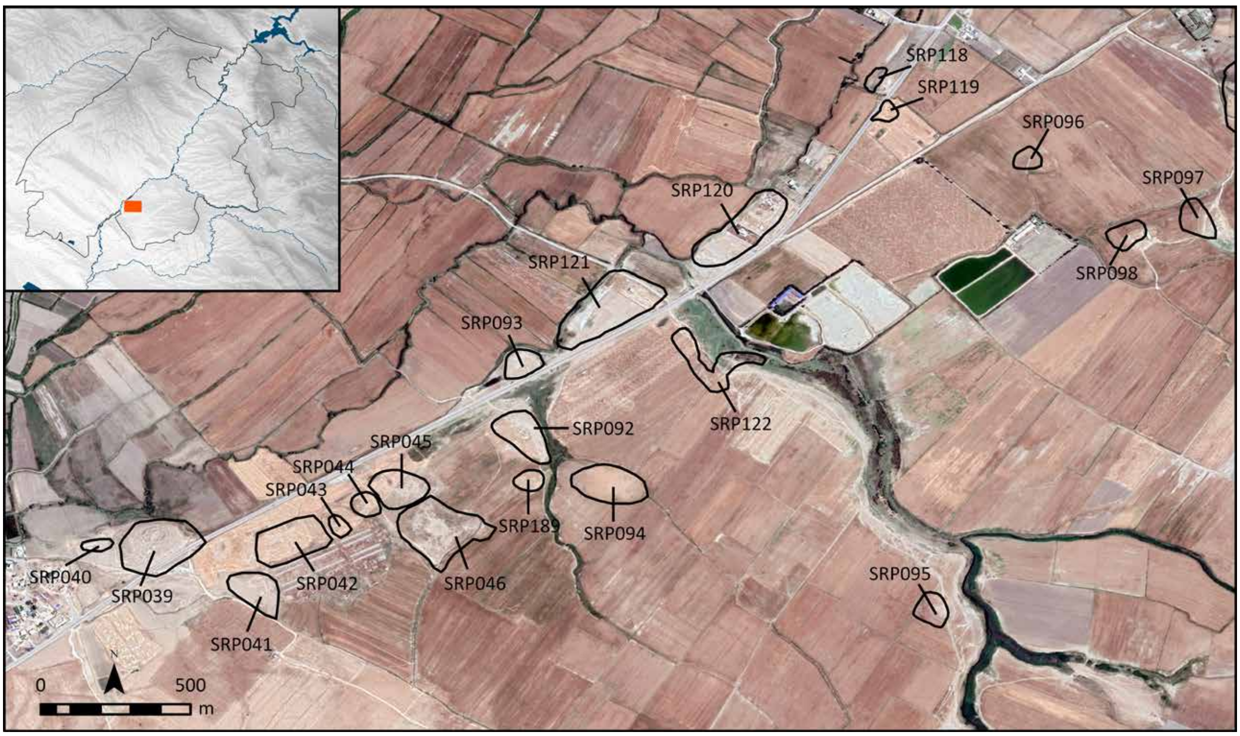


Figure 5.1 Satellite view of the Kani Masi site cluster (GoogleEarth image from May 2020 ©CNES/Airbus).

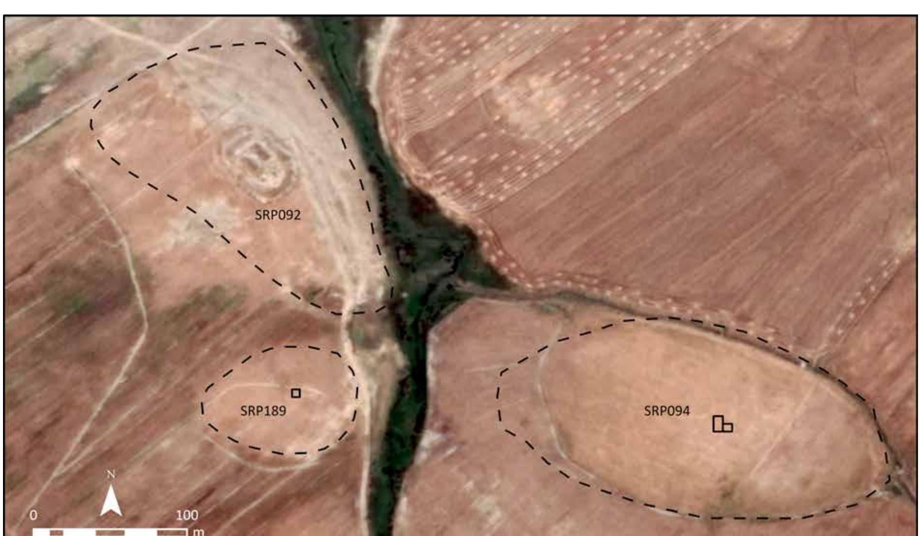


Figure 5.2 Satellite image of SRP094 and SRP189 with locations of excavation trenches (GoogleEarth image from May 2020 ©CNES/Airbus).

Phase	Context	Lab No.	Uncal. (BP)	2 Sigma (BCE) (IntCal2020)	Period
1	K136/L115/L3	AA113264/X34920R	3625±27	2122-1897	Ur III-Old Babylonian
1-2	K136/L111/L1	AA113266/X34922	3533±25	1946-1768	
2	K136/L6/L3	SUERC76927/GU46587	3576±24	2022-1826	
2-3a	K136/L117/L1	AA114864/X36469	3568±28	2021-1778	
3a	K136/L108/L2	AA114863/X36468	3577±28	2025-1781	
3b					
4		bronze bowl			post-Bronze Age (?)
5		burial			modern (?)

Table 5.3 Phasing and associated radiocarbon dates from SRP094. Phasing is based on stratigraphic considerations, absolute dates, and ceramic analysis.

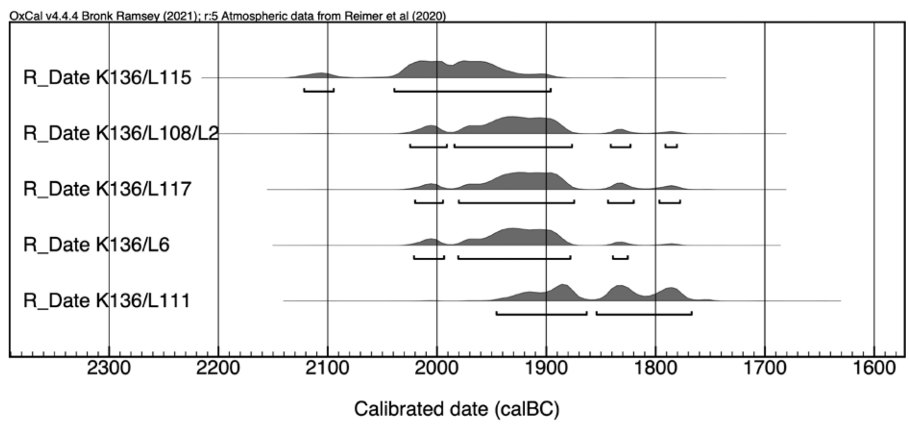


Figure 5.3 Multiplot of calibrated radiocarbon dates from SRP094.

aeolian Holocene sediments. The site cluster is located on the north-western edge of the c. 75 km^2 large Bnkura plain, one kilometre south of the edge of the Sirwan flood plain, and a few hundred metres northeast of the Mrwari hill range. Parts of the site cluster are today used as farmland, with dry-farmed areas such as SRP046 producing limited yields mainly used for livestock grazing. A small spring-fed stream, which is visible on historic satellite imagery and may therefore have also existed in the more distant past, meanders between some of the low mounds and provides access to water year-round.

Surface collections and excavations on different mounded features point to a long but intermittent occupation history stretching back to the Late Neolithic (SRP093). This is followed by Halaf and Ubaid (SRP043, SRP044) and Early Bronze Age (SRP093, SRP092) phases of occupation or activity. Excavations on SRP094 and SRP189 revealed an MB I village and burial ground, which were abandoned at the end of the MB I, or very shortly thereafter. Following what appears to be a gap in occupation from the mid-eighteenth to the later sixteenth centuries BCE, a new settlement was founded on the c. 10 ha low mound of SRP046. SRP046 is covered in large quantities of LB pottery and baked bricks, and LB surface finds are also attested on SRP043, SRP092, SRP095 and from surrounding areas, suggesting a total LB settled area of around 40 ha. Substantial occupation appears to have continued on SRP046 into the Iron Age (IA), while settlement subsequently appears to have moved to other nearby mounds (see Chapter 11.4.2). Historic and modern road constructions, the establishment in the 1980s of a large military installation southwest of SRP046 and trenching on several other mounds inflicted significant damage on all component sites, as has more recent deep ploughing.

5.3 A village near the Sirwan (SRP094)

Excavations on SRP094 were carried out over two seasons and exposed an area of 75 m^2 (Figure 5.2 and Table 5.2). A total of five phases of occupation and use could be identified (Table 5.3, Figure 5.3). The first three date to the Late EB to MB I, or the Ur III to Isin-Larsa/Early Old Babylonian periods. A fourth phase is represented by the deposition of a metal bowl into the Phase 3 collapse, which may be of a later, post-Bronze Age date. A fifth phase consists of a cluster of human remains that were found

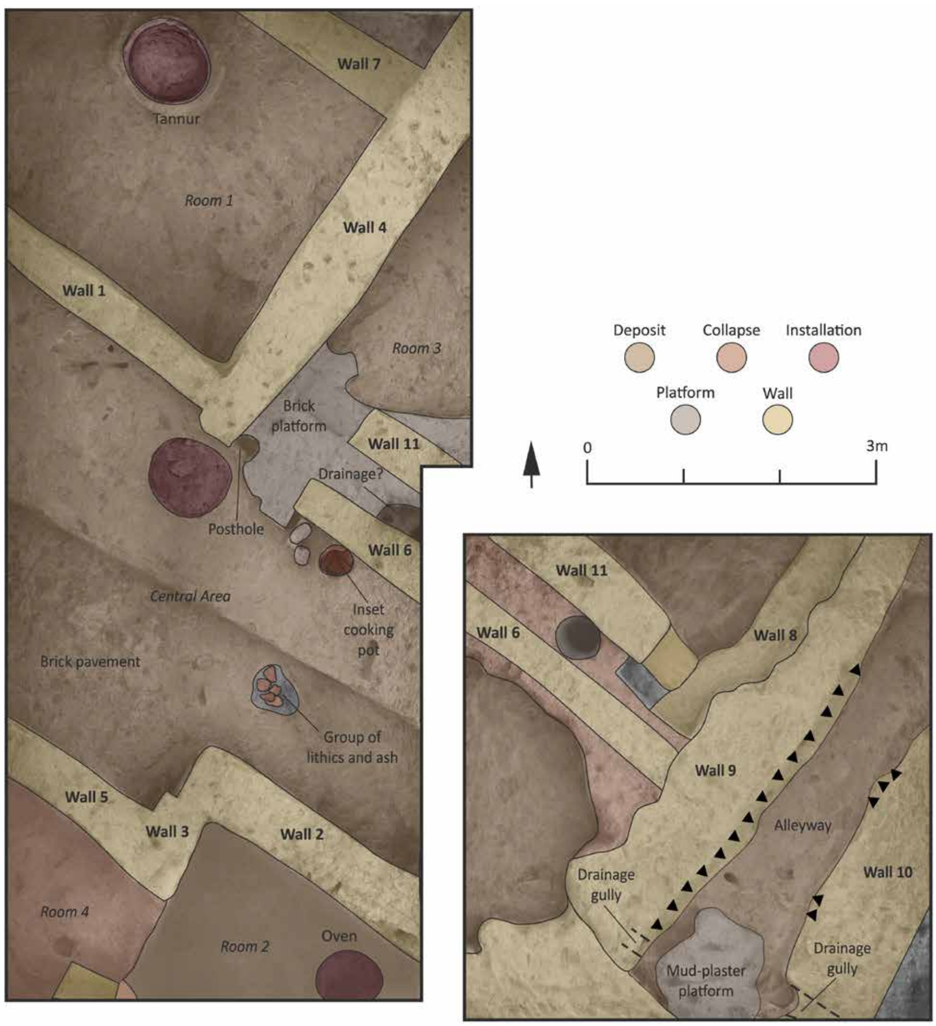


Figure 5.4 Annotated orthophoto of exposed architecture on SRP094.

just below the ploughsoil and that point to the use of the site as a burial ground, most likely in the modern period.

The earliest occupation reached on SRP094, Phase 1, was exposed in a small sounding in the southern part of the trench between Walls 2 and 3 (Room 2, Figure 5.4). At a depth of c. 60 cm below the level of Phase 2 occupation, a circular tannur (c. 70 cm in diameter) was encountered, which had been truncated at the level of the surrounding floor and surfaced over (Figure 5.5.A). The tannur sits well below any of the standing walls of Phases 2 and 3, and was not, therefore, associated with the overlying architectural layout. A charcoal sample embedded in the Phase 1 occupation surface was radiocarbon dated to between c. 2122-1897 cal. BCE.

The Phase 1 floor and tannur were covered by a c. 10 cm thick ashy deposit, followed by 50 cm of a dark brown loose fill (K136/L115), which contained little cultural material other than a few discrete clusters of animal bone, suggesting a deliberate levelling episode. A subsequent fill (K136/L111) is dated to between 1946-1768 cal. BCE by a charcoal fragment.

Phase 2 represents the earliest level of occupation associated with built architecture across the exposure. Though only partially exposed, we can postulate the presence of at least two sizeable houses, built from sun-baked mudbricks. The two buildings were separated by an alleyway, which also served as a water and waste drainage facility.

In the western part of the trench, Phase 2 consists of a series of rooms and a central area, partially paved with bricks, and a potential plastered threshold between Rooms 2 and 4. Wider walls (Walls 2 and 4) ranged in width from 65 to 80 cm, narrower walls between 40 and 60 cm, with room dimensions ranging from c. 4 × 3.5 m (Room 1) to 2.4 × 1.7 m (Room 4). A central area measured 5 × 3.7 m. Little cultural material was found directly associated with Phase 2 floor deposits.

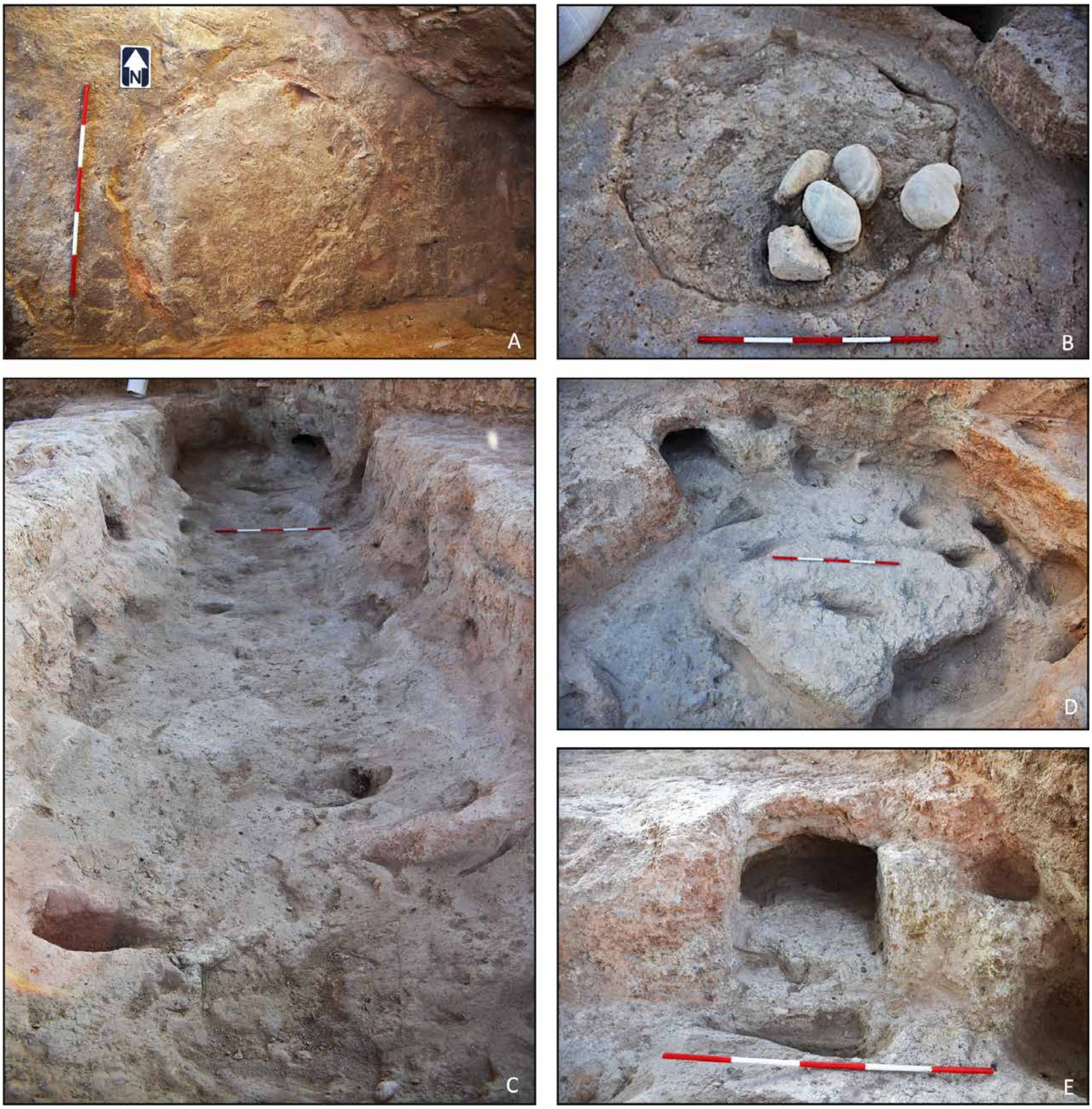


Figure 5.5 A) Phase 1 truncated tannur below Room 2, B) Phase 3b shallow pit containing an arrangement of four stones surrounded by an ashy deposit, C) alleyway in eastern part of the trench, D-E) mud-plaster platform and drainage gullies.

Embedded in the Phase 2 floor surface in the central area directly north of the termination of Wall 2 was a shallow pit containing an arrangement of four stones, surrounded by an ashy deposit (K136/L119). This appears to represent the remains of small-scale cooking activities. The central area extends to the south-eastern part of the excavation area, where a partial ceramic tray (see below) was found placed upside down on the Phase 2 surface. A charcoal sample from a fill layer just above (K136/L6) provides an absolute date between 2022-1826 cal. BCE.

The western building was separated from a further set of structures by a narrow northeast-southwest running alleyway (Figure 5.5.C). The size of the mudbricks used to construct the parallel walls alongside the alleyway could be measured to c. 20 × 15-20 cm. In the southwest area of this alleyway, a hard, green mud-plaster platform (1.1 × 0.9 m) was encountered (Figure 5.5.D). Two drainage gullies ran underneath Walls 9 and 10 to meet this platform (Figure 5.5.E). These drainage features presumably operated to transfer water and waste from

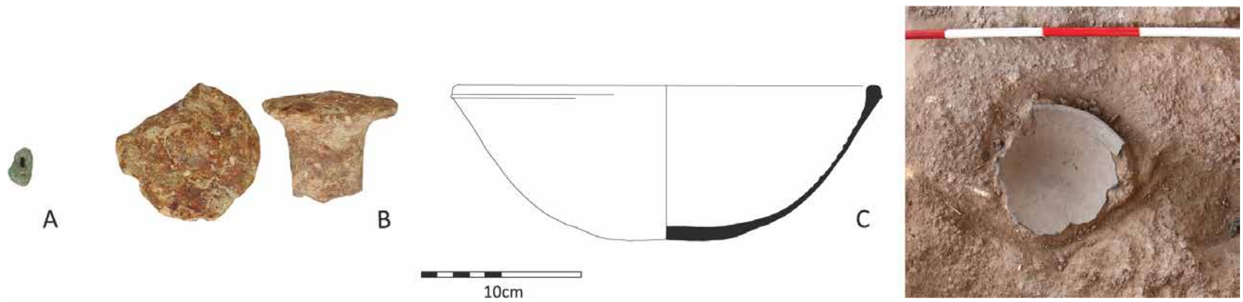


Figure 5.6 A) Earring, B) clay wall peg, and C) metal bowl from SRP094.

inside the surrounding structures out into the alleyway. The waste deposits accumulating in the alleyway in Phases 2 and 3 produced the majority of recovered faunal remains (see below), alongside what looks like a metal earring, and a clay wall cone fragment (K136/L4) that finds a general comparison at Bakr Awa (Figure 5.6.A-B).[8]

Phases 2 and 3a were separated by an ashy layer in some areas of the western structure, perhaps relating to a destruction episode. What may have caused this fire is unclear, and there are no signs of an attack or deliberate destruction. Phase 2 surfaces were subsequently covered by a thick deposit of compact green-grey material (K136/L105) across most of Room 1, and a looser orange-brown fill in Rooms 2 and 4 (K136/L102, L112, L113) and in the central area (K136/L117). A charred barley grain from this fill and levelling episode for the brick floor of Phase 3a (K136/L116) produced a radiocarbon date range between c. 2021-1778 cal. BCE.

Phase 3a, which appears to have swiftly followed the fire that ended Phase 2, represents the extensive reuse of some areas of the building. In the central area, Phase 3a deposits contained little cultural material. The top of a fragmentary pithos with wavy band decoration beneath the rim was encountered at the northwest corner of Wall 2 (Figure 5.7.A) and appears to have been embedded into the Phase 3a pavement. On removal of the pavement and underlying deposit, the body of the pithos was found to run under the corner of the wall. It is likely that this represents Phase 3a reuse of a broken vessel, perhaps for *ad hoc* storage activities. Also associated with this pavement appears to be a heavily degraded plaster basin in the northwest corner of the central area, whose function remains unclear (Figure 5.7.B).

The pavement itself is composed of tightly packed, low heated or perhaps sun-baked, mudbricks. These were laid in a northwest-southeast orientation, in alignment with the architectural layout of the area. Where individual bricks are identifiable, they are each c. 20 × 15 cm, thus matching brick sizes in the Phase 2 walls. Towards the east of the central area, the pavement merges with the top of a compact surface composed of trampled earth (K136/L108). A charred lentil from the latter deposit was dated to between 2025-1781 cal. BCE. At the intersection between the laid mudbrick pavement and the trampled earth surface, a degraded cooking pot was found embedded in the occupation surface, which appears to have been used for storage in Phase 3a.

Separating the mudbrick pavement from Room 3, is an added level of bricks sitting 10 cm higher than the rest of the pavement. This discrete area of higher pavement appears to have been added as a raised threshold joining the central area with Room 3. Its role as an entranceway is also reinforced by the presence of a small circular pit directly abutting Wall 4, which may well have formed the base for a doorpost. Furthermore, at the southeast corner of the raised pavement is a narrow slot, running northeast to southwest between the raised bricks of the pavement and a platformed stone faced with plaster, which may originally have held a perishable dividing panel, perhaps manufactured of wood or reed (Figure 5.7.C).

Inside Room 3, at the east end of the raised threshold, a shallow depression ran alongside the northeast face of Wall 6. It contained a loose brown deposit that did not contain any cultural material. It is possible that this depression represents a water drainage gulley. To the north of this gulley was a jar, which appears to have been smashed *in situ*. A stone tool lay directly to the south, whilst excavation of the deposit surrounding the vessel also exposed a badly preserved bronze pin (Figure 5.7.D-E). These items may originally have been contained within the jar.

Phase 3a reuse of Room 1 is represented by the construction of Oven 1, a circular-oval (1 × 0.85 m) dome constructed of low-fired clay and preserved to a height of 23 cm. The domed structure is reinforced on its outside by a ring of mud plaster (Figure 5.7.F).

The activities attested in Rooms 1 to 4 and the central area point primarily to cooking. The number of small, fine-ware drinking beakers encountered within

8 Miglus *et al.* (2013, Fig. 13, with additional comparisons).

Figure 5.7 A) Pithos embedded in Phase 3 floor, B) degraded plaster basin in section, C) raised bricks of the pavement and a platformed stone faced with plaster, D-E) fragmented *in situ* vessel with stone tool and bronze pin, F) Oven 1 in Room 1.

the respective room fills also suggests that commensal activities were taking place within these spaces. Furthermore, the presence of several jars and reused vessels as informal storage containers in Phase 3 indicates the storage of dry goods. The extensive effort expended on the construction of a mudbrick pavement in the central area, perhaps an outdoor space, not only suggests extensive use of this space, but also speaks to its potential importance as a focal point for interaction either at the household or community scale.

Phase 3b presents another and somewhat later re-use phase and includes a shallow pit dug into the final building collapse that contained a loose deposit of ashy dark brown soil (K136/L110). At the base of the pit was an arrangement of four stones and a fragmentary baked brick, which probably formed the remnants of an *ad hoc* cooking installation (Figure 5.5.B).

Phase 4 is attested in the southeast part of the exposures and consists of a depositional event of a metal bowl, which was found dug into the collapse layer of Walls 6 and 11 and is likely post-Bronze Age in date (Figure 5.6.C).

Phase 5 presents a later phase of re-use of the site as a burial ground, most likely in the modern era (Appendix VIII.2). This is based on the presence of a defined cluster of fragmentary human bone and a partially discernible grave cut right under the ploughsoil.

5.3.1 Faunal and botanical remains

Only very limited faunal and botanical remains were recovered from Phase 2 and 3 contexts. The majority come from the alleyway between the two buildings, where domestic refuse appears to have been dumped or washed into. Of the faunal taxa represented, caprines predominate, with small numbers of pig and cattle alongside a gazelle and rodent (Appendix VI.4). Charred plant remains include the crops emmer wheat, barley, and lentils, as well as wild taxa such as grasses and leguminous plants (Appendix IV.4 and IV.5).

5.3.2 Ground stone industry

Associated with Phases 2 and 3, and also concentrating in the alleyway fill, are a series of fragmentary grinding stones and other lithic implements (Figure 5.8). The grinding stones would have originally been rectangular in shape (saddle querns), with a slightly concave working surface and a rounded or slightly pointed dorsal side (Appendix V.2). These tools were involved in food processing activities. The grinding slabs consist of conglomerate or breccia, a sedimentary stone which can be found in the site's surroundings.[9] Conglomerate/breccia is not an ideal raw material for food processing, as the grinding process produces tiny particles of grit which contaminate the foodstuffs being ground. The almost exclusive use of this less desirable raw material at SRP094 may suggest that the site's inhabitants were not accessing otherwise well-established supply networks for basalt or finished basalt tools; perhaps an indicator of the rural nature of the settlement.

5.3.3 Pottery

The ceramic assemblages of SRP094 and SRP189, which are here considered together, consist of a relatively restricted range of functional groups that include bowls, beakers, jars, and large trays, whose morphological characteristics match types known from both Late EB and the MB I stratified assemblages in the wider region. At Tell Yelkhi, rather than registering an abrupt break, the Isin-Larsa period ceramics also appear to represent a continuation of earlier Ur III traditions.[10] In line with the radiocarbon dates discussed above, the continuation of some Ur III types in all levels at SRP094, thus supports occupation at the site and the adjacent burial ground of SRP189 around the turn of the millennium and across the MB I.

Bowls are not very frequently encountered, but varied shapes are represented in the SRP094 assemblage. A somewhat anomalous bowl with a flat, in-turned ledge rim (Figure 5.9.1) finds comparisons at Tell Yelkhi Levels 5-4,[11] Tepe Kalan (SRP018, see below), and sites across Mesopotamia,[12] including al-Hiba-Lagash,[13] Tell al-Rimah,[14] and Kurd Qaburstan.[15] Most common are hemispherical bowls with grooved upper bodies and simple rounded, or occasionally flattened rims (Figure 5.9.2-3), as well as medium-sized open bowls with flat or everted ledge rims (Figure 5.9.4-6). These bowl types have restricted parallels at Tell Yelkhi Levels 6-5,[16] and at sites across the alluvial plains,[17] including, for example, at al-Hiba-Lagash.[18]

Also present are significant numbers of fine-ware cylindrical beakers with sharp carinations on the lower body directly above flat or convex bases (Figure 5.9.7-11). These beakers are widely attested at, for instance, Tell Halawa,[19] Tell Yelkhi,[20] and Tell Ahmed al-Mughir,[21] as well as at Tell Asmar,[22] and other sites in the alluvial plains.[23] Metal versions of these beakers are also found

9 Kadhim and Al-Kubaisi (2020).

10 Gabutti (2002-3, 99-100).
11 Ibid., Pl. 33.2.
12 Armstrong and Gasche (2014, Family 5C, Pls. 3-6).
13 Renette (2021, 37-38, Type HB-6).
14 Postgate *et al.* (1997, Pls. 50-51).
15 Schwartz *et al.* (2022, Fig. 22.1-3).
16 Gabutti (2002-3, Pls. 30.3-4, 34-38).
17 Armstrong and Gasche (2014, Family 15D, Pl. 25).
18 Renette (2021, Type HF-17).
19 Yaseen (1995, Pls. 59-63, painted examples: Pl. 62.44 and 62.48).
20 Gabutti (2002-3, Pls. 60-62, 70).
21 Gibson (1981, 152-153).
22 Delougaz (1952, 115, Pl. 153).
23 Armstrong and Gasche (2014, Group 65, Pls. 53-54).

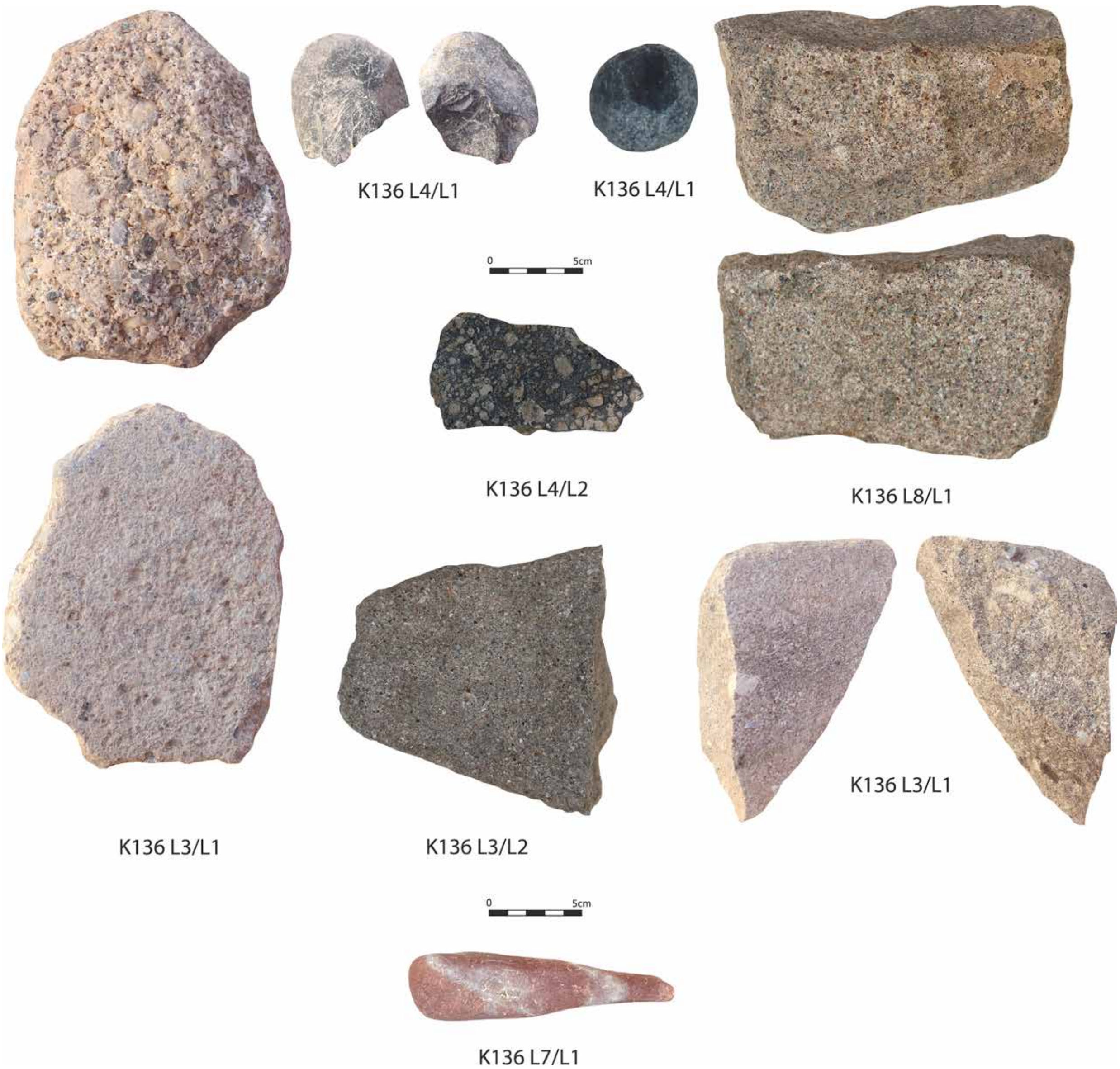


Figure 5.8 Ground stone tools from SRP094.

in MB graves in Lurestan,[24] and at Godin Tepe,[25] pointing to shared commensal practices between transitional and highland communities.

The SRP094 assemblage is dominated by medium-to-large storage jars. These usually have short, narrow necks and pronounced and often triangular or sharply bevelled rims. Many of the jars are decorated with applied bands, incised wavy lines, or pronounced parallel ribbing (Figure 5.9.17-24). Similar types of vessels are known from the middle of the third millennium BCE in the lower Diyala,[26] but they are also typical of the late third millennium at Tell Yelkhi[27], Bakr Awa,[28] and al-Hiba-Lagash,[29] as well as early second millennium BCE Nippur.[30] Less common at SRP094 are open-mouthed craters, with vertical-to-convex bodies and squared ledge rims (Figure 5.9.16). Ledge rims can be plain or adorned with multiple concentric incisions on top. For instance, photos of burial vessels from Kish, excavated in the 1920s, show the same sharply carinated

24 Schmidt *et al.* (1989, e.g. Pls. 124, 126-127).
25 Henrickson (2011, Fig. 6.16.Gd 67-214).
26 Delougaz (1952, 148-150).
27 Gabutti (2002-3, Pl. 80).
28 Miglus *et al.* (2013, 63, Fig. 27a-b).
29 Renette (2021, 82-83, Type HK-2b).
30 McMahon (2006, 72-73, Type C-16b, Plate 110).

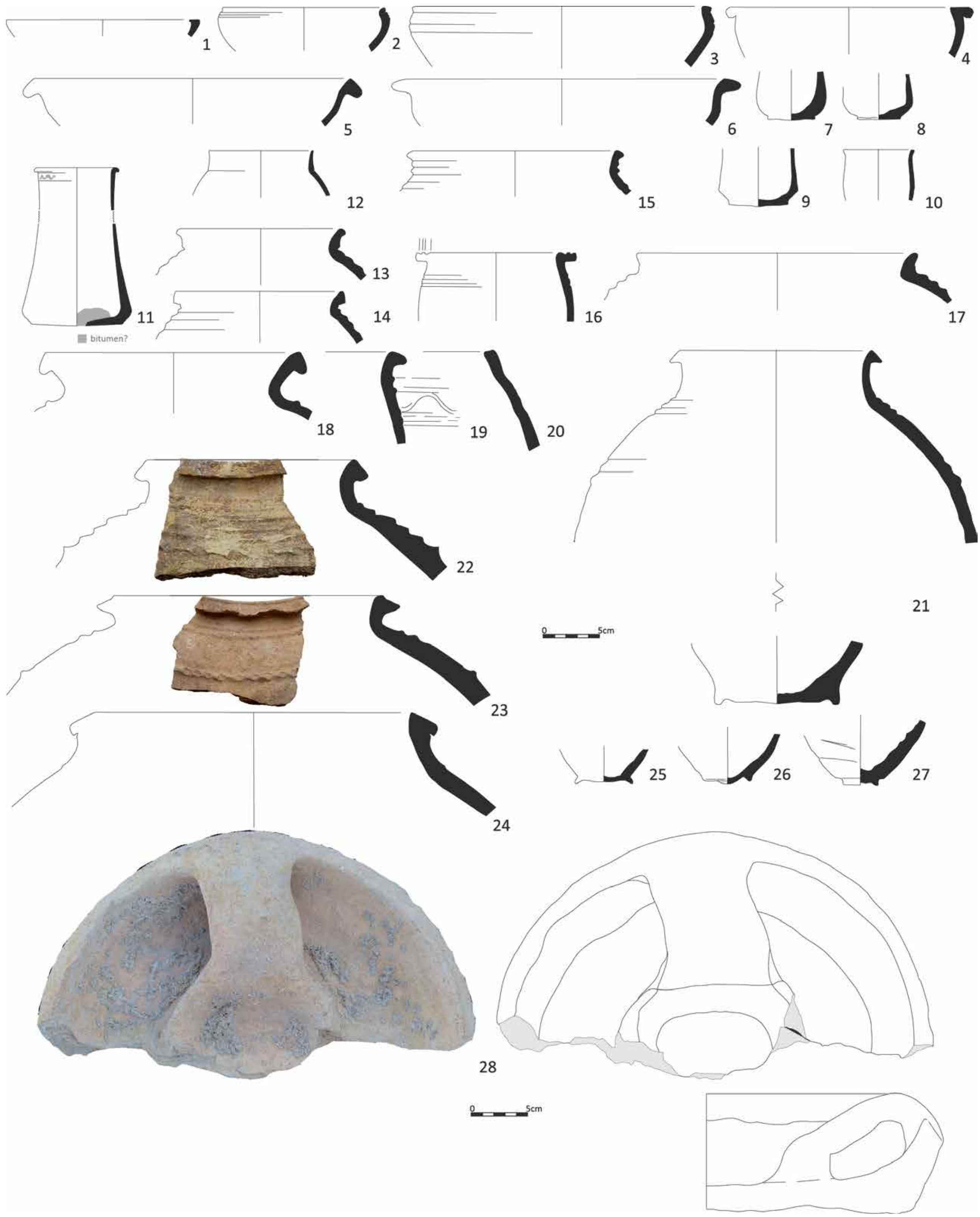


Figure 5.9 The pottery assemblage from SRP094.

Figure 5.10 Animal and cart model from SRP189.

Table 5.4 Burials from SRP189.

Burial	Locus	Age	Sex	Type	Position	Side	Dir.	Location	Grave goods
SRP189.1	I113/8	adult	-	Inhum.	Flexed	R	S	cemetery	2 jars, 1 goblet, 1 bead
SRP189.2	I113/9	YA/MA	M?	Inhum.	Supine		S	cemetery	1 jar

jars[31] and a very similar ledge-rim crater[32] as that found in Burial SRP189.1 (Section 5.3.4 below). Another typical feature of the SRP094 ceramic assemblage is a preference for ring bases for jars of different sizes (Figure 5.9.21, 25-27), which also finds close parallels at MB I sites in the Hamrin and in wider Mesopotamia.[33]

A large ceramic tray with internal handles (Figure 5.9.28) represents a type that has a broad chronological and geographical distribution in the later third and the early second millennium BCE, with significant concentrations along the lower and middle Diyala as well as into the upland areas of the Shahrizor plain.[34] Bürger and Miglus believe that these distinctive types spread from southern Mesopotamia into the lower Diyala in the later Early Dynastic (ED) III and Akkadian periods, and into the middle Diyala and Sirwan regions as well as into the northern Tigris area during the Ur III period at the same time that their popularity was decreasing in the south. [35] The function of these trays is as yet unknown, but a domestic use is most likely.[36]

Some absences are also notable. The SRP094 repertoire, for instance, does not include vessels otherwise typical for the Mesopotamian MB I, such as small hand-made jars with suspension loops, or cross-hatched and impressed decorations that are well-attested in the Hamrin and the lower Diyala plains.[37] It also lacks examples of incised grey ware,[38] which may present a link with Susa and the Iranian highlands.[39] Their absence at SR0P94 may suggest that lower Sirwan communities did not participate in the networks through which these vessels were dispersed, or that they had no interest in these particular artefacts and their associated practices and meanings.

5.3.4 A place for the dead (SRP189)

The small low mound of SRP189 is located to the west of SRP094 across a modern stream. In 2019, we opened a 5 × 5 m trench (I113, Figure 5.2) at the top of the low rise, where surface collections had picked up fragmentary terracotta models of an animal and wheel (Figure 5.10). The wheel and partial animal figurine share broad similarities to terracotta models from Godin III.[40] Such models are common across early second millennium BCE Mesopotamian sites,[41] but similar examples are also known from later second millennium BCE contexts at Kani Masi (SRP046) and Tell Zubeidi.[42] The two surface finds could, therefore, also belong to the LB settlement (SRP046) located just to the west.

Excavations on SRP189 revealed two adult inhumations at the same general depth and with comparable grave

31 Langdon (1924, Pl. 16).
32 Ibid., Pl. 32.
33 Yaseen (1995, Pl. 37); Gabutti (2002-3, Pl. 90); Armstrong and Gasche (2014, Pls. 79-84); Renette (2021, 119, Type Hbase-6d).
34 Bürger and Miglus (2016, 22, Fig. 1).
35 Ibid., 28.
36 Ibid., 29.
37 Delougaz (1952, Pl. 122); Yaseen (1995, No. 105); Gabutti (2002-3, 255, Pl. 134.1).
38 Delougaz (1952, Pl. 123).
39 Peyronel (2013, 59-62).
40 Henrickson (2011, Fig. 6.13-14).
41 Barrelet (1968).
42 Boehmer *et al.* (1985, Pls. 111.132-133, 140).

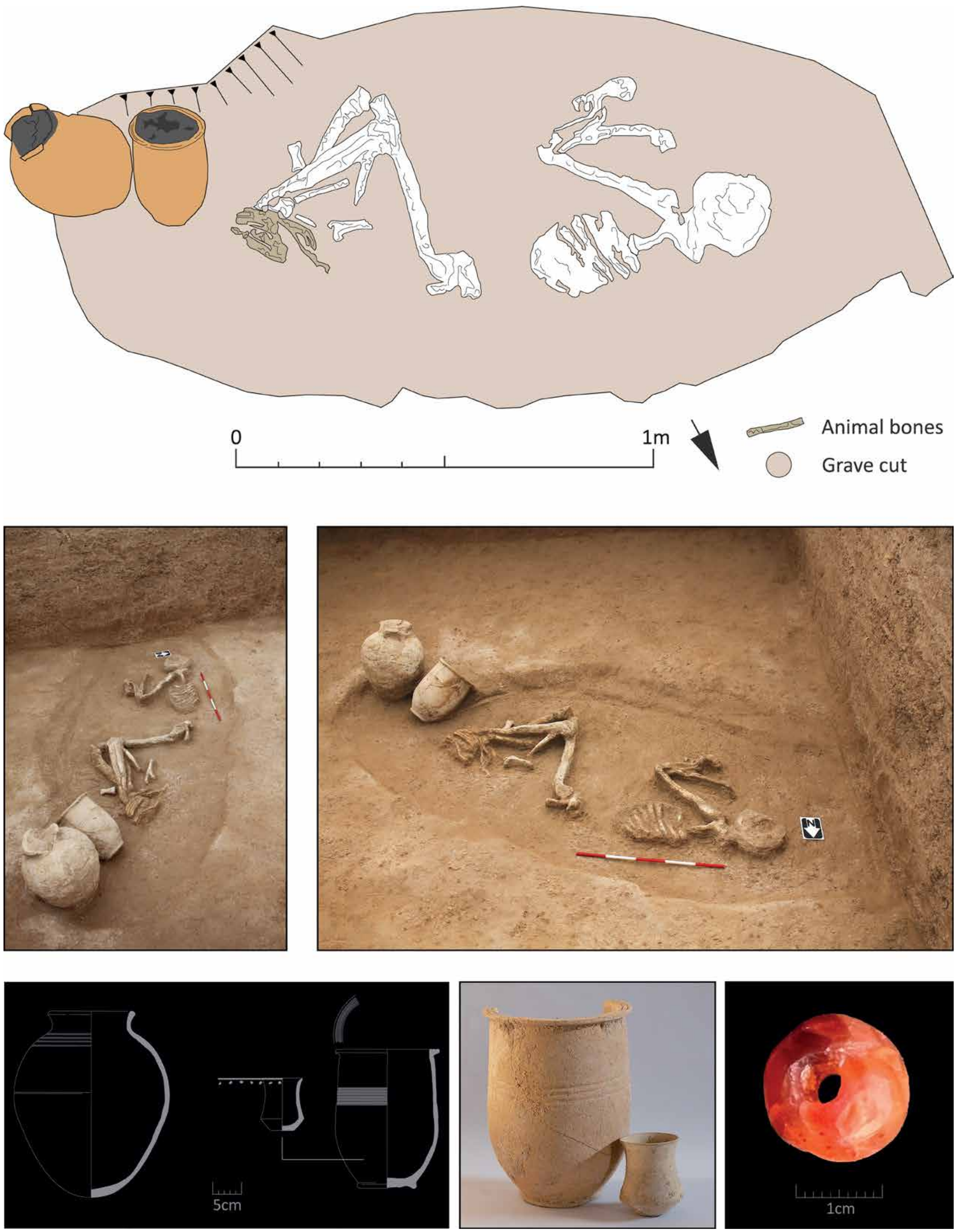


Figure 5.11 Adult inhumation accompanied by three vessels, animal, and possible human bone (Burial SRP189.1).

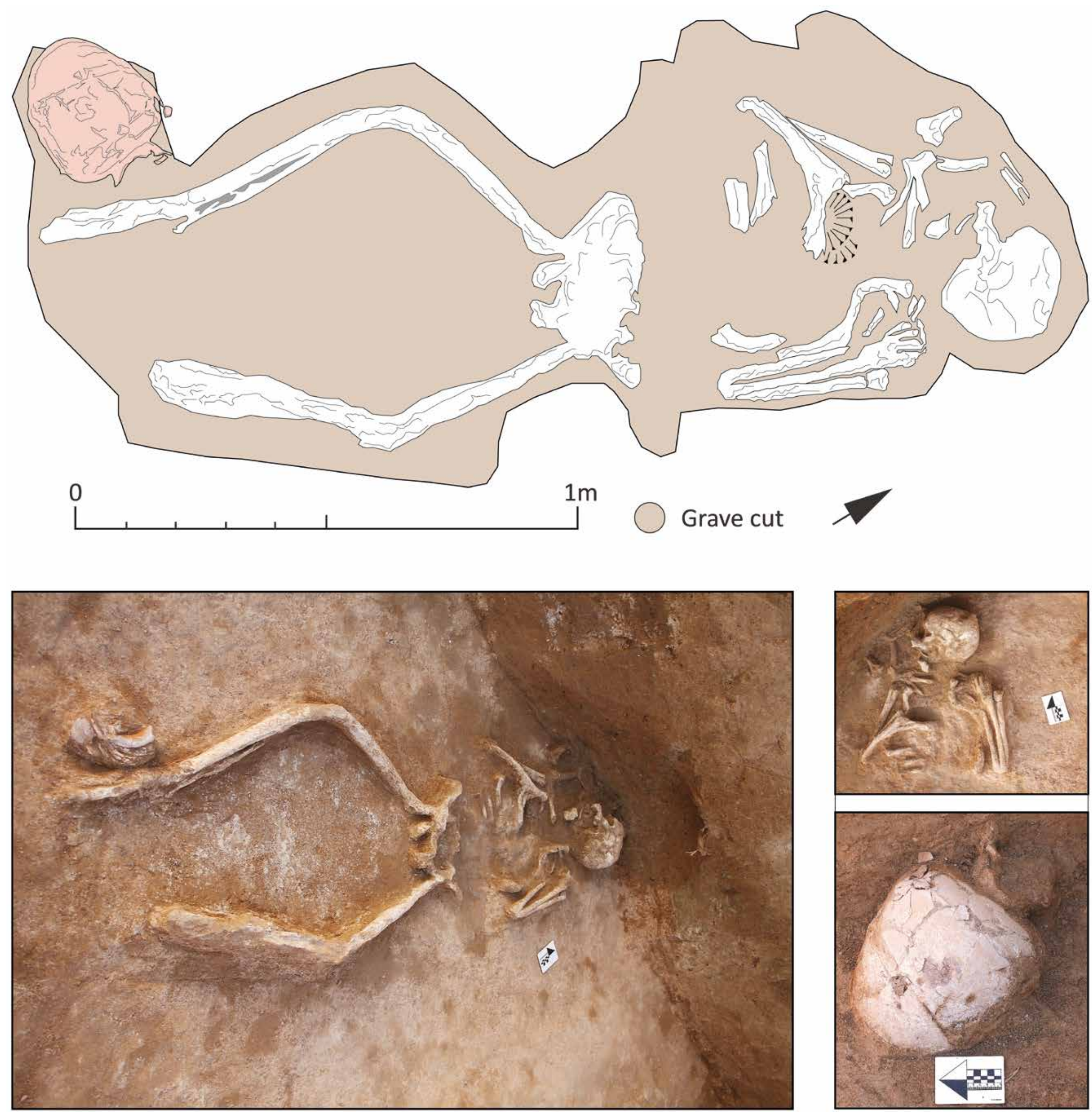


Figure 5.12 Adult inhumation accompanied by a squat-neck jar (Burial SRP189.2).

goods (Table 5.4, Appendix VIII.3), which also closely match the ceramic assemblage of SRP094. There is little doubt, therefore, that SRP189 served as a burial ground for the village on SRP094.

Burial SRP189.1 presents an adult pit burial. The body was placed on its right side in flexed position facing south (Figure 5.11). The individual was found more or less complete, but the skeleton was extremely friable and encased in hardened, cement-like soil that could not be removed once excavated and dried. Age and sex of the individual could not be determined. A carnelian bead was found at the neck of the interred and a green patch along the waist may be the remnants of a garment (see also Appendix IX). Placed at the bottom of the grave and interspersed with the deceased's bones were found an equid proximal phalanx and several other bones, including a possible human arm or clavicle fragment. At the feet of the deceased were placed two larger vessels, a necked, globular jar, and a large ledge-rim crater, which in turn contained a small fine-ware cylindrical beaker with painted dots around the rim. All three vessels find almost exact parallels in the ceramic repertoire of SRP094.

Burial 189.2 is also an adult pit burial that had been placed to the northeast of Burial 189.1 and covered by sun-baked mudbricks (Figure 5.12). The interred individual was most likely male, and, on the basis of dentition, a young to middle-aged adult. The deceased was positioned supine with slightly flexed legs and arms with the elbows bent and hands placed to the top of the chest. The head was turned, facing west. Skeletal remains were extremely friable. Placed near the right foot of the deceased was a necked jar with pronounced everted rim, shoulder and rounded base. The clay matrix of the jar was heavily corroded, making it impossible to lift it without causing its complete disintegration.

The burials from SRP189 find close parallels in the Hamrin basin, where broadly contemporary cemeteries and individual tombs were placed on abandoned mounds, often of Late Neolithic date.[43] Individual Isin-Larsa period graves were excavated at Tell Abada[44] and Tell Razuk,[45] while larger numbers of MB I graves have been revealed at Tell Yelkhi,[46] Tell Hassan,[47] Tell Abu Husaini,[48] Kheit Qasim,[49] and Tell Songor.[50] As at SRP189, many of the Hamrin burials are of adults who are accompanied by one or two medium-sized jars placed at the lower end of the grave pit and occasional scatters of animal bones over the lower legs of the deceased.[51] These have tended to be interpreted as food offerings.[52] The animal bones accompanying Burial SRP189.1, however, include an equid phalanx, which is a non-meaty part of the animal, suggesting that these offerings had a different, ritual or symbolic significance, as does the possible human arm or clavicle bone.

5.4 The lower Sirwan region in the Final Early Bronze Age and the Middle Bronze Age

The results of the SRP's regional survey show that sites SRP094 and SRP189 formed part of one of the peak periods of early-to-mid Holocene settlement in the lower Sirwan region, even if the chronological resolution of surface finds is not quite as fine-grained as for the radiocarbon dated SRP094 assemblage (Figure 5.9). The latter demonstrates that many vessel types continue from the mid-to-late third into the early second millennium BCE, again placing the temporalities of local cultural practice at odds with the event-centred narratives of historical-dynastic phasing. For this reason, we have included material that is most plausibly assigned to the later third millennium BCE in this chapter. There is also significant overlap in most vessel types between the MB I and MB II. Taking these caveats into account, we can assign 12 sites to the Final EB, while a total of 32 produced material falling into the MB. Of these, 13 can be more closely assigned to the MB I and seven to the MB II (Table 5.5, Figure 5.13).

5.4.1 The Final phase of the Early Bronze Age

5.4.1.1 Right bank

Evidence for the final centuries of the third millennium BCE has been surprisingly elusive in the southern plains. On the right bank of the Sirwan, only Shekh Langar (SRP007) produced a small grooved-rim globular jar (Figure 5.14.1), which can be dated to the Akkadian to Ur III periods, with parallels at Tell Yelkhi,[53] Nippur,[54] and al-Hiba-Lagash.[55]

5.4.1.2 Left bank

On the left bank, Tepe Imam Mohammed (SRP017) is among the few settlements that appears to have continued to be occupied in the final centuries of third millennium BCE. Surface finds include a globular jar with everted rim (Figure 5.14.2), which is dated to the ED I at al-Hiba-Lagash,[56] but to the Akkadian and Ur III periods at Tell Yelkhi[57] and at Nippur.[58] Also present are jars with rectangular rims (Figure 5.14.3-6).[59] Tapa Arab (SRP048) produced a grooved-rim jar fragment (Figure 5.14.7),[60] while a triangular rim jar from Gakul Tapa II (SRP087, Figures 5.15 and 5.14.8) finds parallels at Tell Yelkhi[61] and Nippur.[62] An occupation in the final third millennium at Tepe Bawa Mahmood (SRP184) is suggested by a double-ridge jar with wide neck (Figure 5.14.9), which is generally dated to between the ED III and Ur III periods at Mesopotamian sites.[63]

43 Reiche (2019, 586-589).
44 Jasim (1983).
45 Gibson (1981, 80, Pl. 100).
46 Fiorina (2007a).
47 Fiorina (1984).
48 Tusa (1984).
49 Fiorina (2007b).
50 Kamada and Ohtsu (1988); Matsumoto and Yokoyama (1998; 1995).
51 Fiorina (1984, 287-288); Kamada and Ohtsu (1988, 139); Reiche (2019, 586-589).
52 Reiche (2019, 589).
53 Bergamini (2002-3, Pl. 20.13.-34); Gabutti (2002-3, Pl. 81.2-6).
54 McMahon (2006, Pl. 109).
55 Renette (2021, Type HK-2a-b).
56 Ibid., Type HK-1a.
57 Bergamini (2002-3, Pl. 20).
58 McMahon (2006, Pl. 109).
59 Delougaz (1952, Pl. 194); Bergamini (2002-3, Pls. 6, 8); Gabutti (2002-3, Pls. 119-120); McMahon (2006, Pl. 121); Renette (2021, Types HK-4, HI-2c-d).
60 Gabutti (2002-3, Pls. 95-96); McMahon (2006, Pl. 95.3).
61 Bergamini (2002-3, Pl. 20.13-34).
62 McMahon (2006, Pl. 109).
63 Bergamini (2002-3, Pl. 17.1-5); McMahon (2006, Pl. 105).

Site	Final EB	MB I	MB II	MB g.	Site	Final EB	MB I	MB II	MB g.
SRP007	x				SRP150				x
SRP017	x	x	x	x	SRP152				x
SRP018		x	x	x	SRP164				x
SRP025		x			SRP165				x
SRP047				x	SRP170	x	x	x	x
SRP048	x				SRP171	x	x	x	x
SRP054				x	SRP172		x		
SRP061	x			x	SRP175				x
SRP071				x	SRP178		x		
SRP086				x	SRP180	x		x	x
SRP087	x				SRP181				x
SRP092				x	SRP183		x		x
SRP094	x	x		x	SRP184	x			
SRP104				x	SRP189		x		x
SRP106		x		x	SRP196			x	x
SRP113	x		x	x	SRP197		x		
SRP138	x				SRP199				x
SRP142				x	SRP208		x		x
SRP143				x					

Table 5.5 Early Bronze Age (Final phase) and Middle Bronze Age sites in the lower Sirwan region (see also Appendix I).

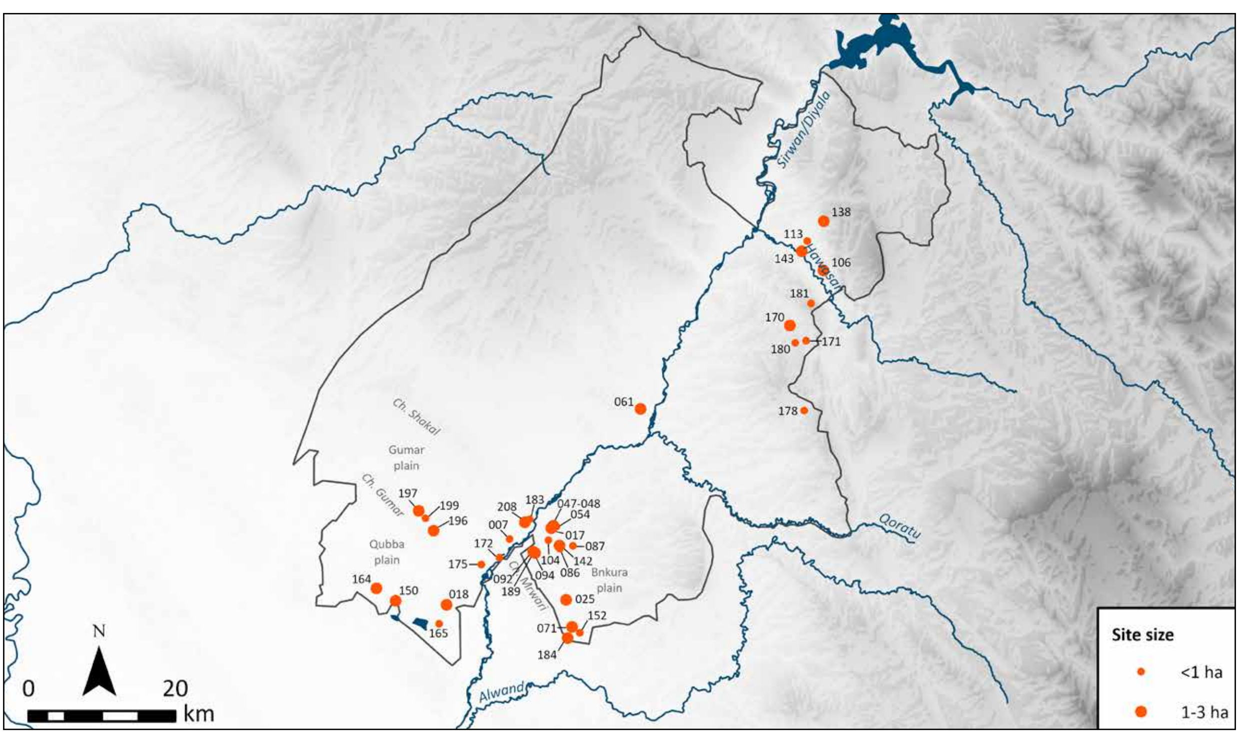


Figure 5.13 Map of Early Bronze Age (Final phase) and Middle Bronze Age sites in the lower Sirwan region (DEM GTOPO30 ©USGS).

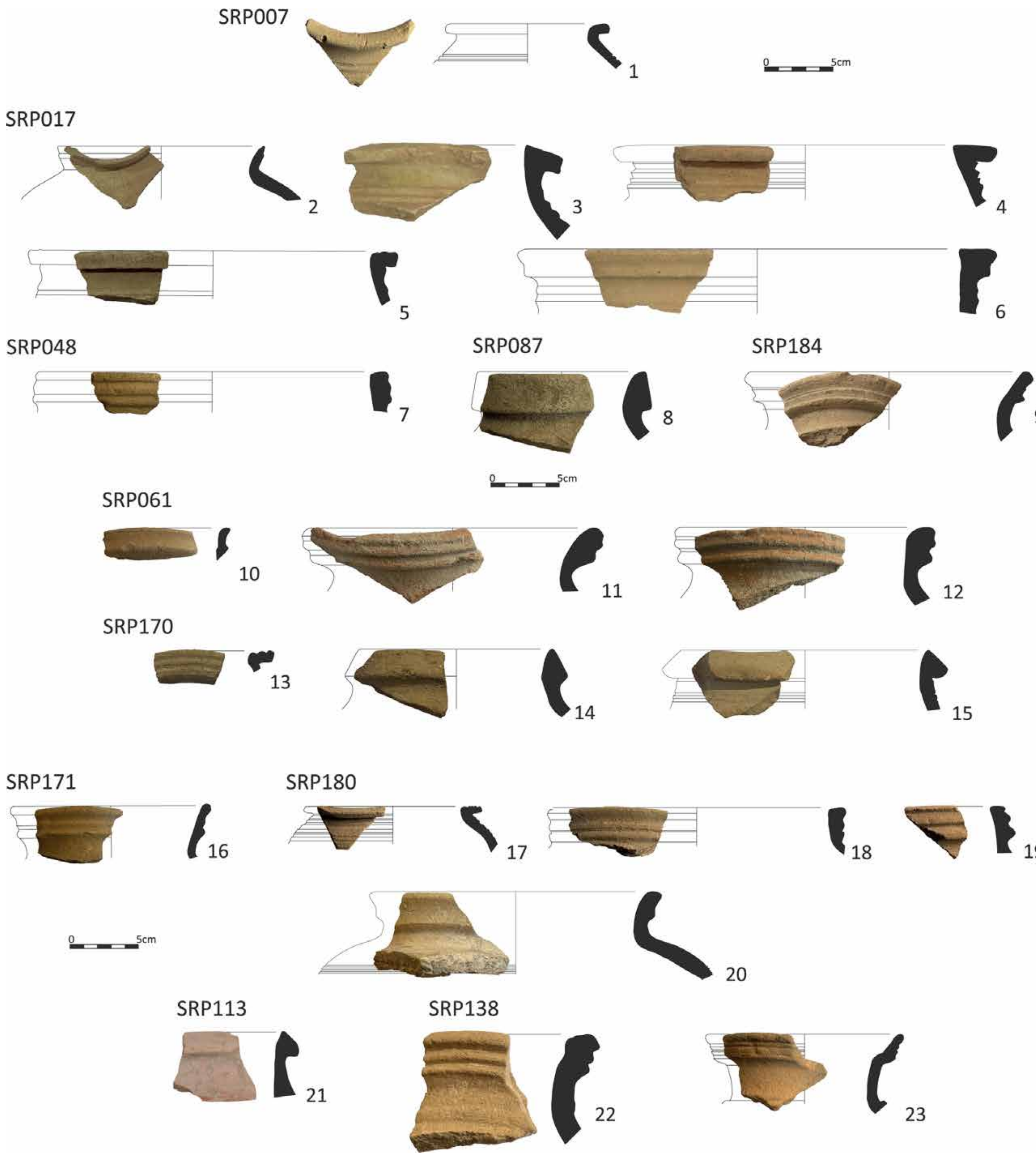


Figure 5.14 Early Bronze Age (Final phase) pottery from the lower Sirwan region.

Figure 5.15 Views of SRP087, SRP018, SRP175, SRP172, SRP183, SRP142, SRP025, and SRP199.

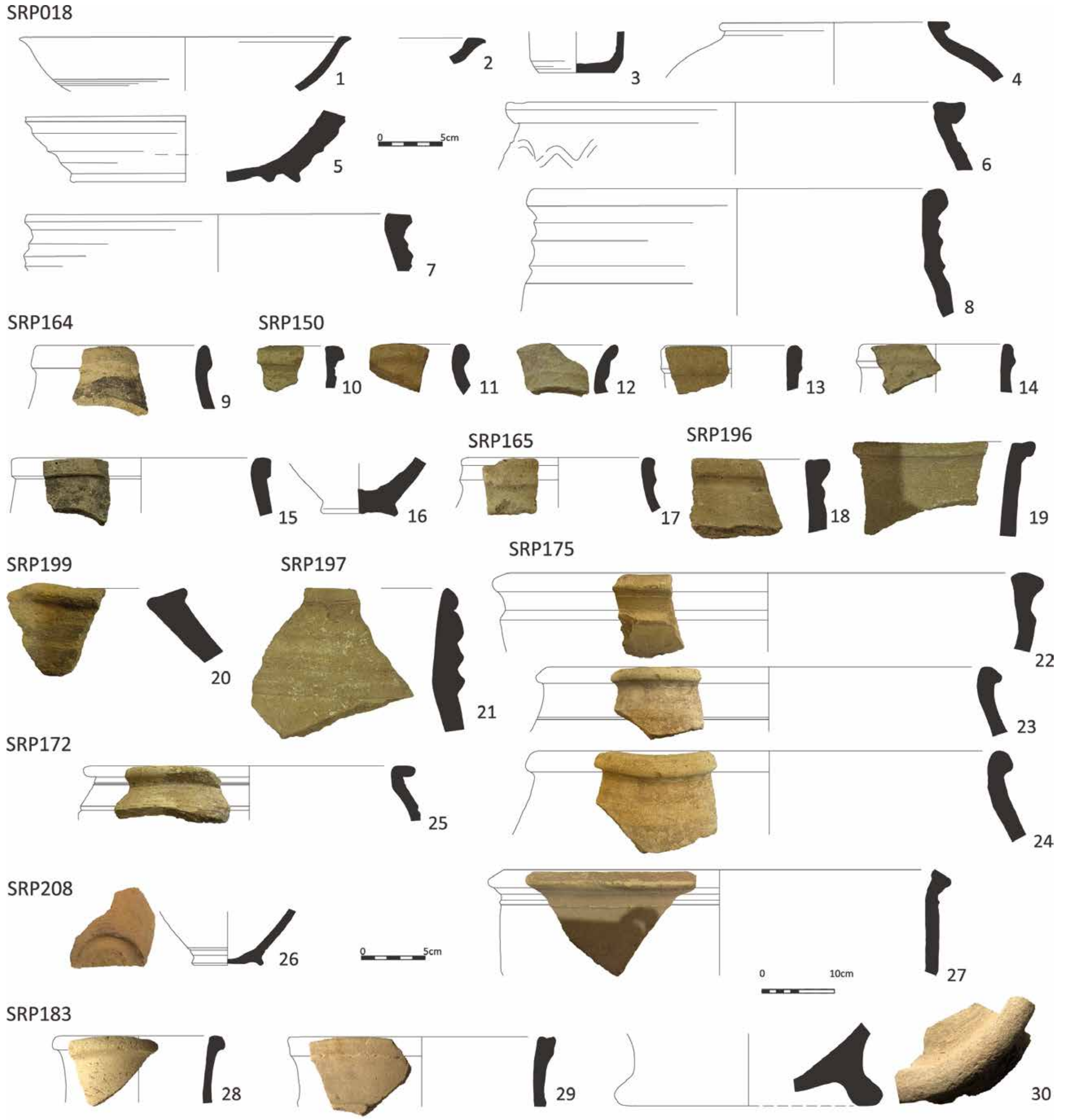


Figure 5.16 Middle Bronze Age I and Middle Bronze Age general pottery from the south-western plains.

5.4.1.3 Uplands

Moving north, Qala Gawri (SRP061) also appears to continue into the final centuries of the third millennium BCE. Surface finds from the site include a carinated bowl (Figure 5.14.10) typical of the Ur III to Isin-Larsa periods at Tell Yelkhi,[64] Nippur, Isin, and Umm al-Hafriyat,[65] and several characteristic Ur III triple-ridge-rim jars (Figure 5.14.11-12).[66]

Across the river in the north-eastern uplands, Girdi Maskut (SRP170) produced several pieces that may also be dated to the Final EB, including a grooved-rim jar fragment (Figure 5.14.13), and two jars with triangular rims (Figure 5.14.14-15), while Chia Raza Tepe (SRP171, Figure 5.14.16) produced a double-ridged jar. Tepe Qaburstan (SRP180) was also occupied during the late third millennium BCE, with surface finds including a globular jar with grooved horizontal rim (Figure 5.14.17), two ribbed band-rim jars (Figure 5.14.18-19), as well as a large jar with everted, drooping rim (Figure 5.14.20).[67] In the Hawasan valley, Tepe Ama Husen (SRP113) produced a jar rim that may also point towards an Akkadian-to-Ur III presence (Figure 5.14.21),[68] while surface collections at the hill-side ruin field of SRP138 include two characteristic triple-ridge-rim jar fragments (Figure 5.14.22-23).

5.4.2 The Middle Bronze Age I

More numerous are sites with surface assemblages dating to the MB I, or to the MB more generally.

5.4.2.1 Right bank

Starting in the south, the most prominent second millennium BCE settlement along the northern fringes of the Qubba plain is Tepe Kalan (SRP018, Figure 5.15). It is one the largest sites in the region, measuring c. 21 ha and featuring a prominent c. 25 m tall and 4.5 ha large high mound, which today houses a Peshmerga military base. The second millennium BCE was one of the main occupation phases on the expansive lower mound, which also features medieval and later standing architecture. For the MB I, surface finds include bowls with everted rims (Figure 5.16.1-2), which find comparisons in MB I assemblages at Tell Yelkhi[69] and Tell al-Rimah,[70] as well as the base of a carinated beaker (Figure 5.16.3) that is well attested at SRP094. A low-necked jar with rounded ledge rim (Figure 5.16.4) can be compared to examples from al-Hiba-Lagash, Phases B-A,[71] and the lower body of a ridged jar (Figure 5.16.5) finds good parallels at SRP094, and Phases D-C at al-Hiba-Lagash.[72] A storage jar with everted rim and wavy band decoration (Figure 5.16.6) can be compared to examples from SRP094 and other MB I sites such as Tell al-Rimah.[73] A more general MB date can be assigned to jars with ridged upper bodies (Figure 5.16.7-8) and with parallels, for instance, at Tell Yelkhi.[74]

In 2019, Daniel Calderbank carried out test excavations at Tepe Kalan to investigate further the nature, date, and extent of its Bronze Age occupation. This produced stratified contexts broadly contemporary with SRP094 and SRP189 as well as with the LB occupation at SRP046 (see also Chapters 6 and 7). Excavations also yielded evidence for an MB II or Old Babylonian occupation that is not attested at the Kani Masi site cluster (see Sections 5.2-3 above). The cultural traditions at Tepe Kalan, especially the MB ceramic assemblages, moreover, show distinctive differences to those from SRP094 and SRP189, and other more northerly sites, pointing towards an intriguing regional patchwork of cultural practices and connections.[75]

Further northwest from Tepe Kalan, the surface assemblage of Tell Nergz (SRP164) includes a band-rim jar that may be assigned a general MB date (Figure 5.16.9).[76] This is also the case for a series of band-rim jars from Qubba Tepe (SRP150, Figure 5.16.10-15), and the ring base of a jug or jar (Figure 5.16.16).[77] A band-rim jar was also recovered at Quba (SRP165, Figure 5.16.17).

To the north, Tepe Gumar II (SRP196) produced a small collection of jars that can be dated to the MB (Figure 5.16.18-19). Surface collections at SRP199 (Figure 5.15) produced the rim of a jar with abraded black painted bands (Figure 5.16.20),[78] while SRP197 yielded a jar with a grooved rim (Figure 5.16.21) similar to examples from Tell Yelkhi.[79] SRP175 (Figure 5.15) also produced evidence for a broadly contemporary occupation in the form of a large basin (Figure 5.16.22), and two band-rim jars with wide diameter (Figure 5.16.23-24) that can be compared to examples from Bakr Awa.[80]

Near the Sirwan, the surface assemblage at Tepe Asyaw (SRP172, Figure 5.15) includes a low-necked jar with rounded ledge rim that points to an MB I presence (Figure 5.16.25).[81] A jar ring base (Figure 5.16.26) with

64 Gabutti (2002-3, Pl. 39.7-14).
65 McMahon (2006, Pl. 90).
66 Bergamini (2002-3, Pl. 17.1-5); McMahon (2006, Pl. 120.5-7).
67 Gabutti (2002-3, Pls. 116.4-5, 117.8); McMahon (2006, Pl. 105.2); Renette (2021, Type HK-5).
68 Bergamini (2002-3, Pl. 20.13-34); McMahon (2006, Pl. 109); Zingarello (2016, Fig. 9; 2017, Fig. 10).
69 Gabutti (2002-3, Pls. 26, 31-32).
70 Postgate *et al.* (1997, Pl. 44.254).
71 Renette (2021, Type HK-4).
72 Ibid., Type Hk-2b.
73 Postgate *et al.* (1997, Pl. 65).
74 Gabutti (2002-3, Pls. 95-98).
75 Calderbank and Glatz (in prep.).
76 Gabutti (2002-3, Pl. 105); Armstrong and Gasche (2014, Type 270C3).
77 Yaseen (1995, Pl. 37).
78 Gabutti (2002-3, Pls. 123-124).
79 Ibid., Pl. 96.
80 Miglus *et al.* (2013, Fig. 24b).
81 Renette (2021, Type HK-4).

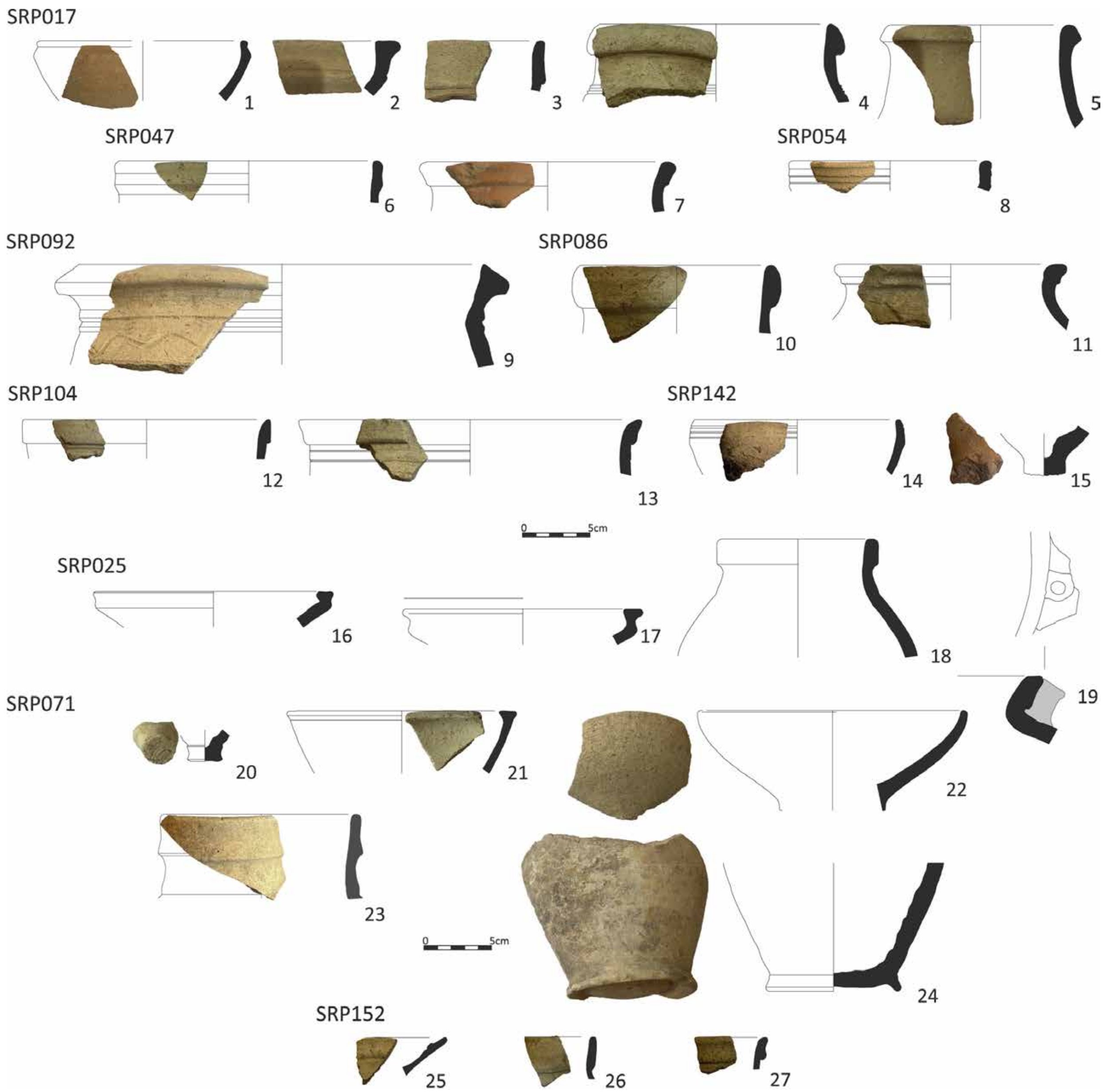


Figure 5.17 Middle Bronze Age I and Middle Bronze Age general pottery from the Bnkura plain.

parallels at Tepe Kalan (SRP018) and Tell Yelkhi,[82] and a large, open-mouth jar (Figure 5.16.27), perhaps a brewing vat or *namzītu*, suggest occupation in the first half of the second millennium BCE at SRP208.[83] The not too distant Tepe Gezhakan (SRP183, Figure 5.15) produced a collection of high-necked jars with small rims (Figure 5.16.28-29) that can be dated to the MB I on the basis of parallels with al-Hiba-Lagash Phase B,[84] and a pithos ring base that can be assigned to the MB more generally (Figure 5.16.30).

5.4.2.2 Left bank

Across the Sirwan, Tepe Imam Mohammed (SRP017) also shows signs of occupation during the MB. A small carinated bowl (Figure 5.17.1) dates to the MB I and finds parallels at Tell Yelkhi[85] and Tell al-Rimah,[86] while

82 Gabutti (2002-3, Pl. 90).
83 Ibid., Pl. 47-51.
84 Renette (2021, Type HK-4b).
85 Gabutti (2002-3, Pl. 37.12).
86 Postgate *et al.* (1997, Pl. 61).

a larger basin can be dated more generally to the MB (Figure 5.17.2).[87] This is also the case for two band-rim jar fragments (Figure 5.17.3-4),[88] while a high-necked jar with triangular rim can be dated to the MB I (Figure 5.17.5).[89]

Small quantities of early second millennium ceramic types were also recovered from Tapa Yahudi (SRP047), including a bowl with waisted rim band (Figure 5.17.6) and a jar with everted, squared rim (Figure 5.17.7).[90] The nearby mound of SRP054 produced a hemispherical grooved bowl fragment (Figure 5.17.8), which finds parallels at SRP094 as well as somewhat later examples at Tell Yelkhi[91] and Tell al-Rimah.[92] SRP092 produced a large jar rim with incised wavy line decoration that can be dated to the MB (Figure 5.17.9).[93]

Further south, SRP086 produced a jar with rounded, thickened rim (Figure 5.17.10) and a jar with waisted rim-band which can be dated to the MB (Figure 5.17.11). This is also the case for two jar rims from Qaburstan Away Gawra (SRP104, Figure 5.17.12-13). The low mound of SRP142 (Figure 5.15) produced a grooved hemispherical bowl made from a mineral-tempered fabric (Figure 5.17.14) that finds parallels at MB I SRP094 as well as somewhat later at Tell Yelkhi, and the base of a stump-footed cup (Figure 5.17.15) also attested at Tepe Kalan (SRP018) and Tell Yelkhi.[94]

In the southern part of the plain, Tepe Sawz (SRP025, Figure 5.15), a steep-sided mound with lower town, appears to have been one of the main MB settlements. Surface collections include two carinated bowls (Figure 5.17.16-17) that find comparisons at Tell Yelkhi[95] and more general similarities at Tell al-Rimah,[96] a band-rim jar (Figure 5.17.18), and a jar with applied column (Figure 5.17.19), which is also attested at Tepe Kalan (SRP018), at Tell Yelkhi, at sites in the lower Diyala, and at al-Hiba-Lagash.[97]

Further south, the prominent high mound of Mala Kunar II (SRP071) was also occupied in the MB. The surface assemblage includes the string-cut base of a stump-footed cup (Figure 5.17.20), a bowl with hammer-head rim (Figure 5.17.21), and a bowl with simple rounded rim (Figure 5.17.22),[98] as well as a band-rim jar (Figure 5.17.23), and a jar with ring base (Figure 5.17.24) that compares to examples from MB I Tepe Kalan (SRP018) and Tell Yelkhi.[99] A small platter with inwardly bevelled rim (Figure 5.17.25) that can be assigned a general MB date comes from Bawa Plawi (SRP152). Parallels for this vessel type[100] can be found at Tepe Kalan (SRP018), Tell Yelkhi,[101] al-Hiba-Lagash,[102] Tell al-Rimah,[103] and Kurd Qaburstan.[104] Two band-rim jars (Figure 5.17.25-27) are also attested.

5.4.2.3 Uplands

Moving north, Qala Gawri (SRP061) produced the base of an MB I carinated beaker (Figure 5.18.1). Further east, along the Iraq-Iran border, Tepe Dar (SRP178) produced a bowl fragment (Figure 5.18.2) that shares strong similarities with a local MB I tradition, the so-called Shamlu ware, attested mainly in the Shahrizor plain.[105]

The surface assemblage from the high mound of Girdi Maskut (SRP170), includes two MB I carinated bowls (Figure 5.18.3-4), which find parallels at Tell Yelkhi,[106] Tell al-Rimah,[107] and more ambiguous comparisons at al-Hiba-Lagash.[108] Two band-rim jars (Figure 5.18.5-6) and a jar with unpierced column appears to be made of a local ware (Figure 5.18.7).

The surface assemblage of Chia Raza Tepe (SRP171) includes two grooved-rim bowls (Figure 5.18.8-9), a ledge-rim bowl (Figure 5.18.10),[109] two band-rim jars (Figure 5.18.11-12), a narrow-necked jar (Figure 5.18.13) with parallels at MB I SRP094 and Tell Yelkhi,[110] and a tray (Figure 5.18.14) similar to that found at SRP094. Also found on the surface was a fragmentary terracotta plaque with a nude goddess motif (Figure 5.18.15), which most likely dates to the MB I and with parallels, for instance, at Tell Asmar.[111]

The nearby Tepe Qaburstan (SRP180) also appears to have housed a fairly substantial MB I settlement. Surface material includes several holemouth bowls (Figure 5.18.16-17) with parallels at Tell Yelkhi,[112] Tell al-Rimah[113] and Bakr Awa,[114] a carinated bowl (Figure

87 Gabutti (2002-3, Pls. 31-33).
88 Ibid., Pl. 102-106; Armstrong and Gasche (2014, Family 270).
89 Renette (2021, Type HK-4b).
90 Gabutti (2002-3, Pls. 102-106); Armstrong and Gasche (2014, Family 270).
91 Gabutti (2002-3, Pl. 30.3-4).
92 Postgate *et al.* (1997, Pl. 41.228).
93 Gabutti (2002-3, Pls. 46-47).
94 Ibid., Pls. 67-68.
95 Ibid., Pl. 38.1-5.
96 Postgate *et al.* (1997, Pls. 44-45).
97 Gabutti (2002-3, Pls. 81.15-16, 82); Armstrong and Gasche (2014, Type 355C); Renette (2021, Type HK-8).
98 Gabutti (2002-3, Pls. 31-33).
99 Ibid., Pls. 90-91.
100 Armstrong and Gasche (2014, Type 10C1).
101 Gabutti (2002-3, Pls. 25-26).
102 Renette (2021, Type HB-6).
103 Postgate *et al.* (1997, Pls. 50-51).
104 Schwartz *et al.* (2022, Fig. 22.1-3).
105 Altaweel *et al.* (2012, 25).
106 Gabutti (2002-3, Pl. 37.12).
107 Postgate *et al.* (1997, Pl. 61).
108 Renette (2021, Type HF-17).
109 Gabutti (2002-3, Pls. 38.9-14, 39.15); Armstrong and Gasche (2014, Type 20L).
110 Gabutti (2002-3, Pls. 85.5, 89.3).
111 Roßberger (2018, 524).
112 Gabutti (2002-3, Pls. 30.5-6, 37.12).
113 Postgate *et al.* (1997, Pl. 61).
114 Miglus *et al.* (2013, Fig. 24d).

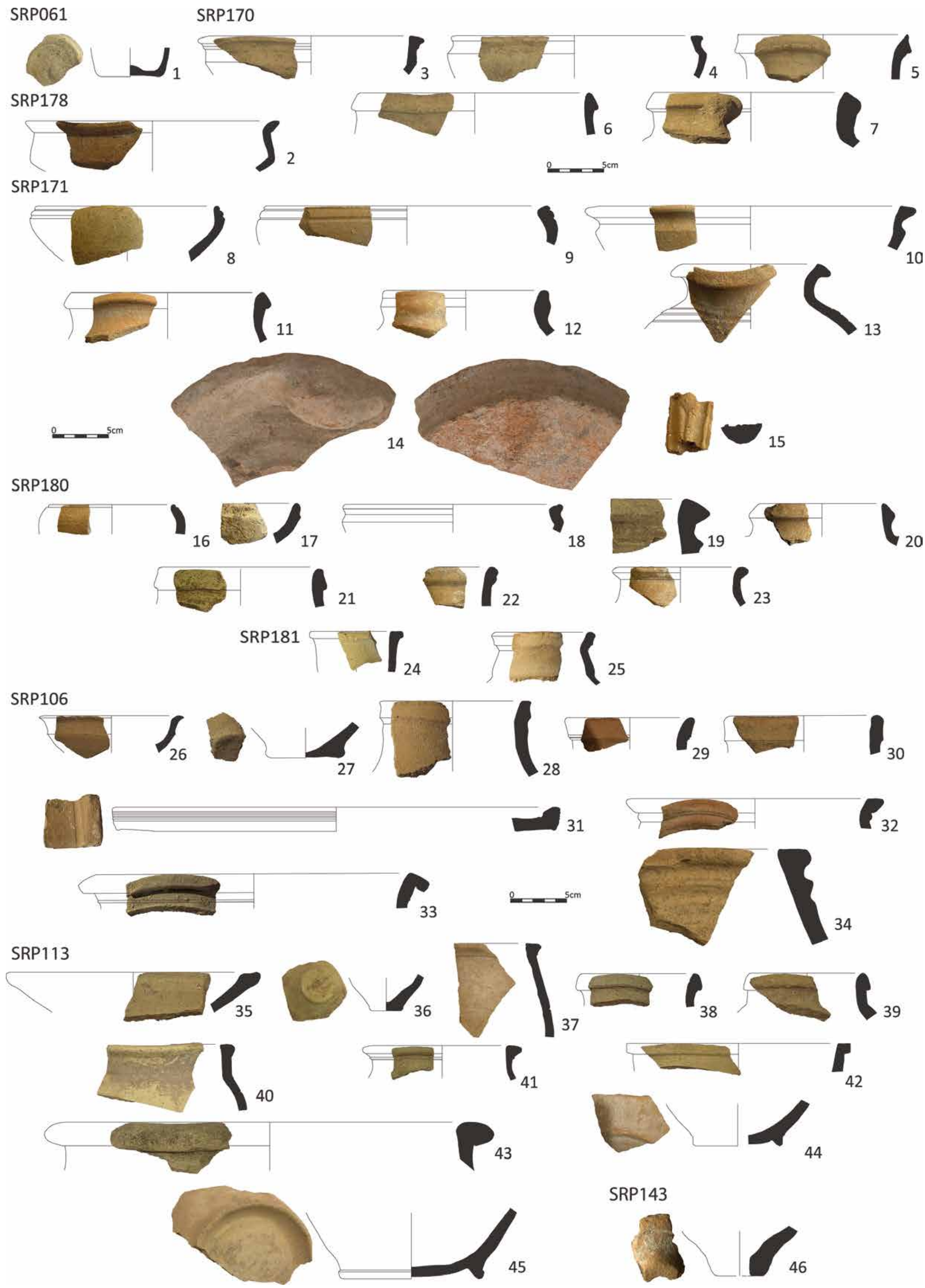


Figure 5.18 Middle Bronze Age I and Middle Bronze Age general pottery from northern and uplands sites.

Figure 5.19 The Darband-i Belula landscape monument.

5.18.18), and several band-rim jars (Figure 5.18.19-23), including one hand-made and a likely local example (Figure 5.18.23). The cave site of Ashkawti Manga Wakal (SRP181) was also in use during the MB I, as attested by two jars, one with rectangular (Figure 5.18.24), and one with grooved band rim (Figure 5.18.25). The latter finds parallels, for instance, at al-Hiba-Lagash Phase C-A.[115]

Moving north to the Hawasan valley, Tepe Shaho (SRP106) produced a comparatively extensive MB assemblage, which includes shapes that are typical of Mesopotamian types, alongside what appear to be often hand-made versions of Mesopotamian forms produced from local clay. Surface collections include a carinated bowl (Figure 5.18.26) with parallels at Tepe Kalan (SRP018), Tell Yelkhi,[116] and Tell al-Rimah,[117]

115 Renette (2021, Types 10b-c).

116 Gabutti (2002-3, Pls. 26, 31-32).

117 Postgate *et al.* (1997, Pl. 44.254).

two band-rim jars made from local fabrics with one hand-formed (Figure 5.18.28-29), and a third example made from a more southern, Babylonian fabric style (Figure 5.18.30). A large tray (Figure 5.18.31), also sometimes described as a lid,[118] presents a localised version, made from a local fabric, of MB trays found across the Babylonian world.[119] In addition to several general MB shapes (Figure 5.18.32-33), a closed-shaped pithos (Figure 5.18.34) can be compared to examples from MB I Tell Yelkhi.[120]

Tepe Shaho is located in the centre of the northern Hawasan river valley, midway between the river and the Darband-i Belula ravine that cuts through the Shakhi Bamu range. Here, the Darband-i Belula relief (also known as Shaikhan) was carved high up on a vertical cliff near the entrance of the ravine (Figure 5.19).[121] Depicted in low relief and in about half life-size is a male figure in triumphal pose, treading on one pleading adversary and facing another kneeling figure. To the right of the figures is a cuneiform inscription, whose palaeographic characteristics suggest a date in the first half of the second millennium BCE. In recent decades, several more carved monuments have been recorded in the surroundings of the Shakhi Bamu range with proposed dates in the late third and early second millennium BCE.[122] Together these monuments mark the Hawasan valley and the Shakhi Bamu as one of the main focal points of highland monument construction and political contest at the turn of the millennium. We discuss these monuments and their wider socio-political context in more detail in Chapter 13.5.

A second site in the Hawasan region with an extensive MB assemblage is Tepe Ama Husen (SRP113), which unlike Tepe Shaho (SRP106) includes mainly Mesopotamian types. Surface collections consist of an inwardly beveled bowl (Figure 5.18.35) that finds comparisons at Tepe Kalan (SRP018) and across sites in Mesopotamia,[123] and a stump-footed cup (Figure 5.18.36). A closed shaped pithos (Figure 5.18.37) can be assigned an MB I date, as can two band-rim jars (Figure 5.18.38-39). More generally dated to the MB is a globular jar (Figure 5.18.40),[124] as are likely several more generic shapes (Figure 5.18.41-43), and two jar ring bases (Figure 5.18.44-45).[125] Further southwest, Tepe Qalandari (SRP143), whose occupation dates primarily to the first millennium BCE and later (see Chapter 11.4.3), also yielded the base of a brewing vat (Figure 5.18.46) that shows signs of southern forming techniques but was produced in a local fabric.[126]

5.4.3 The Middle Bronze Age II

We have assigned an MB II date to material that can be compared to Old Babylonian assemblages in central and southern Mesopotamia.

5.4.3.1 Right bank

Starting again in the south, Tepe Kalan (SRP018) produced the likely base of a tall cylindrical vessel (Figure 5.20.1) that can be assigned a date in the MB II.[127] In the Gumar plain, Tepe Gumar II (SRP196) produced a straight-sided bowl (Figure 5.20.2), and two bowls with inverted rims (Figure 5.20.3-4).[128]

5.4.3.2 Left bank

Across the Sirwan, Tepe Imam Mohammed (SRP017) produced two pieces, a jar with squared rim (Figure 5.20.5) and a body sherd with painted black parallel lines (Figure 5.20.6) that date to the MB II.[129]

5.4.3.3 Uplands

The upland site of Girdi Maskut (SRP170) shows signs of continued occupation into the MB II with a distinctive ring-base cup or goblet that is Mesopotamian in style and fabric (Figure 5.20.7).[130] The surface collection from the nearby site of Chia Raza Tepe (SRP171) also includes several bowls with inverted rims (Figure 5.20.8-9), a jar with short neck and thick rim band (Figure 5.20.10),[131] and a typical MB II ring base (Figure 5.20.11). A local MB II tradition is also attested at Tepe Qaburstan (SRP180) in the form of a straight-sided bowl (Figure 5.20.12), a typical ring base made from a powdery fabric (Figure 5.20.13), and a small, hand-made tray (Figure 5.20.14) with parallels

118 Renette (2021, 41-42).

119 Postgate *et al.* (1997, Pl. 46.283-284); Miglus *et al.* (2013, Fig. 24a); Armstrong and Gasche (2014, Types 5A-B); Renette (2021, Type HE-3).

120 Gabutti (2002-3, Pl. 57).

121 Börker-Klähn (1982, No. 33); Postgate and Roaf (1997).

122 Biglari *et al.* (2018); Alibaigi *et al.* (2020); Alibaigi and MacGinnis (2023).

123 Postgate *et al.* (1997, Pls. 50-51); Gabutti (2002-3, Pls. 25-26); Armstrong and Gasche (2014, Type 10C1); Renette (2021, Type HB-6); Schwartz *et al.* (2022, Fig. 22.1-3).

124 Gabutti (2002-3, Pls. 83-94); Armstrong and Gasche (2014, Pls. 79-84, Types 155A-165B); Renette (2021, Type HL-7b).

125 Yaseen (1995, Pl. 37); Armstrong and Gasche (2014, Pls. 79-84); Renette (2021, Type Hbase-6d).

126 Gabutti (2002-3, Pls. 45.2-3, 46.1, 49.2-3, 50.11, 54.2); Armstrong and Gasche (2014, Type 265A).

127 Armstrong and Gasche (2014, Family 80 or 100).

128 Gabutti (2002-3, Pl. 29.11-21); Armstrong and Gasche (2014, Types 10A, G); Renette (2021, Types HG-1, 2).

129 Armstrong and Gasche (2014, 9).

130 Yaseen (1995, Pl. 57); Gabutti (2002-3, Pl. 76.2); Armstrong and Gasche (2014, Types 65C, 170C-D).

131 Gabutti (2002-3, Pl. 101.1-6).

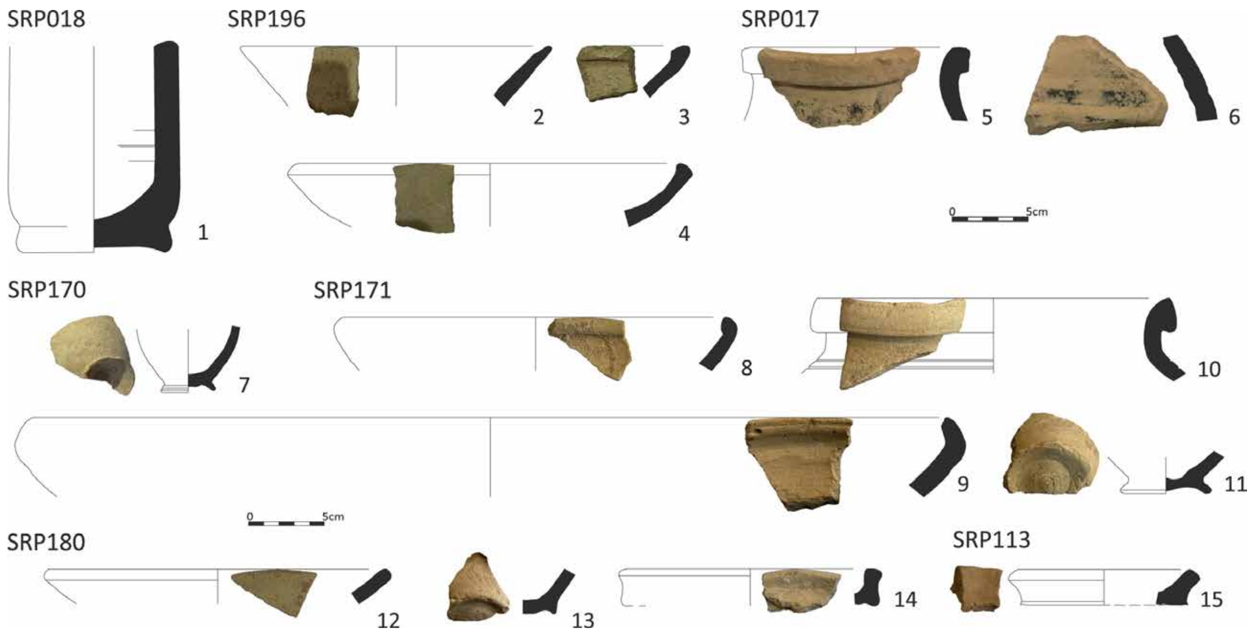


Figure 5.20 Middle Bronze Age II pottery from the lower Sirwan region.

at sites across Mesopotamia.[132] In the Hawasan valley, only Tepe Ama Husen (SRP113) produced a small hand-made tray in a local fabric that may be assigned to the MB II (Figure 5.20.15).

5.5 Conclusions

Excavations at SRP094 produced evidence for a relatively small community that settled at Kani Masi during the final third and early second millennium BCE. The inhabitants of this village engaged in a mixed agropastoral economy, had seemingly limited access to, or interest in the participation in, inter-regional exchange networks, but formed otherwise part of a range of Mesopotamian communities of practice from construction techniques to pottery production, and in the treatment of the dead. Drinking paraphernalia in the form of cylindrical beakers also transcended highland-lowland topographic boundaries, pointing to more widely shared commensal and ritual practices. Metal objects are rare at SRP094, but it is worth noting in this context that strong similarities exist in the MB metalwork of the Hamrin and Lurestan regions[133] and the bronze axes depicted on piedmont landscape monuments.[134]

The analysis of regional surface assemblages points to a dramatic increase in settlement numbers as well as settled area in the MB (Figure 5.21). Just over half of sites occupied in the Final EB are settled at some point in the MB, including Tepe Imam Mohammed (SRP017). Several long-lived upland sites also continue to be occupied. Another observable trend is the resettlement of Middle EB sites, which appear to have been abandoned in the Final EB, during the subsequent MB.

The MB settlement expansion was driven mainly by small and very small sites, suggesting that the plains on either side of the Sirwan were dotted with hamlets and villages such as that at SRP094. The majority of MB sites are below one hectare in size and their primarily agricultural character is reinforced by their locations on the most fertile soils available (Figure 5.22). SRP094 was somewhat larger with around two hectares. This is also the case for two other sites, Tepe Imam Mohammed (SRP017) and SRP208, but their very small MB surface collections and later occupation would suggest a smaller size in the MB than the total recorded site areas.

In the southern part of the research region, this increase in sites may have been supported, or even driven by, a phase of heightened precipitation at the beginning of the second millennium BCE. The recent publication of a 4000-year-long speleothem record which starts at c. 2038 BCE from the cave site of Kuna Ba, provides us with a localised understanding of late third and early second millennium BCE climatic conditions in the Sirwan region (see also Chapter 1.2).[135] The Kuna Ba $\delta^{18}O$ and $\delta^{13}C$ values may indicate a period of higher precipitation between c. 2000 to 1930 BCE with comparatively drier

132 Postgate *et al.* (1997, Pl. 46.283-284); Armstrong and Gasche (2014, Types 5A-B); Renette (2021, Type HE-3).

133 Philip (1995).

134 Peyronel (2013).

135 Sinha *et al.* (2019).

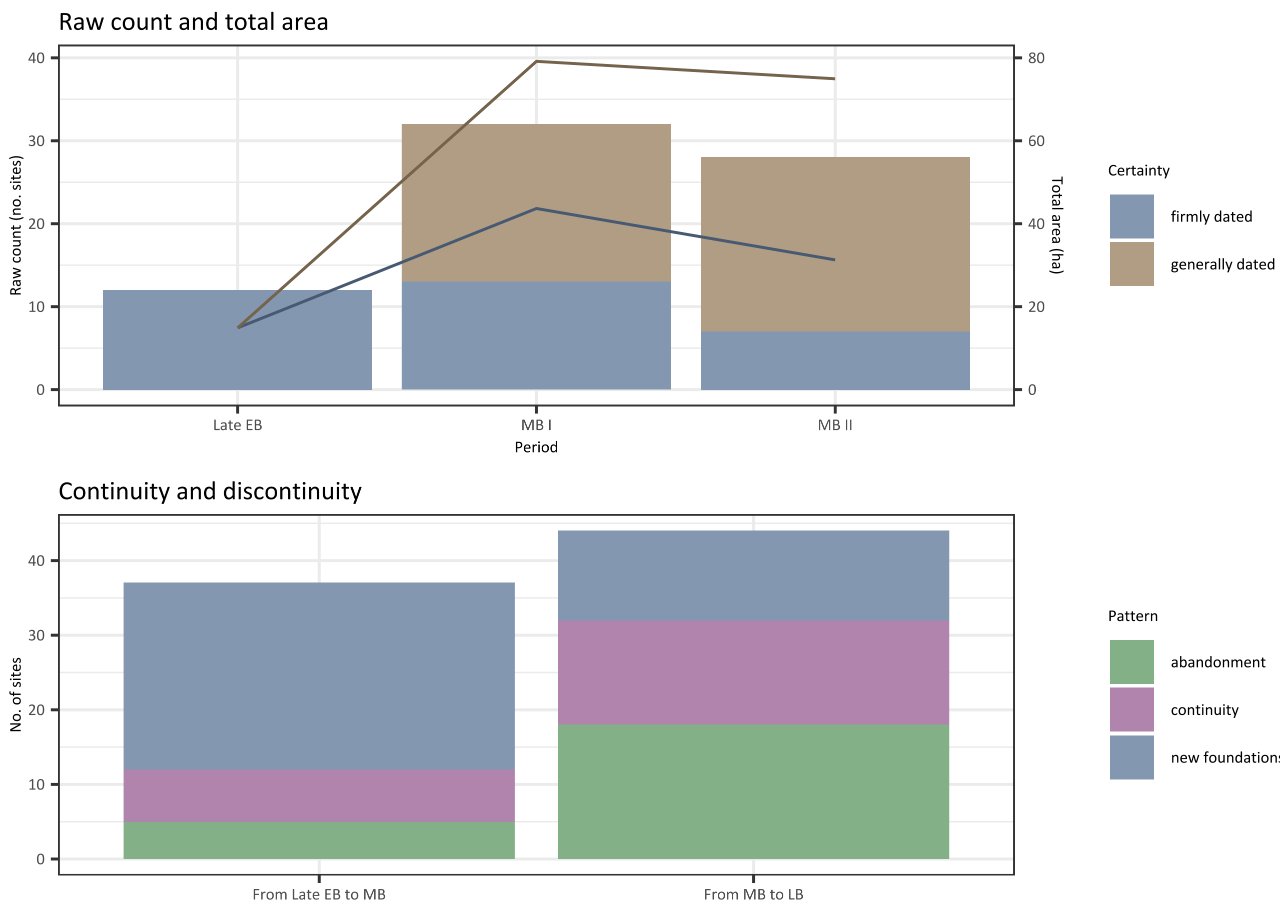


Figure 5.21 Late third and early second millennium BCE site counts, total settled areas, and patterns of continuity and discontinuity.

conditions, interspersed with wetter years, prevailing from c. 1860 BCE. A return to persistently higher precipitation is indicated by the speleothem data between c. 1360 to 1140 BCE, before returning to somewhat more arid conditions. A precipitation model based on the Soreq cave speleothem data,[136] though showing less dramatic changes than would be expected from the Kuna Ba data, also shows a southward extension of the 300 mm isohyets during the MB I, followed by its contraction northwards between c. 1770-1710 BCE (Figure 5.23).

Plotting site distributions with regards to the location and type of available sources of water, further supports the heightened precipitation hypothesis for the MB I. A significant portion of both Final EB and MB sites rely on seasonal streams as their closest source of water, while new MB sites are, for the first time, established quite far (> 500 m) from the nearest known natural source of water (Figure 5.22). The more favourable conditions of the very early second millennium BCE would not only have lowered the risk of rain-fed agriculture in the southern plains overall, but also resulted in higher reliability of the most unpredictable seasonal streams that are fed by the Zagros snowmelt.

In addition to the many small MB sites, a handful of larger sites also produced surface collections that can be dated to the early second millennium BCE. They are all located to the south of the Gumar hill range and include Qubba Tepe (SRP150), Tell Nergz (SRP164), and Tepe Kalan (SRP018). Of these, however, only the latter site produced significant quantities of MB pottery over a large part of its sprawling lower mound as well as in test excavations. It is therefore highly likely that the economic and administrative centre of the Qubba plain in the MB was located at Tepe Kalan. Differences in the ceramic assemblages of Tepe Kalan, which shows more pronounced influences from northern Mesopotamia, and SRP094, whose broad contemporaneity has been established by a series of radiocarbon dates,[137] could potentially point

136 Hewett *et al.* (2022).

137 Calderbank and Glatz (in prep.).

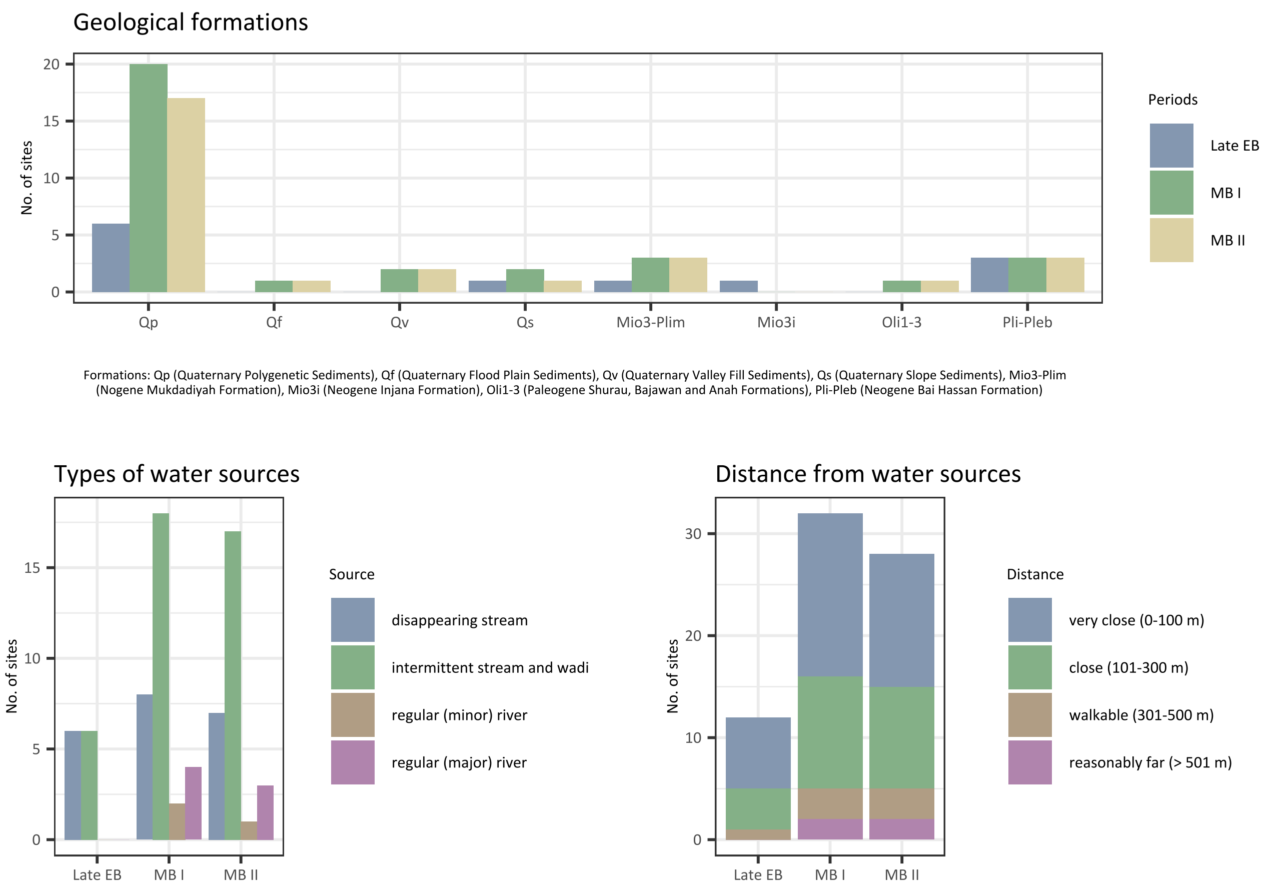


Figure 5.22 Soil quality and accessibility of water for late third and early second millennium BCE sites (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

to different cultural practices, and perhaps also social organisation on either side of the Gumar-Mrwari line. In this scenario the plains to the south may have formed part of, or were of a similar socio-political organisation to, contemporary communities in the Hamrin basin, where textual sources indicate the presence of governors and ruling figures.[138] By contrast, the settlement pattern to the north of these low hill ranges lacks any clear site-size distinctions, suggesting a different, and seemingly less hierarchical organisation.

An increase in the number of settlements is also notable in the northern and upland areas during the MB, which is, however, less easily explained in environmental terms given the generally higher levels of precipitation in the upland zone. Agricultural production was also unlikely the main catalyst, as the soils in the upland valleys are generally less well suited for farming than those in the south. Instead, the most plausible explanation rests with their significance in channelling movement to and from the Zagros uplands on the one hand, and local socio-political developments, especially the formation and subsequent competition between highland polities, in part via the construction of landscape monuments, on the other.

Site sizes in the upland valleys, as in the more southerly plains, are also small to very small, with even the tallest mounds reaching only around 1 ha in size and with no indications of a hierarchical spatial structure. This suggests lower Sirwan communities' socio-political organisation may have been rather different from those of southern Mesopotamia, leading us to question the trust conventionally placed in lowland royal and administrative titles[139] to accurately capture the nature of upland societies and their political landscapes.

From a cultural point of view, MB sites in the northern and upland parts of the survey area also produced surface materials with close parallels in Mesopotamian ceramic repertoires. A partial terracotta plaque with a

138 For a recent summary of available evidence, see Calderbank and Oselini (forthcoming).

139 For a summary of these, see e.g. Altaweel *et al.* (2012, 9-11).

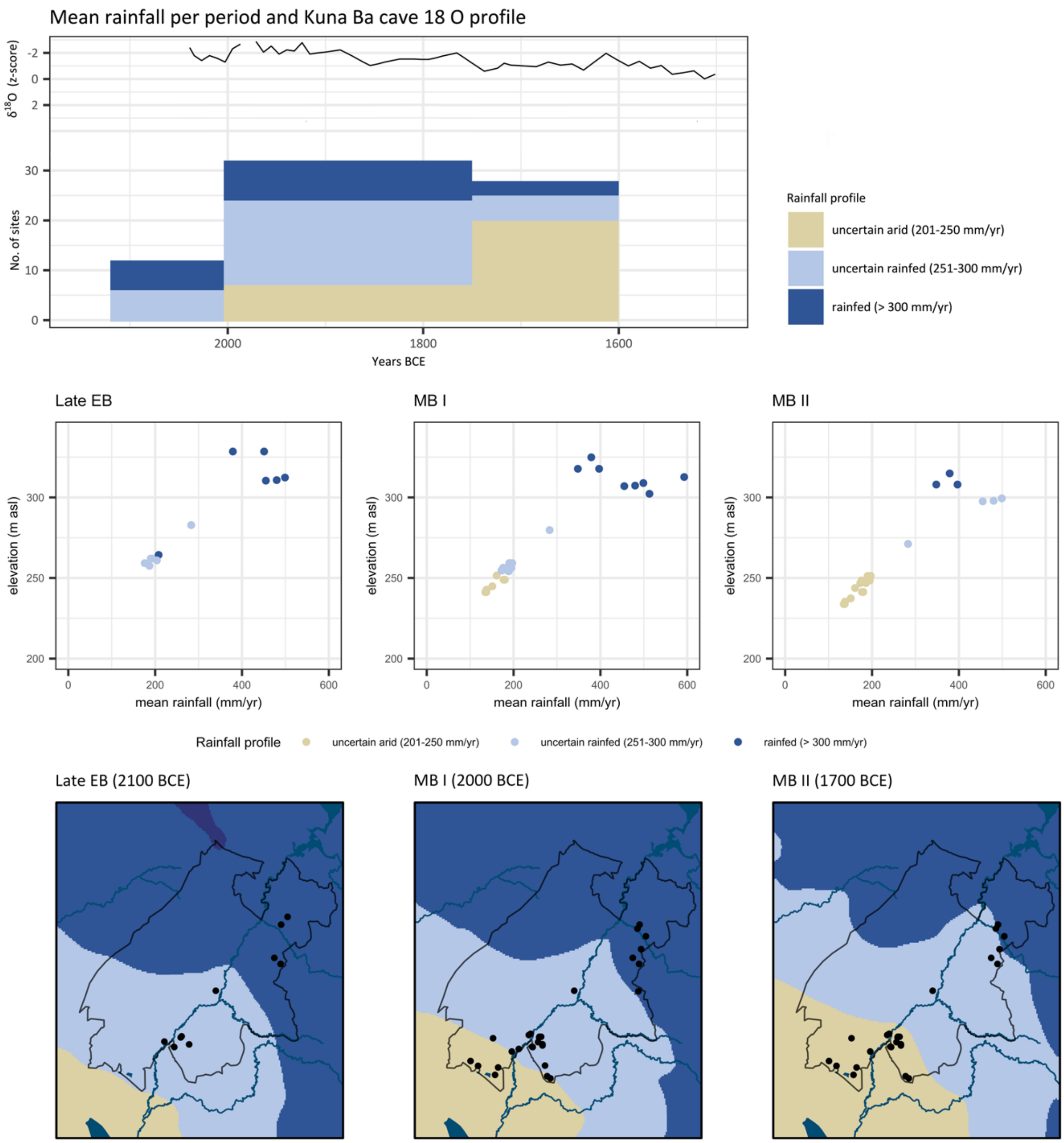


Figure 5.23 Mean rainfall for the late third and early second millennium BCE (cubic interpolation after Hewett *et al.* 2022).

nude goddess motif from Chia Raza Tepe (SRP171) may well indicate that at least some of the site's inhabitants participated in Mesopotamian religion and ritual practices. Late-third-to-early-second millennium BCE pottery assemblages, however, also include examples of a hybrid craft tradition that combines lowland shapes with local, heavily tempered fabrics that are occasionally hand-made, slipped red or orange, and fired in reduced conditions. As with preceding periods, it is highly likely that some of the surface finds that could not be classified confidently but that share technological characteristics with recognisable, Mesopotamian-style vessel forms, belong to a localised Bronze Age ceramic tradition. Also present, though only in very small quantities, are examples of so-called Shamlu ware, a hand-made, slipped, burnished, and frequently incised ceramic tradition well-attested at sites in the Shahrizor plain.[140]

These regional settlement developments are to some extent matched by those reported from the Hamrin and lower Diyala basins. In the Hamrin, the MB I also presents a period of significant settlement increase, with at least 12 sites dated to the Isin-Larsa period. Several of these sites, however, can be classified as local centres with administrative and cult buildings, and cuneiform records.[141] In the lower Diyala, Adams noted the accelerated growth of Tell Asmar, ancient Ešnunna, from ten to 24 ha during the MB I, a trend towards a more dispersed and rural mode of settlement, and the decline or stagnation in growth of earlier population centres.[142] This, he proposed, was the result of political centralisation under Ešnunna following the disintegration of the Ur III state in 2004 BCE. Textual sources and to some extent also the material culture of Tell Asmar suggest that Ešnunna acted as an important commercial gateway for trade with the highlands.[143] From the middle of the nineteenth century BCE, Ešnunna also displayed increasingly expansionary aspirations including northwards along the Diyala/Sirwan, possibly controlling Tell Yelkhi in the Hamrin.[144]

The end of the MB I in the lower Diyala is marked by the widespread destruction of both larger centres and smaller sites, including Tell Abu Harmal, Tell al-Dhiba'i, and the Kititum complex at Tell Ishchali, followed by a drop in recognisable MB II sites.[145] In the Hamrin, Tell el-Suleimah, the most important source of cuneiform tablets in the region, is also destroyed at the end of the MB I, and a decline in the number of MB II sites is similarly noted.[146]

Diagnostic MB II pottery is limited in the SRP surface record. Ceramic continuities may skew this picture to some extent, as might the more friable nature of Old Babylonian pottery types. It is, therefore, possible that our comparatively scarce MB II surface record presents an artefact of collection bias and taphonomic processes. Noteworthy here is that sites which do have MB II surface materials also produced pottery that can be assigned more generally to the MB or the MB I. This would suggest that no drastic shifts occurred in overall settlement logic, and that perhaps more sites may have continued to be occupied than is apparent from the surface data. In the Shahrizor plain, for instance, settlement numbers are reported as relatively stable from the early to the later MB.[147] At Bakr Awa, MB I houses are used as a burial ground in the MB II,[148] while Gird-i Shamlu appears to have been occupied in both the MB I and MB II, albeit with a significant break in Old Babylonian cultural traditions when Shamlu ware temporarily dominates the assemblage.[149]

The results of excavations at SRP094 indicate that at least some settlement abandonment did occur in the Sirwan region at the end of the MB I. A series of radiocarbon dates place the abandonment of the structures on SRP094 around c. 1780-1770 cal. BCE at the latest (Table 5.3). This broadly coincides with a period of more arid and variable climatic conditions in the speleothem records, one that Ešnunna-centred lowland texts paint as a politically unsettled phase of increased Babylonian and Elamite interest in the lower Diyala region. It is impossible to gage through either textual or SRP data, however, whether or how historical events and power struggles in Babylonia and the lower Diyala affected communities along the river's more northerly reaches. MB II pottery types are absent not only from the stratified assemblage at SRP094, but also from the surface collections of other component mounds of the Kani Masi site cluster. We conclude, therefore, that the site lay abandoned from the second quarter of the eighteenth to the late sixteenth century BCE, when large-scale settlement commences at SRP046, which we now turn to in the following chapters.

140 Altaweel *et al.* (2012, 25, Fig. 14).
141 Gibson (1981, 21); Killick (1988).
142 Adams (1965, 47-48).
143 Peyronel (2013).
144 Calderbank and Oselini (forthcoming).
145 Adams (1965, 49-50).
146 Bürger (2011, 1-2); Gibson (1981, 22).
147 Altaweel *et al.* (2012, 25, Fig. 6).
148 Miglus *et al.* (2013); Miglus (2016, 233-235).
149 Al-Janabi (1961); Mühl (2012).

6

The Later Second Millennium BCE in the Lower Sirwan Region: Excavations at Kani Masi (SRP046)

6.1 Introduction

The Late Bronze Age (LB, Table 6.1) in central and southern Iraq is characterised by a comparatively sparse archaeological record, whose interpretation has tended to be dominated by a text-derived focus on the origins, migration, rise to power, and subsequent political expansion of groups and individuals assigned the label 'Kassite'.[1] The identification of a c. 10 ha low mound (SRP046) with almost exclusive LB surface finds among the Kani Masi site cluster by the SRP in 2013, provided the opportunity to expose a LB settlement over larger areas, and to develop – for the first time through an integrated multi-disciplinary methodology – a bottom-up, archaeology-driven, and practice-based understanding of a local LB community that participated in Babylonian cultural traditions at the edges of Kassite political influence.

Below we present the results of excavations carried out on SRP046 between 2016 and 2019. A detailed analysis of the site's ceramic assemblage is presented in the following Chapter 7, while Chapter 8 discusses evidence for local food practices and the wider economy. Chapter 9 investigates a series of interrelated ritual behaviours at the site, and Chapter 10 presents evidence for LB administrative practices. In Chapter 11, we place the excavation and analytical results from SRP046 in a wider regional context.

6.2 Excavations at Kani Masi (SRP046)

As discussed in more detail in the preceding Chapter 5.2, the Kani Masi site cluster consists of a series of mounded features, which were occupied intermittently from the Late Neolithic to the medieval and modern periods. LB surface finds also come from other, nearby mounded features (SRP043, SRP092, SRP095) and from areas in between, suggesting a LB settlement extent in the region of 40 ha. Following surface collections in 2013, magnetic gradiometer surveys were carried out in 2014, 2016 and 2017, using a Bartington GRAD-601 dual axis fluxgate gradiometer.[2] The magnetic survey covered a total area of around nine hectares, including large parts of SRP046, several mounded features to the north and east, and adjacent lower-lying areas (Figure 6.1).

1 For recent summaries, see Bartelmus and Sternitzke (2017); Glatz *et al.* (2019); Paulus and Clayden (2020).
2 Glatz and Casana (2016, 138-139); Glatz *et al.* (2019, 488-450).

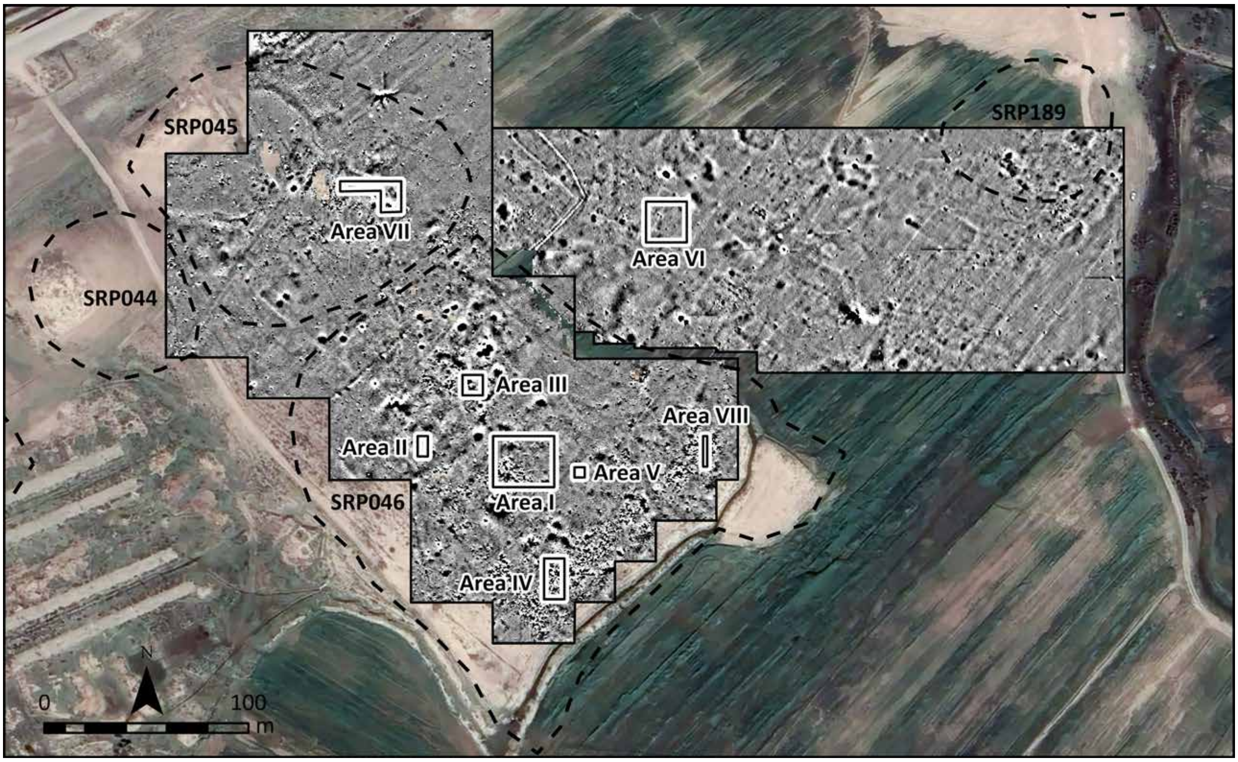


Figure 6.1 Results of the Kani Masi magnetic gradiometer survey (cf. Glatz and Casana 2016, Fig. 9; Glatz *et al.* 2019, Figs. 5 and 6) and excavation areas (GoogleEarth image from May 2020 ©CNES/Airbus).

Dates BCE	Historical period (Mesopotamia)	SRP Period	SRP046 Phase
1600-1400	Early Kassite	LB I	Phases 1a-b
1400-1250	Middle Kassite	LB II	Phases 1b-2
1250-1150	Late Kassite	LB III	Phases 3-4
1150-730	Isin II and later	IA I-II	Phases 4-5

Table 6.1 Periods and their approximate dates discussed in this chapter.

Excavation area	Trench numbers	Years excavated
I	Y87, Y88, Y89, Z86, Z87, Z88	2016, 2017, 2018, 2019
II	Y82	2019
III	V85	2016, 2017
IV	CC89, DD89	2017
V	Z90	2016
VI	N94	2018
VII	L79, L80, L81, M81	2016, 2018
VIII	Y96	2017

Table 6.2 List of excavation areas on SRP046.

In concert, surface collections, magnetic gradiometer survey, and excavation results show that LB occupation on SRP046 and surrounding areas consists of a mix of large, and in some cases monumental, buildings interspersed with open spaces. The latter were used, or re-used, as craft production areas, for large-scale food preparation, and as middens over the course of several centuries. As far as can be ascertained from the data at hand, the LB settlement had no fortification or perimeter wall, which aligns well with the site's open plan and multi-mounded topography.

Excavations at SRP046 began in 2014 with a 1 × 4 m test trench to confirm the site's suspected LB date. A programme of large-scale excavations was initiated in the summer of 2016 and was followed by three further seasons in 2017, 2018, and 2019. In the course of the four main excavation seasons, we uncovered occupation dating predominantly to the second half of the second as well as the early first millennium BCE in a total of 17 excavation trenches ordered along a 10 × 10 m alphanumeric site grid. For the purpose of this publication, and to allow for a more convenient overview of architectural units and activity areas, we have amalgamated directly adjacent trenches into larger excavation areas (Table 6.2). A total area of 1450 m^2 was exposed to a depth of over two metres in some parts of the site. Occupation layers were generally reached between c. 15 and 50 cm below the current surface.

Phase	Description	Areas	Date ranges cal. BCE	SRP period
1	Unbaked mudbrick	I, II, III, IV, VII	1505-1056	LB I-II
2	Industrial re-interpretation	III, VII	1391-1128	LB I-II
3	Commemorations	I, II, III, IV, V, VI, VII	1220-903	LB III
4	Baked brick revival	I, II, VII, VIII	1220-903	LB III-IA
5	Baked brick re-use	I, IV, VII	1220-903	LB III-IA
6	Sporadic later occupation	I, IV, VII		post-IA to modern

Table 6.3 Summary of SRP046 occupation and activity phases. Phasing is based on stratigraphic considerations, absolute dates, and ceramic analysis.

The site's occupation history can be broadly grouped into six main occupation and activity phases (Table 6.3). They include: a first phase of large-scale architecture that is characterised by the use of air-dried or sun-baked mudbrick walls (Phase 1), a phase of industrial re-interpretation (Phase 2), a series of ritual depositions commemorating buildings and industrial areas (Phase 3), and a fourth activity phase, in which building techniques and the logistics of construction underwent a dramatic transformation with a shift towards the extensive use of baked bricks (Phase 4). Phase 5 is defined by small-scale features that appear to re-use Phase 4 baked bricks as well as the sporadic placement of tannur ovens. Phase 6 captures sporadic surface and near-surface sherds, small finds, and open fireplaces that suggest intermittent use of the site into the modern period.

Phases 1-3 we can date with confidence to the second half of the second millennium BCE (LB I-III) and link to the Middle Babylonian or Kassite cultural sphere. Phase 4, which overlaps at least to some extent with Phase 3 depositions, presents a substantial occupation phase that most likely dates to the final centuries of the second millennium and likely continues into the early first millennium BCE (LB III-IA). Phase 5 features are most likely contemporary with Phase 4, but their near-surface and often disturbed contexts and limited associated finds introduce a degree of chronological uncertainty. Phase 6 captures ephemeral traces for later use of the site up until the modern period. Phase 1 includes a series of sub-phases in the form of re-building events and smaller-scale changes in the use of particular spaces, which we outline in detail below.

The establishment of secure synchronisms across the different excavation areas presents a challenge. We have been able to resolve this in some cases, especially where radiocarbon dates provide absolute temporal anchors (summarised in Table 6.4 and Figure 6.2), and where relative chronological relationships can be reconstructed with the help of similarities in ceramic traditions and building techniques. This is, however, not the case for all exposures. Moreover, different areas of the site developed and changed at varying pace, some retaining initial uses and meanings for longer, while others underwent more rapid or frequent change. Thus, due to the continuously evolving nature of settlement spaces, some structures, features, and remnants of activities that archaeological tradition requires us to group into discrete stratigraphic assemblages, overlapped in time to varying extents.

6.2.1 Phase 1: Unbaked mudbrick

In Phase 1, whose earliest absolute *termini ante quem* date to 1506 and 1505 cal. BCE (Table 6.4, Figure 6.2, and Appendix II.1), a series of large structures were built at Kani Masi using air-dried or sun-baked mudbrick and mudbrick packing on what appears to be virgin soil. This includes a large (c. 30 × 40 m) trapezoidal courtyard complex in Area I, which is clearly visible on the magnetic gradiometer image (Figure 6.1), alongside further architectural units, cooking and midden deposits in Areas II, III, IV and VII.

6.2.1.1 Area I

6.2.1.1.1 Phase 1a

The earliest building and occupation phase (Phase 1a) of the architectural complex in Area I was first identified in a small (1 × 1 m) sounding in 2017 in the southeast corner of Room 1 in the form of a hard floor and ashy destruction horizon (Y89/L13, Figure 6.3.A). Finds from the floor include a perforated white marble object as well as fragments of pottery coated with bitumen (Figure 6.3.C). Below the floor a mostly clean soil horizon was encountered, which was excavated to a depth of c. 50 cm below the burnt layer.

The sounding was extended in 2019 in order to ascertain the full extent of the ash layer and expose more of the Phase 1a occupational surface, which yielded further small finds in the form of a bronze blade and a carnelian bead (Y88/L125, Figure 6.3.B, D and E). The ash layer was found to extend to the south and east around Wall 5 as well as underneath it. Further scraping under the ash layer revealed an earlier phase of the wall, which had a somewhat different orientation. An intensely burnt deposit containing large quantities of pottery was also

	Phase	Trench/Locus/Lot	Lab No.	Uncal. BP	2 Sigma (BCE) (IntCal2020)
Area I					
	1a	Z88/L17/L2	AA114862/X36467	3165±35	1506-1319
	1b	Z88/L16/L1	AA113267/X34923	3145±24	1497-1317
	1b	Z88/L36/L1	AA115759/X37359	3134±24	1495-1305
	1c	Z88/L9/L1	AA114859/X36464	3104±27	1433-1288
	1c	Y88/L20/30	AA109181/X31274	3088±20	1417-1289
	1c	Z88/L10/L1	AA114860/X36465	3063±27	1411-1234
	1c-d	TT2	SUERC53433/GU34603	3058±27	1410-1228
	1d	Z88/L14/L4 (V1)	AA114861/X36466	3022±27	1391-1132
	1d	Z88/L14/L4a (V2)	AA114865/X36470	2968±27	1277-1056
Area II					
	1a/b	Y82/L18/L2	AA114856/X36461	3150±27	1499-1320
	1a/b	Y82/L20/L4	AA114857/X36462	3118±29	1488-1292
	1c	Y82/L9/L2	AA114853/X36458	3113±30	1446-1285
	1c	Y82/L9/L6	AA114854/X36459	3087±27	1421-1272
	1c	Y82/L9/L3	AA114866/X36471	3077±30	1421-1261
	1c	Y82/L9/L1	AA114852/X36457	3041±50	1421-1127
	1c	Y82/L7/L3	AA114851/X36456	3043±41	1416-1133
	1c	Y82/L13/L5	AA114855/X36460R	3082±27	1418-1270
	3-4	Y82/L3/L3	AA114850/X36455	2872±57	1220-903
Area III					
	1a	V85/L175/L2	SUERC77188/GU46930	3189±27	1505-1418
	2	V85/L164/L4	AA111949/X33629R2	3017±30	1391-1128
Area IV					
	1b-c	DD89/L9/L1	AA111951/X33631	3103±24	1430-1291

Table 6.4 Summary of radiocarbon dates from SRP046.

excavated along the north section of the trench further to the west (Y88/L126). Here too the ashy deposit extended under the later Wall 1, pointing to substantial architectural remodelling following a conflagration in Phase 1a, whose full extent, however, could not be ascertained as this would have required the removal of extant walls.

6.2.1.1.2 Phase 1b

The subsequent Phase 1b building was exposed across the entire northern part of Area I (Figure 6.4). Excavations in 2016 and 2017 exposed an area of 15 × 10 m in grid-squares Y88 and Y89, revealing four trapezoidal rooms on either side of the c. 80 cm wide mudbrick Wall 1 that runs diagonally from northeast to southwest. A part of what appears to have been a large central room or courtyard was also uncovered. An external wall, which separates the suite of rooms from this larger space, measures c. 1.2 m in width (Walls 4 and 5), while smaller, internal walls have a width of c. 40 cm (Wall 2). Room 1 measures c. 4 × 6 m and was exposed almost in its entirety. It is flanked by a smaller room, Room 5, to the east, and three fully or partially excavated rooms (Rooms 2-4) to the west and southwest, with Room 4 containing a large double-chambered tannur (Figure 6.5.A). A further room in the southwest corner remained unexcavated.

In order to expose additional parts of this structure, we enlarged the excavation area in a southerly direction by 15 × 5 m in 2018 (Z88, Z89), retaining a 1 m wide section between old and new excavation areas. An additional 10 × 5.5 m southward extension along the western section followed in 2019 (Z88). The main architectural features uncovered include the southern portion of Wall 6, a later rebuilding phase Wall 6A, and a second, somewhat narrower wall, Wall 7, measuring 1.2 m in width, which runs perpendicular to Wall 6 in northeast-southwest direction. Remnants of Wall 7 were also identified in the 2019 extension. In the north, Walls 6 and 7 form the southwest corner of the courtyard excavated over a larger area in the northern Area I exposure. In the south, Wall 7 presents the northern limit of Room 7, whose

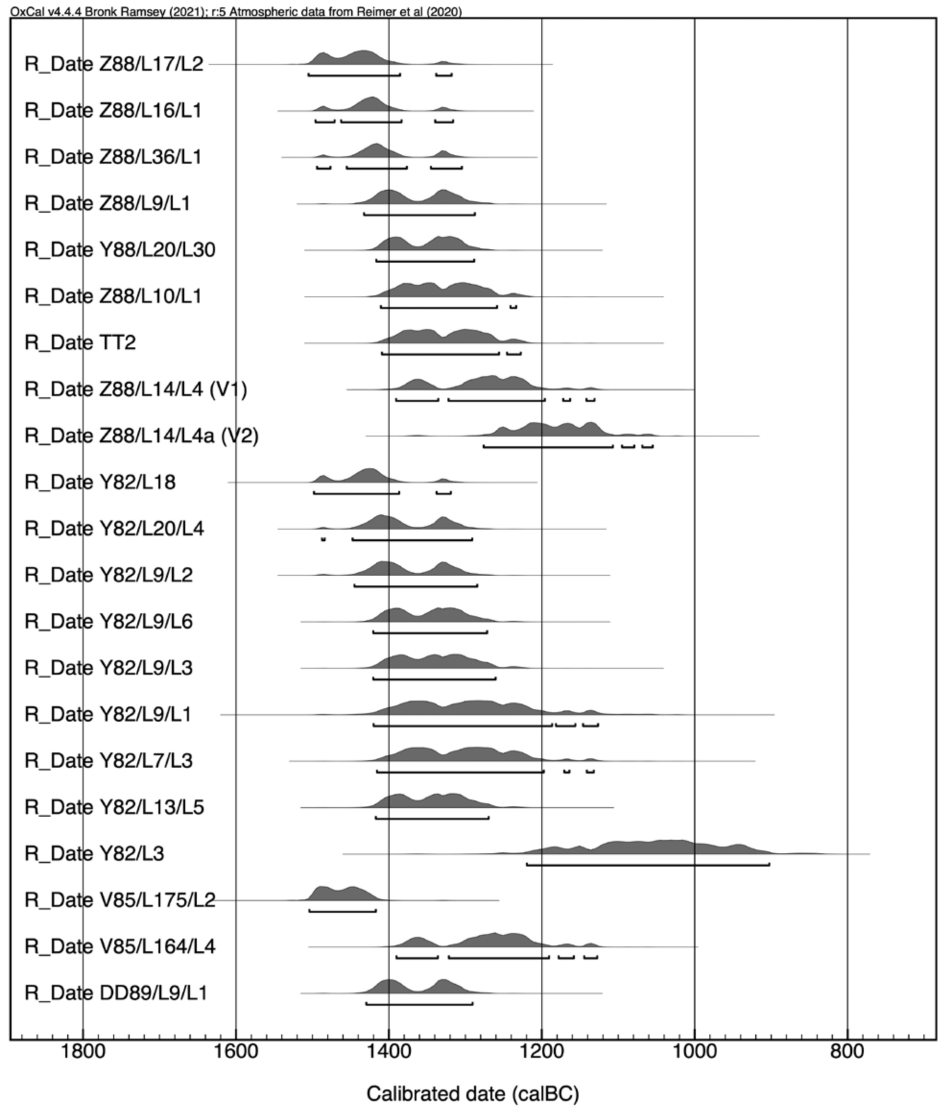


Figure 6.2 Multiplot of calibrated radiocarbon dates from SRP046.

southern extent could not be securely ascertained. The outlines of another wall, Wall 8, were observed running south from the corner of Walls 6-7 for a few metres before slumping into collapse. The 2019 extension revealed a further wall, the three mudbricks or 1.5 m wide Wall 9 along with a brick-lined pavement or platform to the south.

Phase 1b floors were made of a fine, dense mud plaster, which has a distinctive greenish colour (Figure 6.5.B), and that may be comparable to the Level II living surfaces at Tell Ajamat in the Hamrin.[3] In the southern part of the excavation area, patches of this distinctive floor were unearthed in Room 7, suggesting that this area was also occupied in Phase 1b. Although exposed only over a small area, the plaster floor here continued into the eastern section and also ran south underneath the post-abandonment fill (Z88/L14), which points to several more rooms in use in the south in Phase 1b.

A juvenile burial (Burial AI.1, Z88/L16) with two unusual red bottles (Type D.2) was excavated in the southern corner of the courtyard (Figure 9.2, for more information on this and other burials see Chapter 9.2 and Appendix VIII.4). A charcoal sample found adjacent to the skeleton was dated to 1497-1317 cal. BCE, suggesting that the burial was placed there either during Phase 1a or, more likely, the Phase 1b occupation, and before the start of Phase 1c. The latter is represented by undisturbed bricky foundation material (Z88/L12) and a plaster floor above (Z88/L10, Figure 6.5.C). A charcoal sample from this floor was radiocarbon dated to 1411-1234 cal. BCE, which maps well onto the date obtained for the Phase 1c closing ritual in the northern part of the structure (see Section 6.2.1.1.3 below, and Chapter 9.3.2).

3 Armstrong (1981, 149).

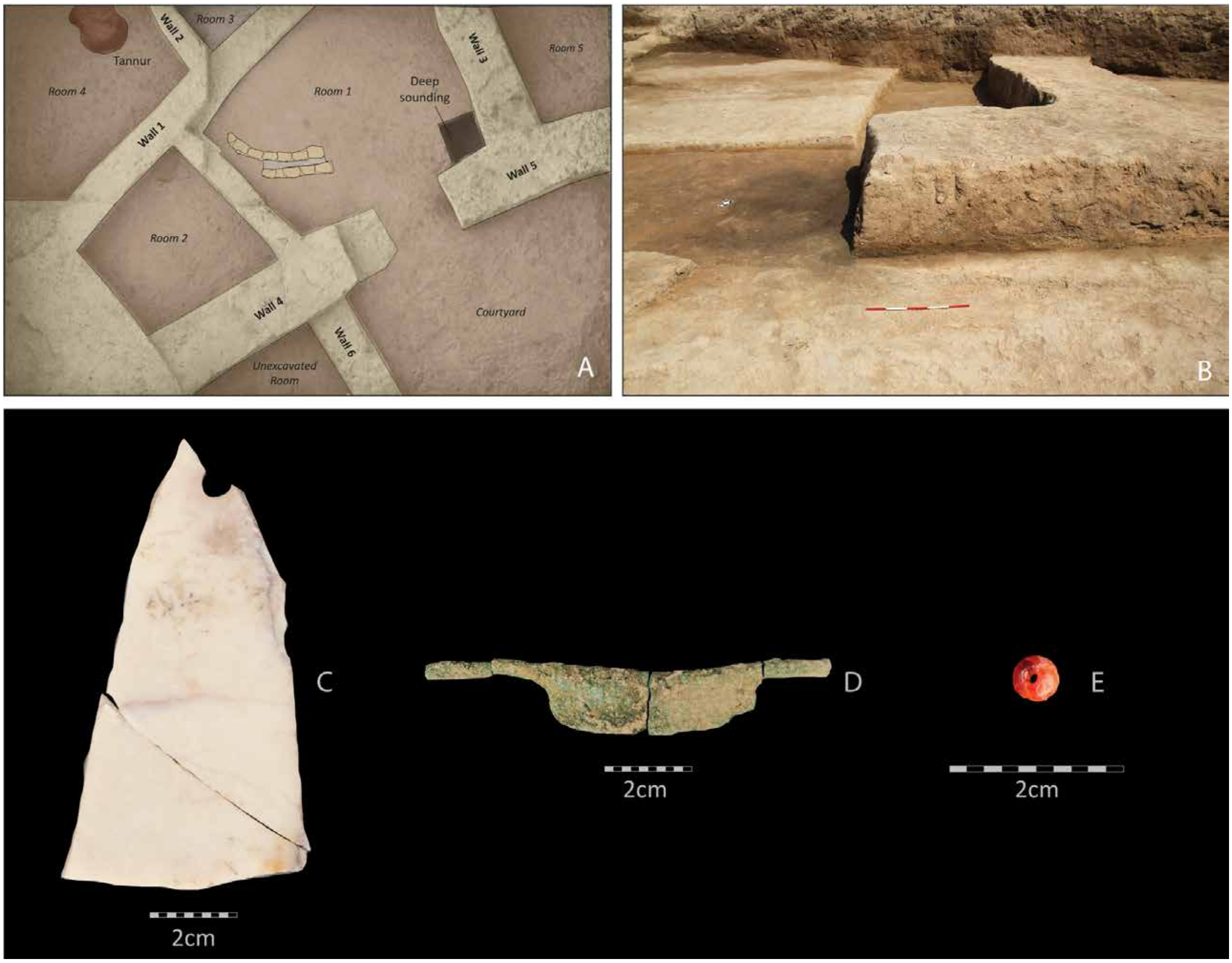


Figure 6.3 A) 2017 sounding in Area I, B) 2019 sounding extension, C) perforated marble plaque, D) metal blade, and E) carnelian bead from Phase 1a contexts encountered in the soundings.

Another interment further southwest produced very similar absolute date ranges, suggesting that this part of the building may have been abandoned already in Phase 1b. Here, ephemeral wall lines were found overlain by a dense mixture of broken pottery vessels, mudbricks, and stones covered in, and held together by, a thick and very hard whitish mud plaster (Z88/L15), whose southern portion (Z88/L36) was covered by an additional fill and a dark burnt layer, suggesting an elaborate funerary procedure (Figure 6.5.D-F). These deposits sealed a juvenile burial (Burial AI.2, Z88/L17, Figure 6.5.G) that appears to have been placed on an organic layer, perhaps a textile or a mat (Z88/L37). In addition to a series of grave goods, the burial appears to have been accompanied by several clay bullae and tablet fragments (see Chapter 10). A charcoal sample from the fill underneath the cranium of the deceased produced a radiocarbon date of 1506 to 1319 cal. BCE, while a caprine carpal from the southerly extension of the hardened mix above the burial produced a range between 1495-1305 cal. BCE. This would suggest that the burial was dug into Phase 1a deposits, but itself belongs to the Phase 1a/b transition and was seemingly associated with the post-destruction remodelling of space early in Phase 1b.

To the southeast, the deposits associated with Burial AI.2 are partially overlain by the substantial, 1.5 m wide Wall 9. Wall 9 displays a, for the site unique, construction technique of irregular dried or sun-baked mudbricks (e.g. 19 × 38 cm, 20 × 26 cm) set into yellowish-white mud plaster, which foreshadows Phase 4 building methods (see Section 6.2.4 below). Wall 9 seems to be the northern-most wall of a distinct architectural unit (Figure 6.5.H-I).

To sum up, the central building complex in Area I reached its maximum extent in the second occupation sub-phase, Phase 1b. The scarcity of pottery and small finds across the exposed floors makes it difficult to determine the use of individual rooms as well as the function of the

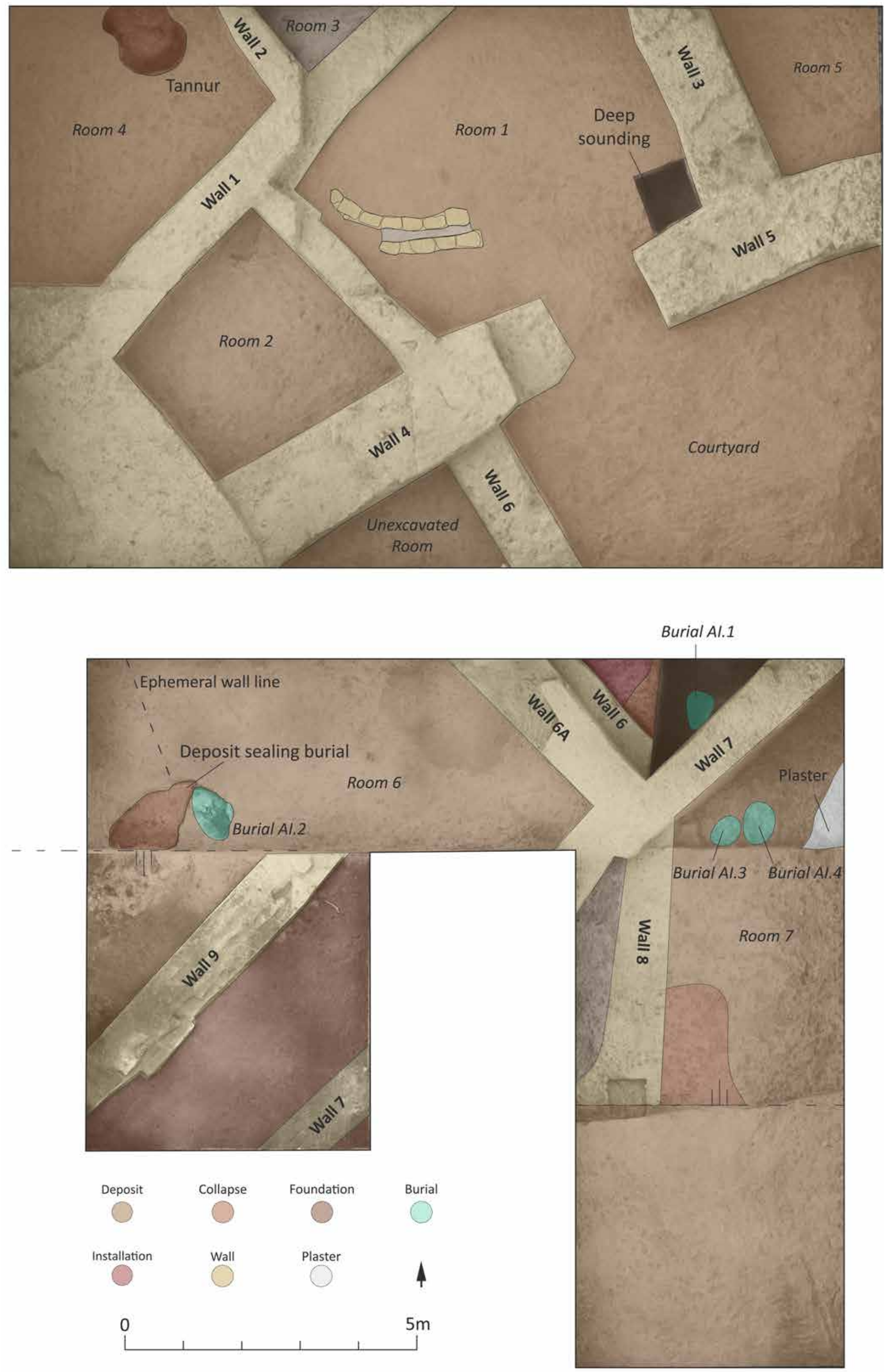


Figure 6.4 Annotated orthoimage of Phase 1 in Area I.

Figure 6.5 A) Tannur in Room 4, B) greenish Phase 1b plaster floor, C) Phase 1c floor above Burial AI.1 (looking north), D) depositions sealing Burial AI.2 (looking south), E) burnt top layer of southward extension of deposit sealing Burial AI.2, F) lower layers of southern deposits sealing Burial AI.2, G) partially excavated Burial AI.2 (looking north), H-I) Wall 9.

structure overall. A tannur, Oven AI.1, in Room 4, alongside several pestles and a polisher in associated fill layers (see Appendix V.3) point to cooking and craft activities, while fragments of hard and dense mudbrick-like material with a layer of hardened white plaster in the collapse rubble may point towards the existence of a second storey. The building's size, which is comparable to the so-called governor's palace at Tell Yelkhi[4] suggests an important, and most likely public, function. This is underscored by the presence of several clay bullae and tablet fragments associated with Burial AI.2, and a nearby midden context in Area II (see Chapter 10), by the ritual closure of the structure in the subsequent Phase 1c, and its commemoration in Phase 3 (see Sections 6.2.1.1.3 and 6.2.3.1 below, and Chapter 9.3.2 and 9.4.1).

What caused the end of the Phase 1b building remains unclear. There is some evidence of localised burning in Room 5, but there are no signs of a wider conflagration. The building, moreover, appears to have been cleared out before its walls collapsed, or were deliberately toppled for rebuilding. The northern rooms and courtyard were subsequently rebuilt mostly following the preceding layout. The abandoned southern part of the complex was used as a burial ground.

6.2.1.1.3 Phase 1c

An infant and a juvenile burial (Burials AI.3 and AI.4) were placed along the south-eastern face of Wall 7 and into accumulating abandonment debris (Figure 9.4 and Figure 9.5). Burial AI.3 (Z88/L19) is a simple, flexed interment of an infant placed in Room 7 shortly after it had been abandoned; the inhumation sits at about the same elevation as the batches of greenish Phase 1b floor described above. A second, and somewhat later, juvenile burial (Burial AI.4, Z88/L9) was dug into the abandonment layers partially above Burial AI.3, but some 60 cm below the highest surviving point of the surrounding walls. Both burials, therefore, were placed on the floor and into the abandonment fill while the surrounding walls were still visible. A charcoal sample dates the fill and more broadly also the Burial AI.4 to between 1433-1288 cal. BCE.

4 Bergamini (1985).

Figure 6.6 A) Northern suite of Phase 1c rooms (looking north), B-C) baked brick drainage canal, D-F) goblets and cups strewn on the floor in Room 1, G-H) cooking installations in neighbouring rooms, I) mudbrick collapse sealing Phase 1c.

In the northern part of Area I, the rooms destroyed at the end of Phase 1b were rebuilt mostly following the same plan in Phase 1c (Figure 6.6.A). Changes include the widening of the southern entrance to Room 1, and the cutting of a passage between Rooms 1 and 2. A significant new addition was a curved drain bordered by parallel lines of baked bricks, each broken in half or into smaller pieces, in the south-western part of Room 1 (Figure 6.6.B-C). The Oven AI.1 was no longer in use. Instead, three hearths, lithic tools used for food preparation and craft activities, alongside faunal remains and pottery vessels associated with food production and consumption were recovered in Rooms 2, 4, and 6 (Figure 6.6.G-H).

In Rooms 1, 4, and 5, floor surfaces and an extensive collapse layer just above (Y88/L20) were found littered with small drinking vessels, footed goblets, and other consumption-related vessels suggestive of commensal consumption (Figure 6.6.D-F, see Chapter 8.2.1.1). Their distribution suggests both deliberate discard and items fallen from shelves along walls as they toppled.

Prior to the systematic analysis of faunal remains, ceramics and other finds from this context, we had hypothesised in a preliminary report that an earthquake might have caused the Phase 1c destruction.[5] This can now be dismissed as an unlikely scenario, as there is no conclusive earthquake-related damage in Area I or elsewhere on the site. Instead, we now have multiple strands of evidence pointing to a ritual event occurring just before the collapse of the walls (Figure 6.6.I). This event included not only extensive feasting, but also the deposition of an infant jar burial (Burial AI.5, Y88/L20) placed on the floor along Wall 1 (Figure 9.6),[6] and the deliberate deposition of an articulated foreleg of a dog on the same floor. The greater-than-usual proportion of sheep in the faunal assemblage also points to a ritual and possibly sacrificial context. We interpret this as the remnants of a closing ceremony associated with the cult of the Babylonian goddess Gula, which appears to have been followed by the deliberate toppling of at least some of the building's walls (for more detail, see Chapter 9.3.2).

A charcoal sample from Room 1 dates the sealed materials (Y88/L20) under the collapse layer to between 1417 to 1289 cal. BCE, while a second charcoal sample from the Phase 1c floor in the southern tip of the courtyard ranges between 1411-1234 cal. BCE. Together they point to the destruction and abandonment of the building sometime in the fourteenth or earlier thirteenth century BCE, the LB II. This absolute date range, while broad, fits well with the composition of the Phase 1c ceramic assemblage detailed in Chapter 7.5.2.

Following the closing ritual and collapse of the walls, the Area I complex was not rebuilt. However, the building continued to hold significance for the local community, who placed a series of commemorative offerings amidst its walls in Phase 3, which remained visible as the building was left to disintegrate (see Chapter 9.4.1). The pottery assemblage and small finds associated with the Phase 3 commemorative practices differ from those of Phase 1, suggesting a break of uncertain length between the abandonment of the Phase 1c structure and the Phase 3 depositions (see Chapter 7.5.5).

6.2.1.1.4 Phase 1d

No such break appears to have occurred in the southern part of Area I, where abandoned parts of the main building complex continued to be used as a burial ground during and after the closure of the northern part of the structure. Here, three nearly complete vessels were placed into the by now substantial post-abandonment fill of Room 7 (Z88/L14, Figure 9.7). Two of the vessels contained the partial remains of a neonate and infant respectively (Burials AI.6-8), with bones also scattered in the surrounding matrix. A charcoal sample from inside one of the jars yielded a radiocarbon date of 1391-1132 cal. BCE and a second charcoal sample from the soil surrounding a second jar was dated to 1277-1056 cal. BCE. About 20 cm above the three vessels, several shallow depressions with successive ash layers point towards open fireplaces and the subsequent use of this area as an outdoor space.

6.2.1.2 Area II

In order to gain a better understanding of the settlement fabric that surrounded the central structure in Area I, we opened two parallel trenches of 2 × 10 m each approximately 50 m to its west. The eastern trench (Y82/L8, L10, L13, L14, and L17) contained a sequence of difficult to differentiate floor surfaces alternating with ashy deposits containing large quantities of ceramics and faunal remains. Due to the tight packing of floors and fill layers in both trenches, it has proven difficult to associate these across the two exposures (Figure 6.7.A-B). As the western exposure contained more identifiable features such as hearths and walls, we will focus our discussion on the results from the western trench (Y82/L1-7, 11, 12, 15, 16, 18-23), with occasional reference to the eastern part.

6.2.1.2.1 Phase 1a

The earliest occupation phase that was reached in Area II is represented by a small section of a reddish-yellow mudbrick wall (Wall 1, Y82/L23) in the southwest

5 Glatz *et al.* (2019).

6 Following a detailed stratigraphic reanalysis, we have concluded that Burial AI.5 was ascribed erroneously to Phase 3 in Perruchini *et al.* (2018) and Glatz *et al.* (2019). The re-assignment of the burial, however, has no implications for the interpretation of Phase 3 as strongly associated with commemorative ritual practices as outlined in Perruchini *et al.* (2018) and Glatz *et al.* (2019), and discussed in more detail below and in Chapter 9.4.1.

Figure 6.7 A-B) Tightly packed alternating floor and ashy deposits visible in the east section of the western trench in Area II, C-G) Phase 1b-c cooking installations and discard areas.

corner of the trench about two metres below the modern surface. The wall appears to run in a northeast to southwest direction. To the north of Wall 1, a surface and subsequent mudbrick collapse and fill deposits (Y82/L21 and L22) yielded pottery and faunal remains, including several articulated pieces, that appear to have accumulated rapidly (Figure 9.10). Taken together, they point towards a consumption event and associated ritual depositions that appear to mark the structure's closure (see Chapter 9.3.1). Evidence for carnivore gnawing on a number of recovered bones suggests that these deposits, although accumulated quickly, subsequently lay exposed for some time before the area was levelled with a thick layer of mudbrick packing (Y82/L20).

A charcoal sample from the levelling horizon (Y82/L20) provides a date between 1488 and 1292 cal. BCE, suggesting that the earlier Wall 1 and associated collapse and fill deposits are broadly contemporary with the Phase 1a building in Area I. This is supported by similar elevations in the two excavation areas and by the pottery recovered from Y82/L20-L22. The pottery from these earliest loci find their closest parallels in sixteenth and fifteenth century BCE assemblages in the Hamrin, in southern Mesopotamia, and in the Gulf region (for more detail, see Chapter 7.5.1). This points towards the earlier end of the radiocarbon date range for Y82/L20, and a date in the sixteenth century BCE for the Phase 1a contexts sealed below it.

6.2.1.2.2 Phase 1a/b-c

The Y82/L20 levelling event was superseded in the northeast corner by a thick ashy deposit with large quantities of faunal remains that look to be a localised hearth refuse dump (Y82/L16, Figure 6.7.C-G). Above it runs Wall 2 (Y82/L15), an air- or sun-baked mudbrick wall of the yellowish colour that is more typical of Kani Masi's Phase 1b-c architecture.

Abutting Wall 2 in the north and sloping upwards to the south was a tightly packed sequence of alternating layers of ashy deposits and living surfaces (Y82/L18, L19, L12, L9, L7; east: L13, L14). The thick ashy deposits, some of which contained hearth features (e.g. Y82/L12, Y82/L7), yielded large quantities of fire-cracked rocks, animal bones, fragments of large, ring-base storage jars, ground stone tools, the bottoms of several brewing vats, alongside complete and fragmented drinking vessels (e.g. Y82/L9).

Together this points to the periodic use of this space for food preparation and as a midden for the disposal of dung fuel and food waste. It is highly likely that these outdoor food preparation activities and episodes of disposal are related to the Phase 1 building complex in Area I, where large quantities of drinking vessels were found in the final occupation layer (Phase 1c), pointing to a large-scale feasting event and closing ritual (see Section 6.2.1.1.3 above, and Chapters 8.2.1.1 and 9.3.2).

Charcoal samples from the earliest of the fill and levelling episodes in Area II (Y82/L20, L18) produced two radiocarbon dates of 1499-1320 cal. BCE (L18) and 1488-1292 cal. BCE (L20), which situate these deposits at the transition of Phase 1a and 1b (Table 6.4). This assessment is also borne out by the ceramic assemblages from these contexts, which include a mix of LB I and LB II types (Chapter 7.5.2). Subsequent hearth features, fills, and surfaces (Y82/L13 and L9) yielded three radiocarbon dates that cluster between 1421-1261 cal. BCE and two further with somewhat wider probability ranges. With the exception of one sample that produced a significantly lower end-date, all five dates closely match the Phase 1c ranges of Area I.

The higher-lying stratigraphy (Y82/L2-L5 and L8, L10, L13) in Area II is more disturbed and therefore more difficult to interpret, but a radiocarbon date from Y82/L3, which ranges between 1220-903 cal. BCE points towards the continued use of this space for intermittent large-scale food production and disposal into Phase 3, and likely also Phase 4.

6.2.1.3 Area III

In 2014, the magnetic gradiometer survey indicated the presence of a sizeable (c. 30 × 40 m) trapezoidal structure to the northwest of Area I, consisting of a large courtyard with a series of rooms along the western side (Figure 6.1). Several large magnetic anomalies also dot the plan of the structure. Excavations in Area III over an area of 10 × 10 m in 2016 and 2017 demonstrated that these anomalies belong to at least three distinct occupation and activity phases (Phases 1-3, Figure 6.8).

6.2.1.3.1 Phase 1a

The first phase of activity in Area III was indeed the construction of a sizeable mudbrick building, roughly contemporary with the earliest occupation phase of the central structure in Area I, and the early architectural remains in Area II. Wall 1, which runs from the centre of the southern part of the trench into the northern portion of the west section, and Walls 2 and 3 formed part of this first architectural phase (Figure 6.9).

A small sounding (c. 2.3 × 0.6 m) to the east of Wall 1 and south of Wall 2 revealed a floor abutting Wall 2 and an earlier phase of Wall 1 that had been cut by a burial pit (Burial AIII.1, V85/L80, Figure 9.1). A charcoal sample from a deposit sealing the burial and below the floor between Walls 1 and 2 produced a date range of between 1505 and 1418 cal. BCE, which presents a broad *terminus ante quem* for the construction of the first phase of this structure. With the exception of the goblet, which presents an early variant of Type F.2a (see Chapter 7.3.1.6),

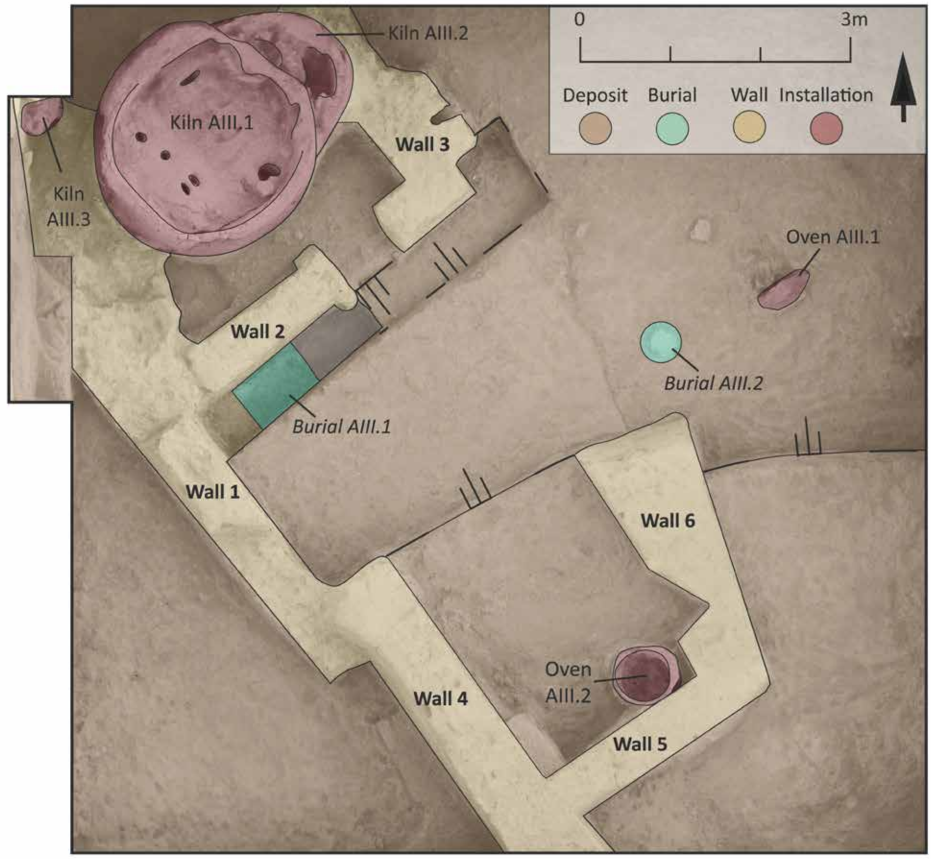


Figure 6.8 Annotated orthoimage of Area III.

and bead necklaces that accompanied the deceased (see Chapter 9.2.1.1), few finds could be directly associated with Phase 1a in this part of the site.

The architectural features exposed in the southern half of Area III (Walls 4-6) and the three large kilns that overlie the Phase 1a building in the north formed part of the later Phase 2, which presents a widespread re-purposing of intra-site space from habitation to industrial production (see Section 6.2.2 below).

6.2.1.4 Area IV

Area IV, which is located to the south of Area I, was opened with the aim of exposing a large magnetic anomaly that extends across much of the south-eastern edge of the site (Figure 6.1). Excavations here quickly revealed that much of this anomaly was produced by Phase 4 baked bricks that had been upturned and dragged across the surface of the site by extensive ploughing. *In situ* baked brick architecture of Phase 4 was exposed only in Area I and Area VIII. Following the removal of topsoil in Area IV, a series of tannurs and features constructed from broken baked mudbricks were exposed. These features belong to Phase 5 and Phase 6 occupations and are discussed in more detail in Sections 6.2.5-6 below.

Excavations below the Phase 5 features in the southern quarter of Area IV yielded over a metre of consecutive activity horizons, some of which included burnt brick fragments and large amounts of pottery. No walls or floors, however, could be identified. Copious amounts of animal bones, pottery fragments, and ashy deposits interlaced with mudbrick collapse point to an outdoor space used as a refuse area (for more detail, see Chapter 8.2.1.3). A charcoal sample dates one of the earliest exposed refuse deposits to between 1430-1291 cal. BCE, establishing a broad contemporaneity with Phase 1b-c in Areas I and II. Activities in Area I are also the most likely source of the material deposited in this part of the site.

6.2.1.5 Area VII

Excavations in the northern-most Area VII were initiated to investigate a series of dipolar anomalies detected by the magnetic gradiometer survey (Figure 6.1). These anomalies were caused by a series of pyrotechnological installations, which are associated with Phases 2 and 4 (see Sections 6.2.2.2 and 6.2.4.3 below).

Below two Phase 2 walking surfaces associated with the industrial area more fully exposed in the central part of Area VII in 2016, and a substantial and almost sterile soft light brown fill layer (M81/L11), a 5 × 5 m

Figure 6.9 View of Phase 1 and 2 contexts in Area III.

sounding identified the ephemeral remnants of mudbrick architecture (M81/L12). As in the earliest occupation phase in Area I, the exposed walls were of a softer, dark brown colour with finer-grained inclusions compared to the harder consistency and more yellowish colours typical of subsequent phases of occupation. With limited time at the end of the excavation season, floor levels were not reached in this sounding. However, the presence of mudbrick architecture underneath industrial installations confirms the overall phasing proposed for the site, and closely aligns Area VII with the occupation history of Area III.

6.2.2 Phase 2: Industrial re-interpretation

6.2.2.1 Area III

The first sign of this industrial re-interpretation in Area III would appear to be the small domed Oven AIII.1 to the east of the first architectural complex, although it may also have been partially contemporary with the last incarnation of the Phase 1 building (Figure 6.8). Once the earlier structure had gone out of use, the room enclosed by Walls 1, 2, and 3 was filled with fine sandy soil to provide a flat surface for the construction of the first of two large domed updraft kilns. Kiln AIII.2 is older and was cut into by Kiln AIII.1, whose ashy refuse was deposited in the northeast quadrant of the trench. A third kiln or oven, Kiln AIII.3, the bulk of which remains in the west section, lies slightly to the west of Kilns AIII.1 and 2 and sits on top of Wall 1. Strewn in and around the kilns were numerous fragments of greenish, over-fired pottery and occasional kiln-wasters.

Kiln AIII.1 preserved an internal platform with 13 irregular holes, where the pottery to be fired would have been stacked. A stoking chamber was accessed at the back of the kiln to the west, while a small mudbrick structure to the southwest contained a hearth/charcoal pit possibly to prepare fuel for the stoking chamber. Tell Kesaran[7] and Tell Zubeidi[8] each housed LB pottery production facilities. Of these, two kilns at Tell Zubeidi compare well with Kiln AIII.1. These oval *Gewölbeöfen* share characteristic building methods of mudbrick columns on the long sides built up to form the dome of the firing chamber, a stoking chamber was located at the back. The two Zubeidi kilns, which the excavators date to the early-to-mid twelfth century BCE, were also constructed in plaster- and brick-lined pits dug into the remains of the abandoned Siedlung I.[9]

The relationship between Kilns AIII.1 and AIII.2 and the suite of walls in the southern part of Area III has been rather challenging to establish. The bottom elevations of Kiln AIII.1 and Walls 4 and 6 imply a roughly contemporary use of an open working area framed by Walls 4, 5, and 6 on three sides. A large round tannur (Oven AIII.2) is located against Wall 5.

Four thick ashy refuse deposits accumulated between the kilns and the working area to the south, as well as in the eastern part of the exposure (V85/L174, L127, L164, and L129), with one possible surfacing event (V85/L158) between V85/L164 and L159. The remains of a juvenile (Burial AIII.2, V85/L116) were placed in this area and subsequently covered by more ashy refuse (Figure 9.8). A charcoal sample from an adjacent locus (V85/L164) produced a radiocarbon date between 1391-1128 cal. BCE, confirming a likely temporal overlap between Phase 2 and Phase 1c-d in Area I (see also Section 6.2.1.1.4).

The refuse layers produced large quantities of ceramics, including many near-complete vessels, the third largest assemblage of faunal remains at the site and the highest proportion of pig remains. As we outline in more detail in Chapter 8.2.2.1, we interpret the southern part of the exposure and midden deposits as the remnants of a food production area, which most likely catered to the craft specialists and workers operating the nearby kilns and other industrial installations in the north-western part of the site during Phase 2.

The final phase of occupation in Area III consists of batches of pottery concentrations, including typical footed goblets, several small heaps of metalliferous waste, which suggest small-scale metalworking, and remnants of a depositional ritual involving the burial of a jar (see Chapter 9.2.6).

6.2.2.2 Area VII

In Area VII, c. 85 m to the northwest of Area III, we exposed a further industrial area consisting of a large kiln, two tannur ovens, and additional installations associated with the storage and preparation of food (Figure 6.10). The kiln and ovens are clearly visible on the magnetic gradiometer results as dipolar anomalies (Figure 6.1). Together with the excavated kilns and tannur in Area III and a later kiln in the eastern part of Area VII, this allows us to propose with some confidence that the scatter of similar dipolar anomalies across much of the northern and north-western part of the site presents an extensive industrial zone focused on pyrotechnological crafts.

Of the fire installations in Area VII, Kiln AVII.1 (L80D/L18), which was sunk some way into the ground, was the most elaborately constructed as well as the oldest industrial installation excavated in this part of the site (Figure 6.11.A-C). It is circular in shape and would originally have been hemispherical in profile. The internal structure of the kiln, although incompletely preserved, displays an elaborate network of chambers separated by a baked clay framework that is comparable to one of the kiln structures at Tell Kesaran.[10]

Around the outside of the kiln, a series of depressions were sunk into the ground. In the southern depression, a well-preserved flue connects the inside of the kiln with the outside and was presumably used as an access point for stoking the fire. In the western depression, a different type of opening is present that may have been used to control airflow into the kiln during firing. Two overfired ceramic wasters found in the kiln fill (L80D/L8) suggest that the function of Kiln AVII.1 was firing pottery, while a concentration of chipped stone tools from the kiln's surroundings includes implements that can be associated with pottery production (see Section 6.2.2.2.1 below). The depressions around the kiln contained a large amount of pottery, chipped stone, and bone, very fragmentary metal pins or needles and one made of bone.

The southern fire installation, Oven AVII.1, appears to be somewhat later in date and, rather than being sunk into the ground, was constructed mostly above ground with mud-plaster building material sloping down from

7 Valtz (1985, 69).

8 Boehmer *et al.* (1985, Pls. 66.1, 74.1-2, 77.1-2).

9 Ibid., 32.

10 Valtz (1985).

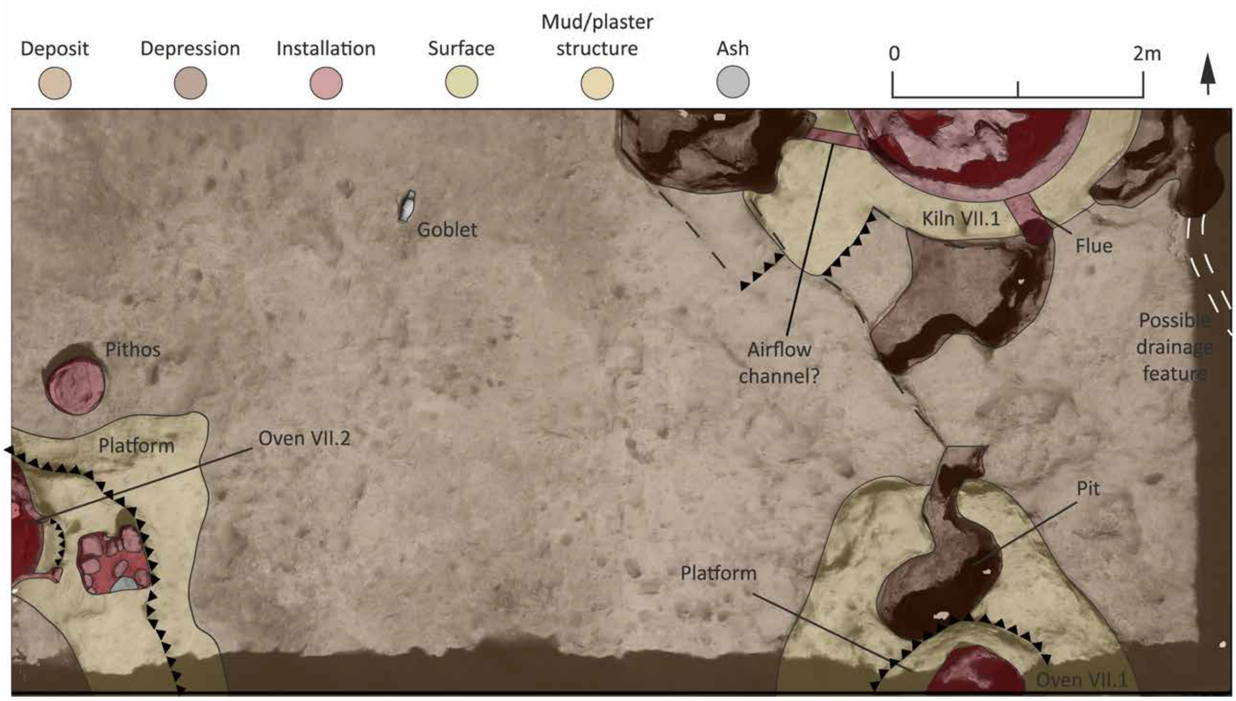


Figure 6.10 Annotated orthoimage of Area VII (Trench L80C/D).

near the top to meet or overlie the surrounding surfaces (Figure 6.11.D). It is circular in shape and there appears to be an opening on the east side. The less elaborate nature and relatively small size of the interior space perhaps suggests a function as a bread oven.

In the southwest corner of the trench, a concentration of features again suggests an area used for food preparation. These include the partial opening of a baked clay structure (Oven AVII.2) in the western trench section (L80C/L11, Figure 6.11.E-F). This oven was built slightly above the surrounding surfaces, and a mud-plaster platform slopes from the surrounding surfaces up against its eastern and southern sides, creating a platform just east of the oven's opening. On this platform sits a roughly square arrangement of baked bricks with a loose ashy deposit among the bricks (L80C/L7). Directly to the north of these features was a complete pithos set into the surrounding surface.

The formal characteristics of the pithos, which has a large open mouth, globular body, and large ring base, date it to the later-thirteenth-to-early-twelfth century BCE (see Chapter 7.3.1.9). A complete footed goblet as well as several concentrations of bone, including human teeth (Appendix VIII.4.11) were found further to the northeast on the surface connecting the different activity areas (L80C/L6). A large grinding stone was found in a higher deposit (L80C/L4), c. 20 cm above the surface, but it was most likely associated with the general function of the area (Appendix V.3). A very similar arrangement of tannur and associated pithos set into the ground nearby is attested in the younger settlement at Tell Zubeidi, which is dated to the final thirteenth to the middle of the twelfth century BCE.[11] As in Area III, the available evidence points to some temporal overlap between the industrial re-interpretation of settlement space in the northern part of the site and the later Phase 1 in Area I.

An extension of excavation Area VII in 2018 showed that the walking surfaces of this industrial zone extended eastward (M81/L8 and L10). Here, a further small hearth (M81/L9), constructed from two bricks and with an ashy deposit in the centre, was excavated. The better preserved of the two surfaces (M81/L10) had a strikingly bright green colour immediately after excavation, which quickly dissipated upon exposure.

6.2.2.2.1 A Late Bronze Age chipped stone industry

A comparatively sizeable assemblage of chipped stones was recovered from Area VII, which merits detailed discussion here. Of the 40 chipped stone artefacts recorded at Kani Masi, 34 were found in Area VII, while Area I and Area III produced three artefacts respectively (Table 6.5, Figure 6.12). Chipped stone was recovered in

11 Boehmer *et al.* (1985, 29-30, Pl. 73.2).

Figure 6.11 A-C) Kiln AVII.1, D) Oven AVII.1, E-F) Oven AVII.2 and large pithos.

Area VII from a range of contexts, including fill-deposits, on floors, and in or near fire installations. The chipped stone assemblage associated with the three external depressions surrounding Kiln VII.1 (L80D/L13-14) is particularly interesting, with cores, unmodified flakes, and retouched artefacts suggesting tool production and associated use activities.

Overall, the Kani Masi LB assemblage is a flake-dominated industry, with unmodified and retouched flakes, which were recovered both as individual finds and in small clusters. Also attested are two tools realised on plaquettes (Figure 6.12.17, 19) and one core, which may have been reused as a tool (Figure 6.12.32), while blades are absent. The artefacts' surfaces are generally well-preserved. A high rate of fragmentation is notable, but it is difficult to ascertain whether these are intentional fractures or brought about by post-depositional processes. Patinae are not developed, and where present are associated with disturbed, near-surface loci.

Categories	Area I	Area III	Area VII
Flakes			
unretouched		1	10
retouched	2	1	12
Laminar flakes			
unretouched	1	1	2
retouched			3
Tools on plaquettes			4
Core/tools			1
Flake cores			2
Total per area	3	3	34
Total			40

Table 6.5 Chipped stone assemblage from SRP046.

Raw materials mostly consist of siliceous sedimentary rocks, especially chert, laminated, shaded, and spotted varieties, and more occasionally a dark limestone and metamorphic rocks. Patinae and impacts are mostly documented on rounded items, while plaquettes bearing residues of primary cortexes are indicative of naturally reworked fragments. This suggests that raw materials were procured along secondary and polygenic fluvial deposits, most likely the nearby Sirwan river.

Flakes include cortical items, which represent a minor part of the assemblage, semi-cortical, and non-cortical items. No morpho-technical standardisation is apparent, apart from the small size of the flakes, which might be due to the raw materials used. Direct percussion with a hard hammer is the only production technique that can be identified, which is also the case for cores. Most of the flakes are unidirectional, while a minor part shows orthogonal or multi-directional previous removals. Laminar flakes are also attested. The reduced number of the negatives on their dorsal surfaces and their size, slightly bigger than ordinary flakes, suggest they were struck at the beginning of the reduction sequence and immediately after the opening of the pebbles and the removal of cortical items (Figure 6.12.2, 4-5).

The two attested cores are small. The first is fragmentary as it lacks the platform, but it preserves most of its extraction surface. It was realised on a small pebble and bears unidirectional negatives, the result of the removal of small flakes from a single platform. Its facial exploitation suggests an abandonment following an initial stage of the reduction (Figure 6.12.22). The second core is slightly bigger and has a more complex biography (Figure 6.12.33). It has three extraction surfaces. The oldest surface shows a different patination stage, indicating later reuse. The remaining two surfaces are opposed and share the same platform. The negatives are unidirectional and the removals rather irregular. The third and youngest surface shows hinged removals that may be knapping errors. The right flank of the core was exploited to restore its distal convexity without success.

Although the retouched pieces are relatively numerous, formal tools such as arrowheads, drills, or scrapers are absent. In a single example, retouch modified the entire perimeter of the flake, creating a disc-shaped object that may have served as a scraping tool in pottery production (Figure 6.12.12). Tools of a similar size and shape are attested, for instance, from Neolithic and Chalcolithic sites in the Levant, where they were used as scraping tools in pottery production.[12] Retouch is generally marginal, but in some instances, such as in the case of plaquettes, can be abrupt and invasive (see e.g. Figure 6.12.17). Denticulate retouch is also attested (Figure 6.12.4), while two pieces appear to bear truncations in their proximal areas (Figure 6.12.7-8). One artefact exhibits alternate retouch on the left edge in association with truncation in its proximal end (Figure 6.12.8). Although potentially unfinished artefacts, these might plausibly be interpreted as geometrics adopted as sickle inserts,[13] though they lack the characteristic glossy bands on their edges. A possible ‘core-tool’ has been realised on a fragmentary pebble and shows radial flake removals on one face and bifacial retouch in specific areas (Figure 6.12.32).

In sum, the LB chipped stone industry at Kani Masi, which is dominated by flakes, relied on locally procured chert raw materials. Evidence for on-site chipped stone production is limited and attested only in Area VII, which most likely produced tools used in craft activities associated with Kiln AVII.1.

Reduction and retouch techniques can be classified as expedient, producing *ad hoc* tools.[14] The absence of workshop areas, especially for the production of sickle inserts, may be due to the nature of excavated contexts rather than a real absence, as large workshops producing geometrics are known from LB urban centres such as Mari and Ras Shamra-Ugarit. Similar contexts are also documented at LB Tell Hazor and Qubur el-Walaydah, where chipped stone tools were produced using a range of reduction sequences for the production of geometrics and *ad hoc* tools.[15]

Geographically closer similarities include the chert-produced and flake-dominated LB chipped stone assemblage at Tell Helawa,[16] which also includes a denticulate realised by applying notches on one edge

12 Rosenberg *et al.* (2008).
13 Coqueugniot (1991); Al-Maqdissi *et al.* (2010); Shimelmitz and Zuckerman (2014); Manclossi *et al.* (2018).
14 Shimelmitz and Zuckerman (2014); Manclossi *et al.* (2018; 2019).
15 Shimelmitz and Zuckerman (2014); Manclossi *et al.* (2019).
16 Peyronel *et al.* (2019).

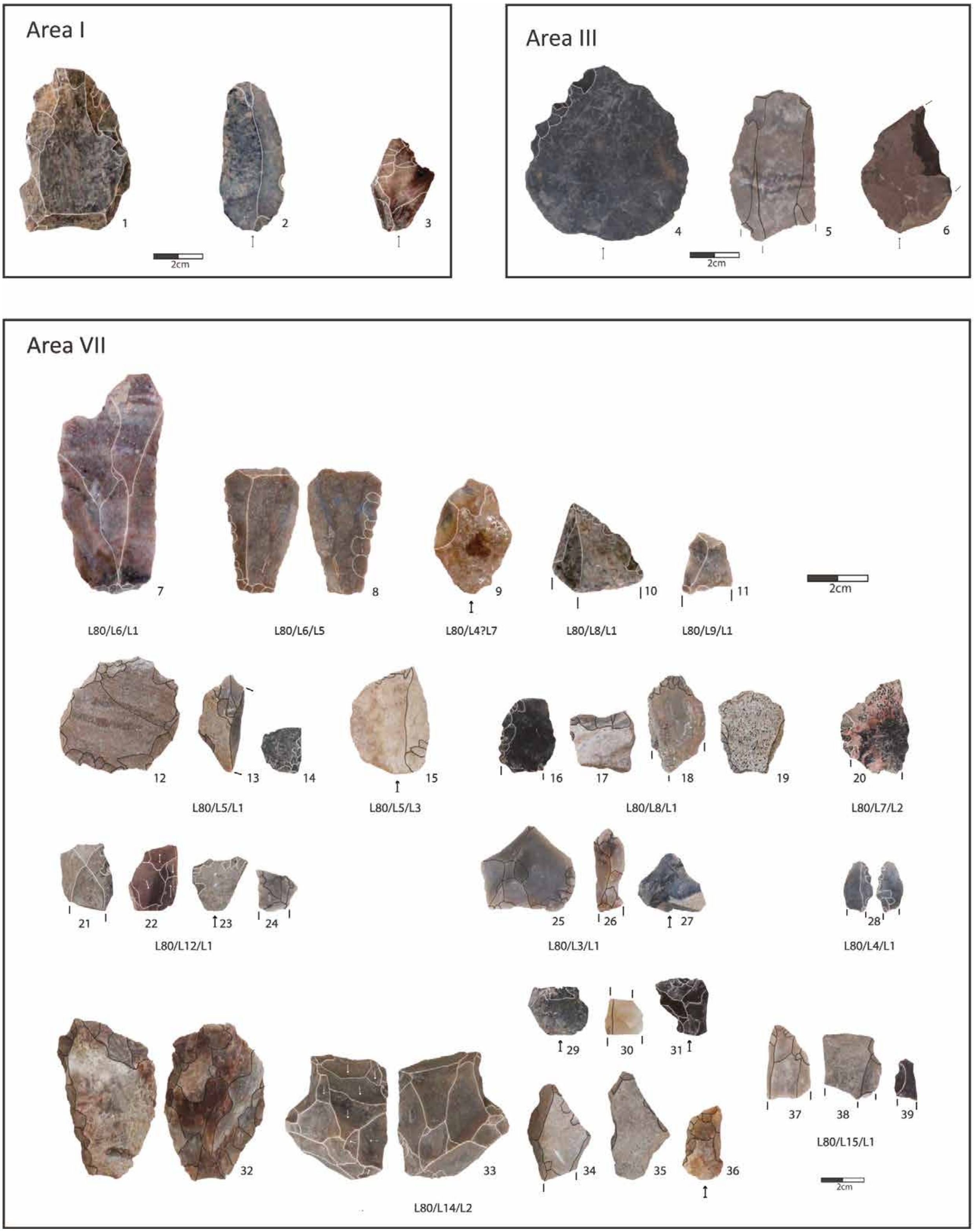


Figure 6.12 Chipped stone assemblage from SRP046.

that is comparable to examples from Kani Masi. The raw materials for the chipped stone industries of LB Gurga Chiya (Trench C) are also locally procured, but the assemblage has a distinctive laminar tendency, with very regular blade items.[17] This difference in chipped stone production at Gurga Chiya is mirrored in respective ceramic assemblages, with Gurga Chiya displaying cultural connections with northern Mesopotamia, while Kani Masi was embedded in a Babylonian ceramic community of practice (see Chapter 7).

6.2.3 Phase 3: Commemorations

Phase 3 presents a horizon of ritual depositions across the site, which commemorate Phase 1 and 2 structures and installations sometime after their destruction or abandonment. We discuss these and other ritual depositions and associated material assemblages in more detail in Chapter 9.4. Here we briefly introduce relevant Phase 3 practices and stratigraphy.

Defining the start and end-date of Phase 3 has proven challenging. How much time elapsed between the final occupations of buildings and craft areas and the deposition of a range of ritual assemblages cannot be defined precisely, as we have only one relevant radiocarbon date for Phase 3. Limited preserved wall heights, depth of fill deposits, and fragmentation patterns observed on faunal remains from relevant loci in Area I, however, point to a significant break in occupation.

This break is also reflected in the ceramic record, with many of the dominant vessel shapes of the previous phases, including wavy-sided bowls (Type A.2), footed cups (Type C.2), and short, hollow-footed goblets (Type F.1) no longer in use in Phase 3. Armstrong and Gasche have argued that these vessels stopped being manufactured across Babylonia in approximately 1200 BCE,[18] which gives some indication of the start of Phase 3 and broadly matches a radiocarbon date of 1220-903 cal. BCE from one of the upper midden horizons in Area II (Y82/L3).

The overall character of the Phase 3 ceramic assemblage at Kani Masi also differs from those of earlier periods, including an increase in the frequency of bowls and a decrease in goblets, which, however, become more elaborate. Broad comparisons for the Phase 3 assemblage can be found in the Hamrin, and in LB or Early Iron Age (EIA) graves in the Pusht-i Kuh of western Iran (see Chapter 7.5.5 for a more detailed discussion of the pottery).

It is highly likely that Phase 3 ritual activities are in part at least contemporaneous with the baked brick buildings unearthed in the southern part of the site, which we group into Phase 4 on architectural grounds. In the absence of any significant quantities of pottery that can be dated to later periods across the site, and based on evidence for a stratigraphic connection of LB III pottery and baked brick architectural features in an exposed surface area near the top of the mound of Tepe Bawa Mahmood (SRP184; see Chapter 11.3.2), it is highly likely that Phases 3 and 4 straddle the LB-IA transition.

6.2.3.1 Area I

Evidence for commemorative practices in Area I include the deposition of two discrete assemblages of ceramic and faience vessels, which we interpret as offering sets. Offering AI.1, which was placed on top of, or dug into the final collapse layer in the central part of Room 1, consisted of two very similar drinking cups with globular bodies, flaring rims, and narrow bases, a faience bucket, and a gold earring (Figure 6.13.A and Figure 9.13). Offering AI.2 was dug into the western wall of Room 1 and consisted of a simple straight-sided bowl in which a squat jug and faience bucket were stacked (Figure 6.13.B and Figure 9.13). Also found nearby was the better part of a beer-brewing vat, a large open-mouthed vessel with perforated base (Figure 6.13.C). These offering sets are discussed in more detail in Chapter 9.4.

6.2.3.2 Area II

A charcoal sample from one of the latest midden layers in Area II produced a radiocarbon date range of 1220-903 cal. BCE, suggesting a continued use of this space as a food preparation and discard area into the final centuries of the second and the early first millennium BCE.

6.2.3.3 Area III

A small fragment of a faience bucket was also found wedged into the side of Kiln AIII.1 in Area III, suggesting similar commemorative ritual activities as in Area I, as does the deposition of a large ovoid jar in a manner suggestive of a jar burial, but with no evidence for human remains. As we discuss in more detail in Chapter 9.2.6, this too is a fairly common depositional practice at LB Kani Masi.

6.2.3.4 Areas IV and V

Jar depositions reminiscent of, but not containing, a burial, are also attested in Areas IV and V to the south and east of Area I.

6.2.3.5 Area VI

The eastward extension of the magnetic gradiometer survey in 2017 suggested the presence of several structures to the north and east of the site. Particularly clearly visible were the outlines of two adjacent trapezoidal buildings c. 100 m northeast of Area I

17 Wengrow *et al.* (2016, Fig. 4.7).

18 Armstrong and Gasche (2014, 101).

Figure 6.13 A) Offering AI.1, B) Offering AI.2, and C) brewing vat in Area I, D) deposit partially covering the ceramic cylinder with relief decoration in Area VII.

(Figure 6.1). In order to investigate these structures further, we opened a 20 × 20 m excavation area in 2018. Extremely compact topsoil significantly slowed excavation progress, however, and soon forced the reduction of the excavation area to a 5 × 20 m stretch along the western side of the trench. Somewhat surprisingly, given the clear magnetic signatures, we were unable to define either walls or floors with any certainty during excavations. However, some 24 clusters of complete or near-complete vessels were unearthed, whose distribution pattern follows the orientation of the magnetic anomalies on what was most likely a floor surface. Bar the extensive plough action, which is responsible for the fragmentation of some vessels or vessel parts, this deposit was undisturbed and the distribution of finds, therefore, lends some credence to an apparent corridor or room implied by the magnetometry.

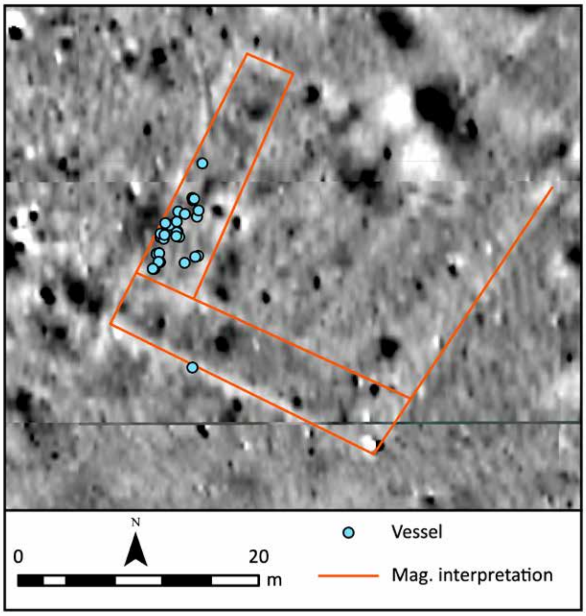


Figure 6.14 Annotated magnetic gradiometer image of Area VI with wall lines and pottery distribution outlined.

The vessels represent a variety of types, including numerous small bowls and plates, and were almost all found lying upside down, with cups and goblets lying on their sides. With the exception of larger jars, which fractured *in situ* from the pressure of the surrounding soil, the lack of vessel fragmentation as well as several unusual artefact arrangements, suggests that these are purposeful depositions, most likely offerings placed along decaying walls similar to Area I (Figures 6.14, 9.14, 9.15). Excavations in Area VI yielded no viable radiocarbon samples, but the recovered ceramic vessels all point to a date in the LB III (see Chapter 7.5.5).

6.2.3.6 Area VII

The disuse of the industrial installations in Area VII too was marked by a ritual deposition. Above the surfaces connecting the earlier fire installations, Kiln AVII.1 and Oven AVII.1, a large cylindrical ceramic object was found, most likely a stand with fenestrations at the top and a prominent decorative relief, which we describe in detail in Chapter 9.3.3 (Figure 6.13.D). The stand was placed amidst, and then deliberately covered by, a series of baked and over-fired brick fragments (L80D/L7).

6.2.4 Phase 4: Baked brick revival

The ritual depositions of Phase 3, which underscore the continued significance of the ruins of the large structure in Area I and surrounding activity areas for Kani Masi's inhabitants, indicate a shared memory of place as well as a wider demographic and cultural continuity. The placement and identical orientation of the buildings in the next phase of major architecture, Phase 4, would seem to support this conclusion. Ceramic and small finds are sparse, no doubt a consequence of the proximity of Phase 4 remains to the modern surface and the use of mechanical ploughs across the site. The overwhelming majority of finds associated with Phase 4 architecture, however, are characterised by cultural continuity from earlier phases.

The major cultural change that occurred in Phase 4 is the introduction of standardised square (c. 35 × 35 cm), reddish-pink kiln-fired bricks and their extensive use in the construction of several large buildings. Large quantities of these baked bricks have been brought to the surface by modern plough action, which show up as extensive areas of high magnetism on the magnetic gradiometer image (Figure 6.1). During the 2017, 2018 and 2019 seasons, we exposed several of these Phase 4 structures in Areas I, VII, and VIII.

The squared brick format and the alternating rows of full and half bricks for the construction of larger walls, Sauvage's ABC technique,[19] and the use of mud-mortar to set the bricks,[20] are well attested at LB sites in central and southern Mesopotamia. There is a diverse range of brick dimensions at especially the large, urban centres of the Kassite world, but baked bricks between 34 to 36 cm squared can be found, for instance, at LB Babylon, Isin, Ur, Nippur, and Larsa, as well as in subsequent IA, or Isin II, contexts.[21]

This matches the chronological range for Phase 4, which two radiocarbon dates suggest straddled the LB-IA transition. A charcoal sample from a second test trench in 2014 (TT2) below a plaster floor in Area I provides a *terminus post quem* of 1410 to 1228 cal. BCE for the start of Phase 4, which, as we outline above, most likely overlapped with Phase 3 ritual activities. A second date of 1220-903 cal. BCE from Area II provides a ballpark for its lower chronological limit.

Sparse finds also mean that the functions of the baked brick structures remain as yet difficult to define. The extensive use of baked bricks, the expense and logistics involved in their production,[22] the size of the buildings, and their architectural layout, seem to point to a public role. Although, unlike many of the monumental structures at Ur, Nippur, and elsewhere, Kani Masi thus far has yielded no inscribed or stamped bricks. Inscribed bricks are also absent from later LB sites in the lower Diyala,[23] and, with the exception of a baked brick pavement at Tell

19 Sauvage (1998).
20 Woolley (1965, 3); Moorey (1994, 309).
21 For a summary table and relevant bibliography, see Sauvage (1998).
22 Potts (2014a, 33-34).
23 Adams (1965, 53).

Figure 6.15 Annotated orthoimage of the Phase 4 baked brick building in Area I.

Yelkhi,[24] no broadly contemporary baked brick structures are attested at sites in the Hamrin. Similarly absent from the wider Sirwan/Diyala region are glazed or moulded bricks used in the construction of ziggurats and temples at Dūr-Kurigalzu and elsewhere.

6.2.4.1 Area I

Excavations in Area I revealed the central portion of a square, multi-roomed building c. 20 × 20 m in size (Figure 6.15), which is clearly visible on the magnetic gradiometer image (Figure 6.1). This structure, which was built using baked bricks, is located less than five metres to the southwest of the Phase 1 building complex (see Section 6.2.1.1 above). A total of five rooms were exposed in Area I. Despite ongoing damage by plough action, the architecture is generally very well preserved and includes several courses of standardised baked bricks, and several layers of lime-plaster on both floors and walls.

Room 1, in the centre of the excavated portion of the building, was paved with baked bricks, one and a half rows of which survive *in situ* in the southwest corner (Figure 6.16.A, E), and was enclosed by different wall formats. Walls 1, 3, 7, and 9 measured 1.5 baked bricks or c. 55 cm in width, each course switching the side on which the full and half bricks were placed. Another wall is only one brick in width (Wall 8), and a third type (e.g. Wall 6) only uses half bricks.

Rooms 2 and 3 to the east and south had floors that were elevated by at least five brick courses above the pavement of Room 1 (Figure 6.16.B, C, E). Several layers of white plaster facing run unbroken from the top of Wall 6 to the very bottom of the wall, where they meet and partially overlie the pavement in Room 1. A gap in the centre of Wall 6 may have been an entrance to Room 3 in an earlier building phase. It is also possible that the small corner of plaster sitting partway between these two levels in the

24 Bergamini (1985).

Figure 6.16 The baked brick structure in Area I: A) Room 1 (looking south), B) corner of Wall 4 and Wall 6, C) Wall 4 (looking northeast), D) corner of Wall 7 and Wall 6 in Room 3 with remnants of lime-plaster floor, E) paved floor in Room 1 (looking south), F) west face of Wall 3 with remnants of Room 4 lime-plaster floor, G) corner of Wall 3 and Wall 9 and part of Wall 10 with pebbled courtyard to the north, H) pebbled courtyard (looking south).

corner where Walls 4 and 6 meet represents the remains of a step down from Room 3 into Room 1 (Figure 6.16.B).

Room 3, which measured c. 3.75 m in width and at least 5.9 m in length, also revealed a plastered floor that meets the faces of the enclosing walls (Figure 6.16.D). The association between the plaster floor and Wall 6 illustrates a sequence of small-scale architectural modifications. Here, two phases of the plaster surface lie both over and under the line of the wall's top surviving course of bricks. It appears that the earlier floor surface was laid over the top of Wall 6, thus opening a large space joining Rooms 1 and 3. It was only later that the upper bricks were added to separate the two rooms. The second phase of plaster flooring was then laid up against the added wall bricks on either side.

Room 2 to the east is also dominated by a lime plaster floor surface that is very well preserved in patches, particularly in the east of the exposure. In some areas, the plaster is up to two centimetres thick and clearly represents repeated episodes of surfacing. Where preserved, it covers the bottom edge of the southeast face of Wall 5. The plaster floor and Wall 5 must therefore have been contemporary, and the wall may originally have been faced with lime-plaster.

Room 4, a large space measuring at least 3.7 × 7 m, was delineated by Walls 1-3 and Wall 10, and abutted Room 1 to its northwest. This room was initially interpreted as an outdoor area.[25] However, further excavation uncovered the extent of Wall 3, revealed Walls 9 and 10, and discovered well-preserved plaster flooring running along the western edge of Wall 3 (Figure 6.16.F).

Room 5 is located to the northeast of Room 4 and northwest of Room 2. Framed by Walls 3, 5, and 9, it measures 3.5 x at least 2.5 m. The area contained within these walls did not reveal any remnants of thick plaster flooring, but whitish flecks remained throughout the hard packed soil. A pebbled, and likely outdoor surface extends to the northwest (Figure 6.16.G-H).

To the southeast of the building, immediately east of Room 3, there may lie another room, or this may be external to the building. Some unclear wall lines were traced northwest from Wall 8 before turning 90 degrees towards the small remaining portion of Wall 11, likely representing the southern limit of Room 2 and possibly the northern limit of Room 6. If Wall 11 does represent the northeast corner of this room, then it measures 3.6 × 5.9 m.

6.2.4.2 Area II

As outlined in the preceding section, a radiocarbon date of 1220-903 cal. BCE suggests the continued use of this area as a place for food preparation and intermittent discard. Most likely, the area serviced the newly constructed baked brick building complex in Area I.

6.2.4.3 Area VII

The heavily disturbed remnants of another baked brick structure were uncovered on top of a c. 10 m tall natural hill in Area VII (Trench L79), with plaster and building material eroding downslope and being seemingly reused in Phase 5 (Figure 6.17.A).

The bricks for the buildings in Areas I, VII, and VIII were most likely produced in a large kiln in Area VII (Kiln AVII.2). Area VII already had a distinctively industrial character in Phase 2, having yielded a kiln, a tannur, and a cooking installation (see Section 6.2.2.2 above). This earlier industrial area appears to have been ritually closed by the deposition of a large ceramic object with relief decoration (see Chapter 9.3.3). In line with the magnetometry results, which showed a large dipolar anomaly in the south-eastern part of Area VII, a large oval kiln structure (4.85 × 4 m) came to light just below the topsoil and amidst a distinctive dark soil laced with ash (Figure 6.17.B-C, M81/L2). The kiln, which has an intricate architecture made of fired bricks, stone and mud-plaster has been badly damaged by modern plough action and only the lowest courses of the combustion chambers survive. A double row of baked bricks skirting the internal architecture most likely presents the remnants of an outer kiln wall.

Hardly any finds were associated with the structure and no kiln wasters were found nearby. This is most likely due to its position just below the current surface of the site and ongoing damage from agricultural activities. Given its size and construction material, especially the pinkish colour of the bricks, which match the Phase 4 buildings in Area I and Area VIII, the kiln was most likely used in the production of baked bricks. Two further installations, a tannur (Oven AVII.3, M81/L4) and large ceramic plate (M81/L7) set in an ashy deposit, were excavated at a somewhat lower elevation and may present an assemblage of cooking and industrial infrastructure belonging to Phase 2. All three installations are sat on a succession of fill layers, which yielded very few archaeological finds (M81/5, M81/L6).

6.2.4.4 Area VIII

Excavations in Area VIII also partially exposed a large, multi-roomed rectangular structure that formed part of a series of aligned buildings along the southern perimeter of the site (Figure 6.17.D-E). Only the bottom baked brick courses of two walls were encountered, however, immediately below the topsoil; the rest had been removed by recent ploughing. Set upon levelled and compacted soil, the preserved course of the walls is one and a half bricks wide, the same as Walls 1, 3, 7, and 9 in Area I, suggesting a similar date. With the

25 Glatz *et al.* (2019).

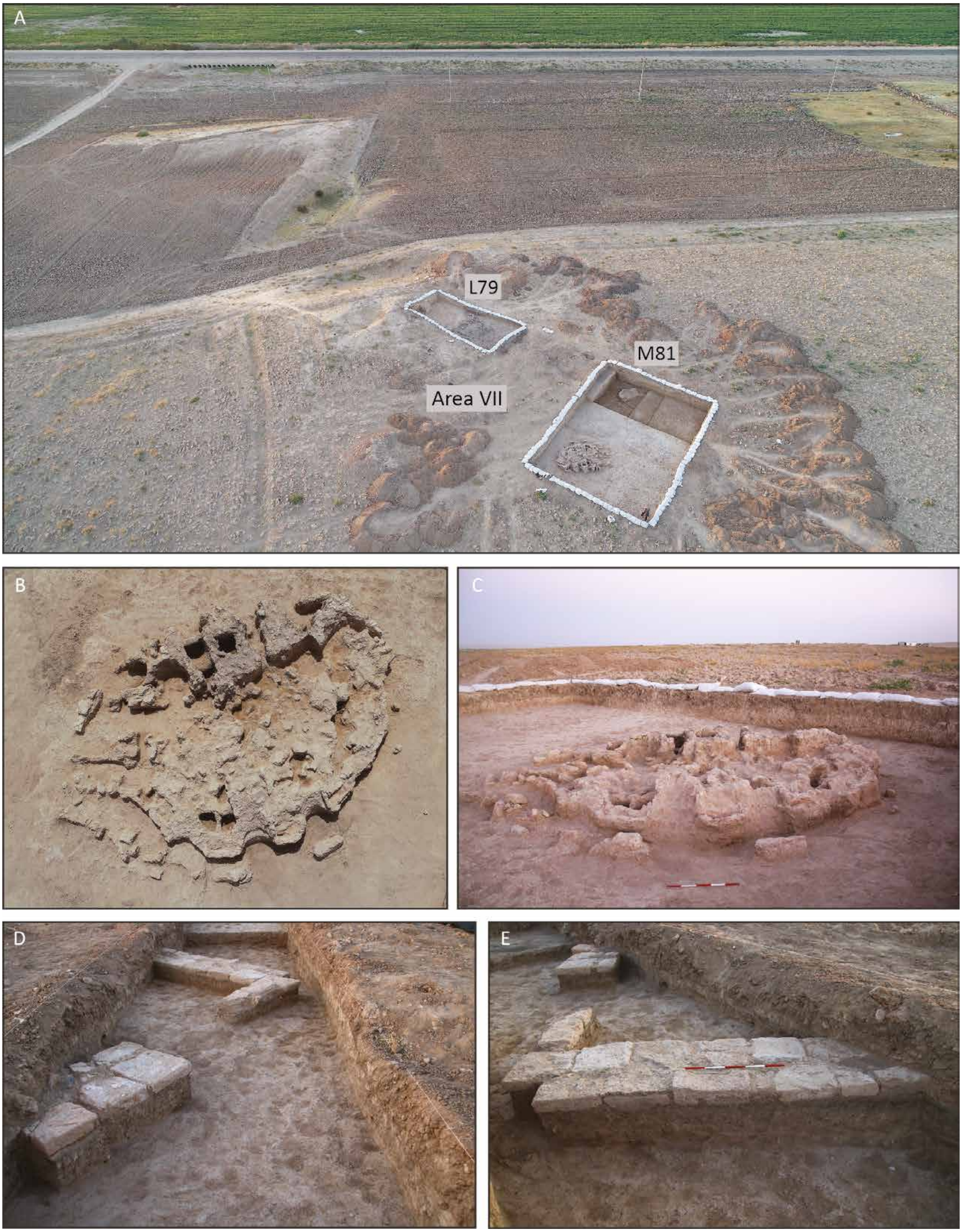


Figure 6.17 A) Aerial view of Area VII exposures in 2018, B-C) Kiln AVII.2, and D-E) baked brick architecture in Area VIII.

Figure 6.18 A) Oven AI.2 in Area I, B-C) other baked brick re-uses in Area I, D) Locus 2 brick construction in Area IV, E) Locus 3 structure, F) a further elongated baked brick structure, and G) Oven AIV.1 in Area IV.

exception of a small bronze pin fragment, no other material was associated with the walls.

Also unclear is how Phase 4 came to an end. A burnt collapse layer, found associated with the brick course in Area VIII, could suggest a violent ending of some form, but the better preserved structure in Area I yielded no indicators of how it may have met its end. The general lack of artefacts on any of the floors, while perhaps partly the result of close proximity to the ploughed surface, may point to a deliberate clearing.

6.2.5 Phase 5: Baked brick re-use

Several ephemeral phases of activity at the site are attested only centimetres below the topsoil. The most substantial of these is characterised by the use or re-use of the baked bricks of Phase 4 to produce small-scale features. Also attested at similar elevations are a series of tannur ovens. We have grouped these together as Phase 5. Some of these features are very likely associated with Phases 3 and 4, but they are difficult to date with confidence in the absence of securely stratified finds.

6.2.5.1 Area I

In Area I, evidence for Phase 5 occupation includes a tannur installation, c. 100 × 63 cm, in Room 6 of the baked brick structure (Oven AI.2, Z88/L4, Figure 6.18.A; B-C for other brick features in Area I). The tannur's date of construction and use remains difficult to determine as it contained a mixed pottery assemblage and a fragmented glass vessel.

6.2.5.2 Area IV

During Phases 1 and 2, Area IV functioned as a refuse area. In Phase 5, a series of baked brick features were constructed in this part of the site. This includes a small, squared baked brick structure (DD89/L2) which was found partially covered with stacks of upright, unfired mudbricks (Figure 6.18.D). No human remains were found, but shape and construction method suggest a grave. Similar graves are attested from thirteenth to twelfth century BCE Babylon, Tell ed-Der, Uruk, Nippur, Tell Zubeidi, and a few earlier examples have been documented at Tell Yelkhi.[26] Examples from Babylon and

26 Sternitzke (2017, 366, Fig. 14.04b, 269, Pl. 14.01).

Tell Basmaya also include stacked upright brick coverings.[27] This technique is also known from Parthian-period graves,[28] but in the absence of other finds from this period a later date seems unlikely. A rectangular niche was found associated with this feature, whose purpose was perhaps to hold offerings. Alternatively, it could have functioned as a hearth,[29] although no associated ash deposits were found.

A second, narrow and rectangular brick-constructed feature (CC89/L3) occupied the north-eastern part of the exposure (Figure 6.18.E). Oriented northeast to southwest, the feature also included a small rectangular installation. This rectangular niche was open on its southeastern side with three baked bricks set vertically into the ground to form the other three sides. Several additional but more fragmented baked brick features were encountered (Figure 6.18.F).

Two circular tannurs (Oven AIV.1 and AIV.2) were also found nearby. The tannurs were constructed of two layers of over-fired clay and had their top portions destroyed by their close proximity to the modern surface. Oven AIV.1 contained a series of baked bricks stacked on top of one another as well as a small number of sherds, bone, a bead, and a small fragmentary ball (Figure 6.18.G).

While the tannurs were likely used for food preparation, the purpose of the brick constructions remains uncertain. The spacing between them and the brick niches adjacent to two of them may point to a burial and/or ritual function. The presence of glass and modern ceramic fragments in near-surface contexts notwithstanding, later second millennium BCE pottery was the dominant material culture present in all of the Phase 5 loci. Hence, despite their disturbed contexts, these features could very well be broadly contemporary with Phases 3 and 4.

6.2.5.3 Area VII

A similar re-use of baked brick fragments combined with a possible pyrotechnological installation was also found at the bottom of the slope of the small hill in Area VII.

6.2.6 Phase 6: Sporadic later occupations

A small number of turquoise and dark green glazed sherds and fragments of glass vessels point to the sporadic post-LB-IA use of the site. Blue and turquoise-coloured glass bracelet fragments, which appear across the region after the seventh century CE,[30] were recovered in small numbers from several surface and topsoil contexts and may point to Islamic-period burials now destroyed by plough action. An Ottoman pipe fragment is also among the site's surface finds. Near-surface remnants of open fireplaces in Area IV and Area VII, modern ceramics, nails, and other implements attest to the occasional use of the site in the more recent past, including perhaps as a campsite.

6.3 Conclusions

To sum up, SRP046 was first settled in the sixteenth century BCE and its occupation appears to have continued with limited interruptions into the early centuries of the first millennium BCE (Phases 1-5). The site was then used more sporadically as a likely burial location and campsite up until the modern period (Phase 6). Kani Masi is currently the earliest securely dated site associated with Middle Babylonian or Kassite material culture and practices, which we outline in detail in the following Chapters 7-10. It is also the only extensively excavated site to date that shows a broadly continuous sequence of occupation spanning the LB-IA transition.

Kani Masi's open, multi-mounded settlement morphology with no discernible high-mound or perimeter wall, and with large buildings located at some distance to each other and with interceding spaces utilised as cooking, craft, and disposal areas, differs from that of other large LB sites in the SRP survey region, and also from other contemporaneous sites in central and southern Mesopotamia (see also Chapter 11.2-3).

Tepe Bawa Mahmood (SRP184), for instance, consists of a steep tall mound, which housed a substantial LB structure at the top that is now built over by a modern shrine. The site may also have had a LB lower town. The sprawling lower mound of Tepe Kalan (SRP018) also produced extensive LB surface collections and stratified contexts, although a LB occupation on the main mound is less certain. A broadly similar settlement morphology also characterises the site of Tell Yelkhi in the Hamrin. Tell Yelkhi, which was occupied from the fifteenth to the twelfth century BCE,[31] accommodated a so-called governor's residence, a building of broadly similar size to the Area I structure at Kani Masi, on the top of the central mound, while the LB II lower town of Tell Kesaran produced evidence for craft production areas.[32] Other excavated Middle Babylonian sites also tend to display a more tightly clustered settlement fabric than that observed at Kani Masi. This is the case for small, rural settlements such as Tell Zubeidi,[33] a collection of domestic houses on Mound 7 at Tell Basmaya,[34] and the urban neighbourhoods of LB Ur.[35] Kani Masi, thus, may be added to a growing number of case studies that defy classification through traditional Bronze Age Mesopotamian settlement typologies.[36]

27 Ibid.; Almamori *et al.* (2020, Fig. 27.2, Grave 25).
28 Novák *et al.* (2000, 15-19).
29 For the latter interpretation, see e.g. Stone and Zimansky (2004, 391, Fig. 339).
30 Spaer (1992).
31 Invernizzi (1980); Bergamini (1985).
32 Bergamini (1985, 56).
33 Boehmer *et al.* (1985, Pl. 61).
34 Almamori *et al.* (2020, Fig. 8).
35 Woolley (1965).
36 Stone and Zimansky (2004); Campbell *et al.* (2017b); Hammer (2022).

What this might imply with regards to the site's function is a more difficult question to answer. Given the lack of concern with defensibility, either through elevated topography or the construction of defensive architecture, as well as a complete absence of weaponry from the site, we can exclude a function as a military and administrative outpost such as, for instance, the Sealand site of Tell Khaiber,[37] or Middle Assyrian Tell Sabi Abyad.[38] Rather, and as we shall argue in more detail in the following chapters, the available archaeological evidence suggests that social gatherings involving feasting and other ritual acts formed the foundation of Kani Masi's local and regional significance.

37 Campbell *et al.* (2017b).
38 Akkermans (2006).

7

Kani Masi's Late Bronze Age Pottery: Style, Technology, and Cultural Connectivity

7.1 Introduction

Excavations at Kani Masi (SRP046) have recovered a significant assemblage of LB pottery that must be understood within its broader regional and chronological context. Substantial LB pottery assemblages have previously been identified from excavations at the main cities of the lowland alluvial plains – Nippur,[1] Isin,[2] Uruk,[3] Ur,[4] Tell ed-Der,[5] Babylon,[6] Kish[7] and Dūr-Kurigalzu[8] – as well as from regional surveys.[9] While generally considered to demonstrate continuity with MB styles, LB Babylonian style assemblages are usually identified by the presence of the characteristic and highly diagnostic goblet.[10] These iconic goblets, described by Armstrong and Gasche as the "form *par excellence* for dating",[11] are used as key indicators for identifying widespread re-settlement of the alluvial plains during the late fifteenth and fourteenth centuries BCE, following the ostensible 'Dark Age' (c. 1740-1450 BCE) that is assumed to have followed the disintegration of the First Babylonian Dynasty. The Kassite goblet, more than any other vessel type, is implicitly tied to notions of imperial control and its stylistic persistence assumed to reflect the relative stability of Kassite power until c. 1150 BCE.

LB pottery assemblages have long been seen as the artistically impoverished backdrop to the high-level wealth and artistry of the LB international scene. Thrane has referred to the "astonishing conservatism" of pottery during the Kassite period.[12] The material collected from excavations of four distinct stratigraphic phases (Levels I-IV) at Dūr-Kurigalzu, for instance, was deemed so homogenous as to be adequately captured with a single photograph.[13] This ostensible conservatism has seen these LB pottery assemblages characterised simply as 'Kassite', a label of coarse chronological use considering the Kassite dynasty reigned for approximately four centuries in areas of northern Babylonia,

1 Armstrong (1993, 130).
2 Hrouda (1977; 1981); Kaniuth (2017).
3 van Ess (2014).
4 Woolley (1965).
5 Pons (1989); Gasche (1991); Minsaer (1991).
6 Sternitzke (2016).
7 Clayden (1992).
8 Baqir (1945).
9 Adams (1965; 1981).
10 Adams (1965, 51); Adams and Niessen (1972, 14).
11 Armstrong and Gasche (2014, 101).
12 Thrane (1999, 32).
13 Baqir (1945, Fig. 25).

Historical	Material / Culture-Historical		Material
Brinkman (2017)	Armstrong (2017)	Sternitzke (2016)	Calderbank and Oselini (forthcoming)
Early Kassite (c.1750-1415)	-	-	-
		Early Kassite (c.1500-1400)	LB I (c.1600-1400)
Middle Kassite (1415-1225)	Early Kassite (1450-1300)	Middle Kassite (c.1400-1300)	LB II (c.1400-1250)
Late Kassite (1225-1155)	Late Kassite (1300-1150)	Late Kassite (c.1300-1150)	LB III (c.1250-1150)

Table 7.1 The main chronological systems provided for Late Bronze Age Babylonia, separated according to organising principle.

and exerted influence for at least three centuries across vast swathes of the wider region, including the southern marshlands and the littoral regions of the Gulf.

Several broad chronological frameworks exist for LB Babylonia (Table 7.1). Brinkman, for example, separates the Kassite period into three historically defined units: Early (from Samsuiluna to Karaindaš, c.1750-1415 BCE), Middle (Karaindaš to Kaštiliašu IV, 1415-1225 BCE), and Late (Tukulti-Ninurta I to Enlil-nādin-aḫe, 1225-1155 BCE).[14] This historical chronology must be considered alongside materially determined chronological frameworks. In his state-of-play contribution to the *Karduniaš* volume, Armstrong advances a culture-historical framework based on ceramic development amongst several common vessel types. While his overall impression is that "the similarity – even homogeneity – of vessel shapes from all parts of Babylonia during the Kassite Period is striking",[15] he does recognise broad separations between Early Kassite (c. 1450-1300 BCE) and Late Kassite styles (c. 1300-1150 BCE), especially for bowls, stemmed cups, small jars, and goblets.[16] Armstrong also notes a general decrease in the quality and care taken in the production of Late Kassite vessels compared to their early counterparts.[17] Sternitzke has added further refinement by reanalysing the pottery from Babylon, suggesting Early (c. 1500-1400 BCE), Middle (c. 1400-1300 BCE), and Late Kassite (c. 1300-1150 BCE) pottery styles.[18]

These relatively unrefined pottery frameworks of the LB contrast with the comparative data we have seen for other periods covered in this volume, in particular those recently developed for the Late Chalcolithic (for a detailed discussion, see Chapter 3). This is partly due to the previously mentioned homogeneity of LB assemblages, but is undoubtedly also a product of the underlying research motivations that have driven analyses of LB pottery: to identify the presence of state/imperial power (e.g. 'Kassite') and to map its territorial extent.[19] Only recently have we started to plot pottery styles onto a neutral chronological framework divorced from the historical record. This chapter works alongside the chronological framework developed by Calderbank and Oselini,[20] which is based on regional pottery styles along the Sirwan/Diyala river valley and supported by radiocarbon dates from Kani Masi. Although we continue to use terms such as 'Kassite' or 'Middle Assyrian' in this volume, we do so with necessary qualification. For example, we generally opt for 'Kassite-style' or 'Babylonian-style' pottery, subtle differences which we believe stress cultural affinity rather than political control.

The overwhelming majority of stratified LB ceramic evidence recovered from the Babylonian heartland dates to the LB II-III. Material dating to the late fifteenth century, the latter part of the LB I, has been recovered from just a few restricted contexts at Tell ed-Der (Area E3, Phase 1c; Area F, Burial 392) and Nippur (Area WA, Level IVC), with material from Susa (Level A XII-XI) also being drawn upon selectively to identify the main trends of ceramic development during this early phase.[21] In so doing, past analyses have largely overlooked assemblages from the Gulf – Failaka island (Periods 3A-4A) and Qala'at al-Bahrain (Periods IIIA-B) – and from Tell Yelkhi (Levels II-I) in the Hamrin. Tell Yelkhi demonstrates a sequence of broadly continuous occupation between c. 1525 and 1150 BCE, supported by a robust pottery sequence.[22] Recent excavation at several sites in the Shahrizor and the Erbil plains have also recovered LB material at Bakr Awa,[23] Gurga Chiya,[24] Dekon,[25] and Kurd Qaburstan.[26] Each of these assemblages demonstrate complex patterns of local and

14 Brinkman (2017).
15 Armstrong (2017, 421).
16 Gasche *et al.* (1998, 27-38, Pls. 1-3); Armstrong (2017, 422-430, Fig. 15.1-3).
17 Ibid., 429.
18 Sternitzke (2016).
19 See Calderbank (forthcoming) for a critique.
20 Calderbank and Oselini (forthcoming).
21 Gasche *et al.* (1998, 38-39); Armstrong (2017, 434-435).
22 Bergamini *et al.* (2002-3).
23 Miglus *et al.* (2013); Miglus (2016).
24 Wengrow *et al.* (2016, 258-261).
25 Marf (2021); Marf *et al.* (forthcoming).
26 Schwartz *et al.* (2022).

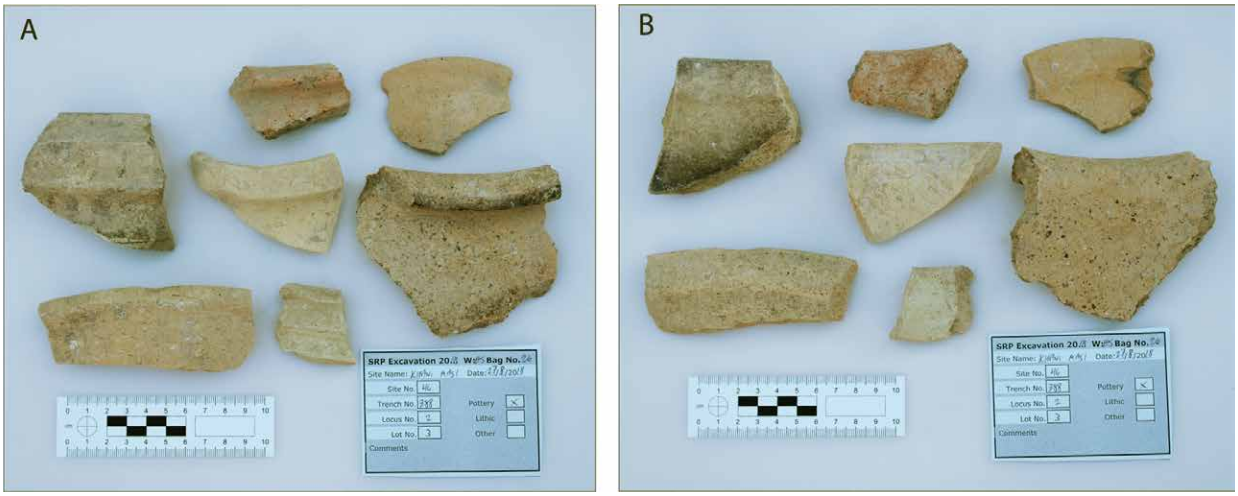


Figure 7.1 Field photographs of diagnostic sherds used for typological identification: A) exterior surfaces and B) interior surfaces.

inter-regional connections that we are only just starting to identify and understand.

Kani Masi provides the first extensive LB pottery assemblage for the Sirwan region, supported by rigorous stratigraphic context and a series of radiocarbon dates. The analysis presented in this chapter, and integrated into other parts of the volume, endeavours not only to present a chrono-morphological assessment, but to examine Kani Masi's pottery as embedded within the everyday lives of its community, and therefore central to processes of socialisation, identity formation, and cultural interaction in this highland-lowland interface.

We intend to do this via three main objectives:

1. to provide a detailed typological assessment of the site's LB I-III assemblage, split into a hierarchical system of vessel *Families* and constituent *Types*. Vessel Families provide important information on intended vessel function, therefore informing the contextual and distributive analyses in Chapters 6 and 8, while vessel Types offer chronological insights which can be used to support a robust, localised chronological framework (Sections 7.3 and 7.5).
2. to undertake a technological *chaîne opératoire* analysis of the assemblage – from clay preparation to techniques of forming, finishing, and firing. This will provide insights into the local craft economy, particularly in relation to issues of production scale and product standardisation (Section 7.4).
3. to trace the diachronic development of the LB assemblage (Phases 1-3; see Chapter 6) in relation to relevant (inter)regional assemblages (Section 7.5) and the broader socio-political context.

These varied forms of analysis are critical to understanding the dynamic craft relationships at play between the Kani Masi community and others living along the course of the Sirwan/Diyala, especially given the network of multi-directional cultural and political influences emanating from Babylonia, Mitanni, Assyria, the Zagros, and Elam during the LB period.

7.2 Collection and recording methods

Collection and recording of Kani Masi's pottery followed a process designed to maximise expediency. Pottery was not routinely collected from the overburden or the mixed upper deposits of the site, but was kept only from secure loci. Pottery from these loci was sorted on site at the end of each day's excavation; bulk body sherds were discarded in a controlled manner, while complete vessels and diagnostics were brought back to the project base for recording and analysis.

Two levels of recording methodology were used. The first, more intensive method consisted of a sample of all complete/almost complete vessels (n=99) and selected diagnostic sherds (n=400) covering the spectrum of different vessel Families/Types. These were illustrated and supplementary data was collected on several features: shape type, rim and/or base diameter, surface/fabric colour, and inclusion type/concentration. Further morphometric data was collected for complete vessels, including maximum height, maximum width, and volumetric capacity.

The second, less intensive method of recording was applied to all diagnostic sherds from stratified occupational deposits in Area I (n=949). High-resolution field photographs were taken of the interior and exterior surfaces of all bulk diagnostic sherds (Figure 7.1). Once the shape typology had been established, these photos were used for typological identification of sherds. This method was used because it could be applied remotely, a necessity due to the travel restrictions brought about by the Covid-19 pandemic, and was deemed a reliable method for providing important bulk distributive data. To minimise issues with misidentification, sherds were only typologically assigned when certain, and only to the level of vessel Family. This was necessary when working from photographs, where general shapes are more easily identifiable, but subtleties of Type are more ambiguous. The association of diagnostic sherds to vessel Families, while relatively coarse, allows important information to be gathered on the spatial distribution of functional vessels, integrated into the discussion of the Area I building in Chapter 8.2.

The data presented in this chapter will follow the phasing set out for Kani Masi in Chapter 6. These phases are summarised as follows, with the attribution of specific pottery-yielding loci presented in Table 7.2.

- **Phase 1a**: sporadic earliest evidence for site use, including sounding in Area I, architectural features in Area II, and the house and associated Burial AIII.1 in Area III.
- **Phase 1b**: primary building phase in Area I, and Burials AI.1 and AI.2 and associated levels in Area II.
- **Phase 1c**: partial abandonment of Area I south, including Burial AI.3 and AI.4, and the final phase of Area I north rebuilding.
- **Phase 1d**: Area I collapse, jar Burials AI.6-8.
- **Phase 2**: industrial reinterpretation in Area III, including Burial AIII.2, and industrial activities in Area VII, which overlap chronologically with Phases 1c-d in Areas I and II.
- **Phase 3**: Architecture in Area VI, and ritual/memorial activities across the site.
- **Phase 4**: Baked brick architecture in Areas I and VIII, refuse deposits in Area II, and industrial installations in Area VII.
- **Unstratified**: any ceramics where the stratigraphic relationship could not be fully determined.

7.3 Typological structure

The Kani Masi assemblage follows a multi-level framework of classification. Firstly, a series of essential shape-based separations (Families) are identified, organised according to their degree of openness, with open Families appearing before closed Families. Families are designated by alphabetic signifiers (A, B, C…) and are labelled with commonly used ceramic terms, such as bowl, goblet, cup, and jar. Shape Families are then separated into constituent Types by variations in rim shape, foot/base shape, and occasionally also by distinctive diagnostic body shapes. Types are represented by single numbers (e.g. A.1, A.2, A.3…), with the lowest numbers being reserved for complete shapes (where present), then rim shapes, body shapes, and foot/base shapes in ascending numerical order. For several Types, the preservation of numerous complete profiles allows the identification of Sub-Types, separated by subtle differences in body shape.

> For example:
> Family: F. Goblets.
> Type: F.1. Short flaring foot
> Sub-Type: F.1a. Short flaring foot with spherical body and cylindrical neck

In total, 12 vessel Families have been identified, comprising 43 constituent Types, as well as an additional five miscellaneous shape Types and four ambiguous rim/base Types. The typology was designed in this hierarchical manner and with the associated numbering system to correspond broadly with Armstrong and Gasche's second-millennium vessel typology,[27] as well as broadly contemporaneous assemblages analysed in recent years.[28] Unlike Armstrong and Gasche's typology, which incorporates technical aspects of production, the Kani Masi typology follows a purely shape-based structure, designed to fall more in line with intended vessel functions. Detailed technological discussion will instead be provided in Section 7.4.

Since LB assemblages are generally well known elsewhere across the region, this typological assessment will not provide exhaustive typological descriptions and illustrations to demonstrate minor variations within each Type. Instead, it will provide general typological descriptions for Families/Types, supported by a selection of illustrations, morphological description, and phase distributions. Section 7.5 will then discuss a few key Types that impact most significantly upon questions of chronology and inter-regional cultural connection. Associated information on rim and base diameters and volumes for each Family/Type can be found in Table 7.3.

7.3.1 Shape typology

7.3.1.1 A: Small bowls

Small-medium sized open bowl Types (<250 mm rim di.) are the most frequently attested Family of vessels within the Kani Masi assemblage (Table 7.4, Figure 7.2). Almost all bowls have flat, string-cut bases, which are generally fairly roughly finished, with the body flaring outwards directly above the base. The differences between the six distinct Types are determined firstly by body shape (A.1-4) and secondly by rim shape (A.5-6):

27 Armstrong and Gasche (2014).

28 Calderbank (2021a).

Phase	Area	Locus (with pottery)	2 Sigma (BCE) IntCal2020
1a	Area I	Y88/L125-126	1505-1418 (V85/L175/L2)
	Area II	Y82/L21-22	
	Area III	V85/L175, V85/L180	
1b	Area I	Y88/L113, Y88/L121-2 Z88/L15-17	1506-1319 (Z88/L17/L2) 1499-1320 (Y82/L18/L2) 1497-1317 (Z88/L16/L1) 1488-1292 (Y82/L20/L4)
	Area II	Y82/L16-20	
	Area III	V85/L176	
1c	Area I	Y88/L108 Y88A/L33, Y88A/L36, Y88A/L39-45 Y88B/L20, Y88B/L22, Y88B/L27, Y88B/L38 Y89/L5, Y89/L6 Z88/L7-9	1446-1285 (Y82/L9/L2) 1433-1288 (Z88/L9/L1) 1430-1291 (DD89/L9/L1) 1421-1272 (Y82/L9/L6) 1421-1261 (Y82/L9/L3) 1421-1127 (Y82/L9/L1) 1418-1270 (Y82/L13/L5) 1416-1133 (Y82/L7/L3) 1417-1289 (Y88A/L20)
	Area II	Y82/L7, Y82/L9, Y82/L13-14	
	Area IV	DD89/L8, DD89/L10	
1d	Area I	Y88A/L15-18, Y88A/L21 Y88B/L4, Y88B/L7-8, Y88B/L12, Y88B/L33, Y88B/L35 Y89/L4 Z88/L5, Z88/L24, Z88/L14	1391-1132 (Z88/L14/L4, V1) 1277-1056 (Z88/L14/L4, V2)
2	Area III	V85/L17, V85/L110, V85/L116, V85/L127, V85/L164	1391-1128 (V85/L164/L4)
	Area VII	L80C/L6, L80C/L10, L80D/L13	
3	Area I	Y88/L102-4, Y88/L110 Y88B/L2-3 Y89/L3	1220-903 (Y82/L3/L3)
	Area II	Y82/L3, Y82/L10	
	Area III	V85/L2-4, V85/L7, V85/L157	
	Area V	Z90D/L2, Z90D/L10	
	Area VI	N94/L2-3	
	Area VII	L80C/L2, L80D/L2	
	Area VII	M81/L6	
Unstratified	Area I	Y88.0 Y88A/L13-14 Y88B/L1	-
	Area III	V85/L1	

Table 7.2 Relevant loci separated by phase and area. Loci are listed in stratigraphic order. Only loci with collected ceramics are included.

- **Type A.1.** Ripple-sided body, with a simple, rounded rim. The body often exhibits a characteristic ‘wobbly’ effect.
- **Type A.2.** Wavy-sided, s-shaped body, with a flaring, rounded rim.
- **Type A.3.** Curved body, with a rounded rim, which is occasionally slightly thickened with an impressed notch directly beneath.
- **Type A.4.** Sharply turned/carinated upper body leading into different shaped rims: simple and rounded, slightly thickened with incised bands directly beneath, or a flat ledge rim.
- **Type A.5.** Straight-sided body, with a slightly inverted shape close to a simple rounded or squared rim.
- **Type A.6.** Straight-sided body, with a slightly everted shape close to a simple rounded or squared rim.

Eighteen complete bowl profiles are attested, most of which belong to Types A.1-2. These vessels, as a rule, exhibit open, shallow shapes with simple flat bases to provide stability. Base diameters always fall between 45-60 mm. Rim diameters, while showing overall diversity (range 110-300 mm), mostly fall within a tight range of 100-200 mm (avg. 185 mm). Vessel capacities are

Type	N	Rim di. Range	Rim di. Avg.	Base di. Range	Base di. Avg.	Vol Range (L)	Vol. Avg. (L)
A.1	10	145-195	176	46-70	62	0.22-0.48	0.37
A.2	17	110-240	145	40-58	52	0.07-0.31	0.19
A.3	9	160-300	204	62	62	0.44	0.44
A.4	5	190-240	208				
A.5	3	170-250	203	60	60	0.36	0.36
A.6	3	150-200	175				
A Total	**47**	**100-300**	**174**	**40-70**	**57**	**0.07-0.48**	**0.30**
B.1	6	300-390	336	122-137	130	3.49-4.76	4.13
B.2	2	250-255	253	94	94	1.77	1.77
B.3	8	220-360	274				
B.4	4	375-450	417				
B.5	1	330	330				
B Total	**21**	**225-450**	**313**	**94-137**	**118**	**1.77-4.76**	**3.34**
C.1a	7	65-69	67	26-38	32	0.08-0.27	0.2
C.1b	5	60	60	27-32	31	0.13-0.23	0.2
C.2	24			27-38	32		
C.2a	17	55	55	23-38	31	0.05-0.09	0.07
C.2b	41	57-58	58	25-45	33	0.1-0.2	0.14
C.3	4			50-53	51	0.14-0.16	0.15
C.4	6			18-35	26	0.15	0.15
C Total	**104**	**55-69**	**62**	**18-53**	**32**	**0.05-0.27**	**0.15**
D.1	1			0	0	0.22	0.22
D.2	2	32		0	0	0.09-0.1	0.1
D Total	**3**	**32**		**0**	**0**	**0.09-0.22**	**0.14**
E.1	16			34-72	50	0.31	0.31
F.1	25			53-85	60		
F.1a	6	72-76	74	45-67	58	0.18-0.53	0.39
F.1b	12			65-82	74	0.9-0.96	0.93
F.2	5			55-60	58		
F.2a	6	62	62	56-68	60	0.32-0.5	0.38
F.2b	12			50-75	62		
F.3	20			48-62	57		
F.4	5						
F.5	1			68	68	0.52	0.52
F Total	**92**	**62-76**	**70**	**45-85**	**61**	**0.18-0.96**	**0.47**
G.1	2	120-200	160				
G.2	1						
G.3	2			56-82	69		
G Total	**5**	**120-200**	**160**	**56-82**	**69**		
H.1	9	110-220	135				
H.2	12	110-180	134			ca. 12-15	ca. 12-15
H.3	11	100-140	120				
H.4	1					ca. 4.8	ca. 4.8
H Total	**34**	**100-220**	**130**				

Type	N	Rim di. Range	Rim di. Avg.	Base di. Range	Base di. Avg.	Vol Range (L)	Vol. Avg. (L)
I.1a	5	440-600	523	265-440	353		
I.1b	2	370-380	375	280	280		
I.2a	2	470-580	525				
I.2b	3	290-370	333				
I.3	1	500	500				
I.4	1						
I.5	1			260	260		
I Total	**15**	**290-600**	**449**	**260-440**	**311**		
J.1	2	370-480	425	65 (25 hole)	65 (25 hole)		
J.2	3	300-600	417	76 (20 hole)	76 (20 hole)		
J.3	7			45-75 (15-26 hole)	60 (20 hole)		
J Total	**12**	**300-600**	**420**	**45-76 (15-26 hole)**	**63 (21 hole)**		
K.1	5	150-240	200				
K.2	6	100-250	198				
K.3	1						
K Total	**12**	**100-250**	**199**				
L.1	3	150-210	179	165-195	178		
L.2	2	170-225	198	215	215		
L Total	**5**	**150-225**	**187**	**165-215**	**188**		
M.1a	4	80-84	81	24-35	28		
M.1b	3	39-95	62	28-48	35		
Z.1	4	85-105	95				
Z.2	2	60-70	65				
Z.3	10			45-126	71		
Z.4	6			80-128	108		

Table 7.3 Core morphometric information for main diagnostic sherd Types and Families.

consistent with that of an individual food portion or for sharing of small plates as part of a communal meal (range: 0.07-0.48 L; avg. 0.3 L; n=19, Figure 7.7). There is a clear separation, however, between the volumetric measures of Type A.2 vessels (avg. 0.19 L) and all other measured Types (A.1, A.3, and A.5), which tend to hold approximately twice the capacity (avgs. 0.36-0.44 L).

Bowl Types A.1 and A.2 are considered central to the Kassite LB I-II tradition. Both Types are commonly found in LB assemblages at Tell Imlihiye and Tell Zubeidi in the Hamrin,[29] and at sites across Babylonia[30] and the Gulf.[31] At Kani Masi, however, Types A.1 and A.2 exhibit different chronological trajectories (Figure 7.3.A). While Type A.2 represents the most common bowl type in Phases 1a-2, A.1 bowls only start to appear in Phase 1c before suddenly displacing A.2 as the dominant type in Phase 3. No ripple-sided bowls at all were recovered from LB levels at Tell Yelkhi,[32] reinforcing the differential uptake of these two vessel types between sites in the Sirwan/Diyala and lowland Babylonia.

Wavy-sided bowls (Type A.2) are similarly typical of the Middle Assyrian 'standard ware' tradition, as seen at Tell Sabi Abyad[33] and at sites in the Syrian Jazirah.[34] Localised variations have also been identified at Nuzi,[35] Godin Tepe phase Post III:2,[36] and Tepe Guran, GII Layer B.[37] The Tepe Guran bowls, however, are perhaps more similar in shape and fabric to those of the MB Shamlu tradition

29 Boehmer *et al.* (1985, Pls. 28.22-27, 114-115).
30 Armstrong and Gasche (2014, Pls. 36-37).
31 Højlund (1987, 77-80, 121-128, Fig. 455).
32 Valtz (2002-3).
33 Duistermaat (2008, Fig. IV.12-14, 36-40).
34 Pfälzner (2007, Pl. 24.275-280).
35 Starr (1939, Pl. 89).
36 Henrickson (2011, Fig. 6.40).
37 Thrane (2001, Pls. 62-63).

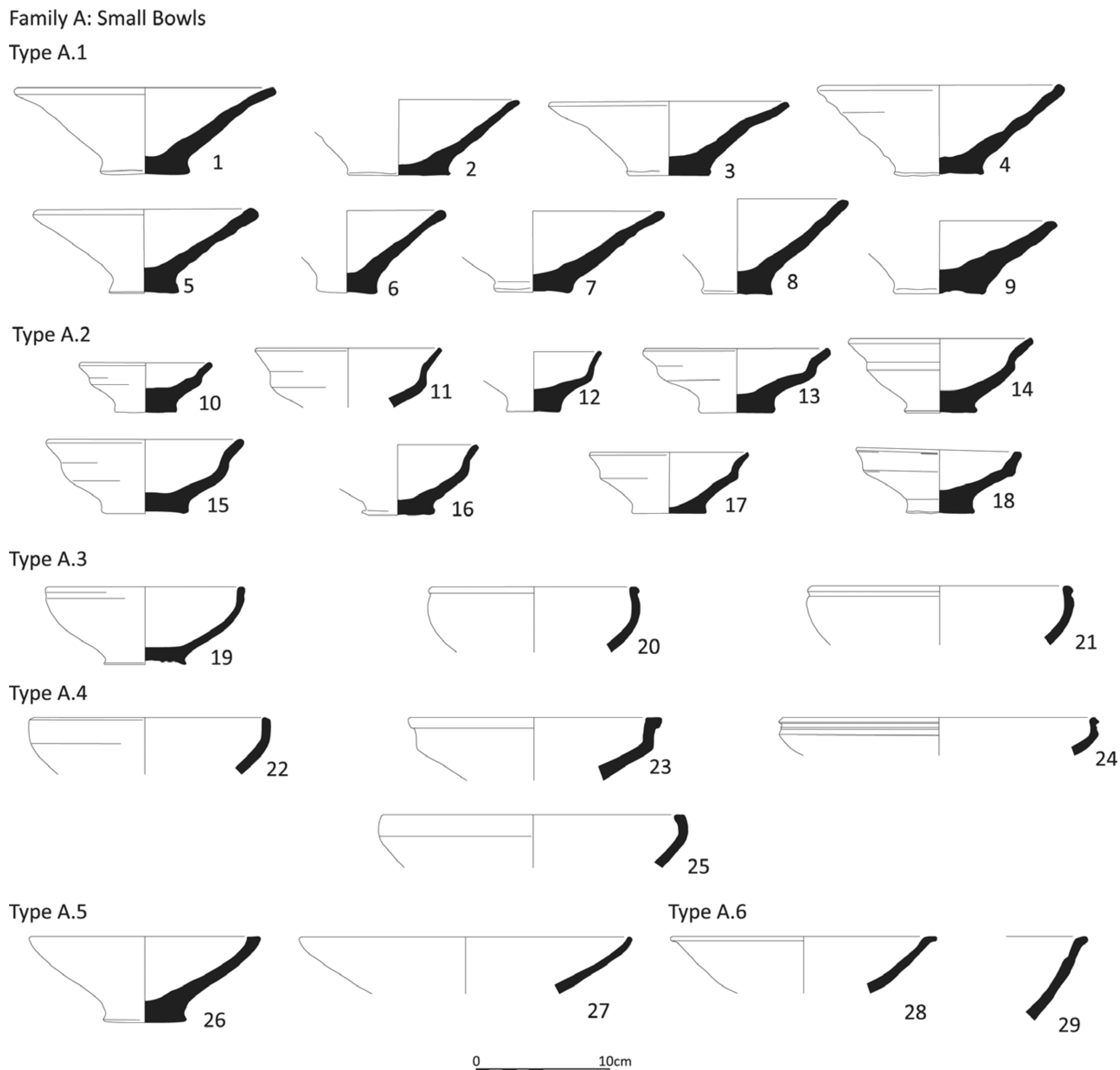


Figure 7.2 Type A: Small bowls.

found in the Shahrizor plain.[38] Ripple-sided bowls (Type A.1), on the other hand, demonstrate fewer inter-regional connections, and are found only sporadically in Middle Assyrian contexts, for example at Tell Sabi Abyad[39] and Tell Sheikh Hamad.[40]

The less common Types have more restricted chronological implications. Type A.3, for instance, is a type fossil for Kani Masi Phase 1c-d. This is significant given that the closest parallels are recovered from Tell Imlihiye,[41] Tell Yelkhi Level II (fifteenth century BCE),[42] from an infant burial at Bakr Awa, considered to date to the middle centuries of the second millennium,[43] and from Godin Tepe Phase III:2 dating to the Middle Bronze Age.[44] A few simple carinated bowl sherds of Type A.4 align well in shape and fabric to those found at Tell

38 Mühl (2012, 89-90; in prep.).
39 Duistermaat (2008, Fig. IV.38).
40 Pfälzner (1995, Pl. 191.a, d).

41 Boehmer *et al.* (1985, Pl. 31.76-81).
42 Valtz (2002-3, Pl. 141.46-48).
43 Miglus *et al.* (2013, Fig. 14.b).
44 Henrickson (2011, Fig. 6.39.b).

Figure	Sherd	Type	Phase	Rim di.	Base di.	Vol. (L)	Colour (Surface / Fabric)	Inclusions	Notes
1	Z88.8.5.1	**A.1**	**1c**	195	67	0.45	Pale green/Pale green	Chaff (preserved)	Filled-in base.
2	V85.164.2.3	**A.1**	**2**	180	78	0.44	Pale green/Pale green	Chaff/fine sand	Wet smoothed ext. Rough base.
3	Y82.10.11	**A.1**	**3**	180	62	0.32	Orange/Orange	Fine chaff/sand	Roughly finished base.
4	Y88B.3.10.2	**A.1**	**3**	184	67	0.48			Very clear ridges on int/ext.
5	Z90D.2.10.1	**A.1**	**3**	170	52	0.3			Very clear ridges on int/ext.
6	N94.103.4.2	**A.1**	**3**	145	46	0.22	Pale orange-pink/Pink	Fine chaff/calcite	
7	N94.102.9.2	**A.1**	**3**	195	60	0.46	Pale green/Pale green	Chaff	X-rayed. Filled-in base. Rough base.
8	N94.102.9.7	**A.1**	**3**	165	53	0.39	Pale green/Pale green	Fine chaff	Sooting around base. Filled-in base. Rough base.
9	N94.102.9.5	**A.1**	**3**	175	70	0.3	Pale orange/Pale orange	Fine chaff	X-rayed. Filled-in base. Rough base. Slowly turned S-cut.
10	Y82.22.2.2	**A.2**	**1a**	100	46	0.07	Pale pink/Pale brown	Fine chaff/sand	Neatly made.
11	Y82.22.2.1	**A.2**	**1a**	140			Pale pink/Pink	Dense sand/fine chaff (preserved)	Quite finely made.
12	Y82.19.3.1	**A.2**	**1b**	110	40	0.16	Pink-orange/Pale brown	Chaff (preserved)	Roughly formed.
13	Y82.17.1.2	**A.2**	**1b**	120-140 (irr.)	58	0.17	Pale green/Pale green	Chaff/fine sand	Rough/irregular shape.
14	Y89.6.1.5	**A.2**	**1c**	140	55	0.26			
15	V85.127.2.2	**A.2**	**2**	145	52	0.31	Pink orange/ Pink-brown	Rough chaff/undis-solved clay	Blocky fabric. Rough base.
16	V85.164.3.2	**A.2**	**2**	120	55	0.22	Pale pink/Pale pink	Chaff (preserved)/ Sand	Irregular warped rim. Crack following coil join on int. Heavily wet smoothed.
17	Y82.3.1.1	**A.2**	**3**	120	55	0.18	Cream/Pale brown	Chaff (preserved)	Filled-in base.
18	Y88B.8.13.1	**A.2**	**1d**	123	51	0.14			Filled-in base.
19	Y88A.21.36.1	**A.3**	**1d**	150	62	0.44	Pale yellow/Pale yellow	Chaff	Fingerprint from lifting? Impressed band beneath rim.
20	Y88B.20.28.1	**A.3**	**1c**	160			Pink/Pink	Chaff	
21	Y82.13.4.1	**A.3**	**1c**	200			Pink/Pink	Chaff (preserved)/ Fine sand	Impressed band beneath rim.
22	Y82.22.3.1	**A.4**	**1a**	180-200 (irr.)			Pink/Pale brown	Chaff (preserved)/ Fine sand	Irregular rim.
23	Y88A.33.42.3	**A.4**	**1c**	190			Pale brown/Pale brown	Chaff (preserved)	
24	Y88B.8.12.2	**A.4**	**1d**	240			Pale orange/Pale orange		Fine grooves on/beneath rim.
25	V85.110.1.5	**A.4**	**2**	230			White-cream/ Grey-green	Fine chaff/sand	
26	Y82.22.4.1	**A.5**	**1a**	170	60	0.36	Pink/Brown	Rough chaff (preserved)	Rough s-cut base with fingerprints.
27	Y82.3.1.2	**A.5**	**3**	250			Buff/Pale brown	Chaff (preserved)	Roughly formed.
28	Y82.13.1.1	**A.6**	**1c**	200			Pale pink-cream/Buff	Chaff (preserved)	
29	Y82.13.2.2	**A.6**	**1c**				Pale pink/Pale pink	Chaff (preserved)/ Fine calcite/sand	Ridge on interior – coil join?

Table 7.4 Type A vessel attributes.

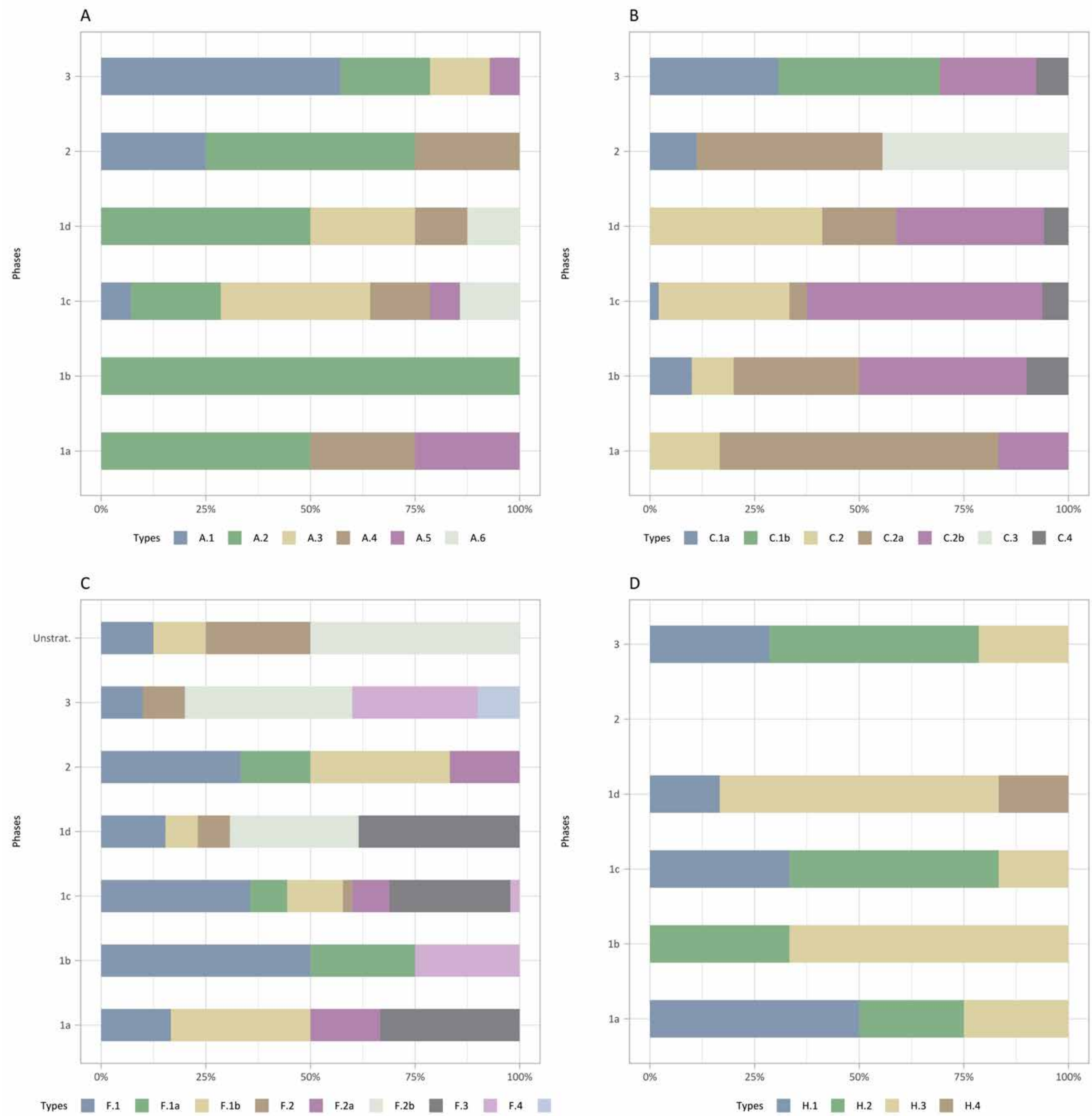


Figure 7.3 Stacked column chart of Families A, C, F, and H showing the relative distributions of Types according to phase.

Yelkhi Level II,[45] sixteenth century Tell Khaiber[46] and Failaka island, Periods 3a-b (c. 1600-1450 BCE).[47] Finally, the flat, slightly in-turned rim of a Type A.5 vessel from Area II (Figure 7.2.26), while yielding no precise external parallels, fits more in line with the internally bevelled platters of the MB found at sites across the survey region (Figure 5.16), or Middle Assyrian style bowls, for example from Tell Sheikh Hamad.[48]

7.3.1.2 B: Medium-large bowls

Medium-large open bowl Types share the same general shape as Family A, with straight or slightly curved bodies, but are larger in size (approx. ≥250 mm rim di.) and differ

45 Valtz (2002-3, Pl. 142.1-7).

46 Calderbank (2021a, Pls. 1-3).

47 Højlund (1987, Figs. 294-295).

48 Pfälzner (2007, Pl. 28.309, 323-324).

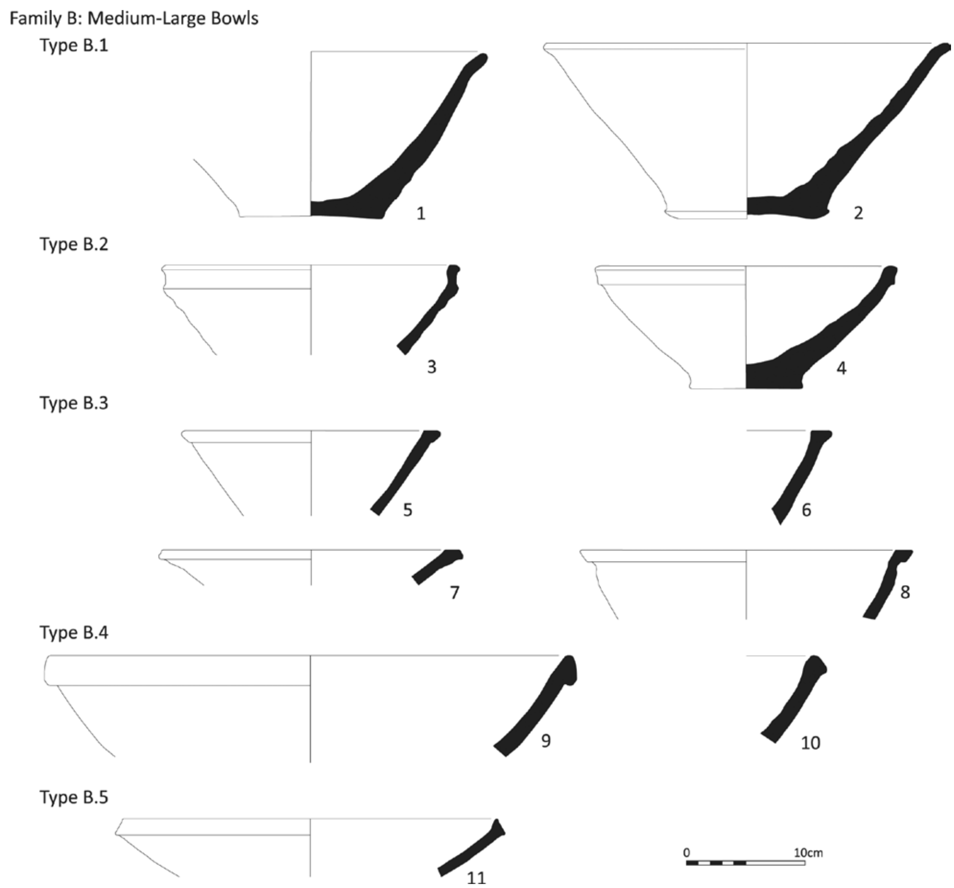


Figure 7.4 Type B: Medium-large bowls.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Vol. (L)	Colour (Surface / Fabric)	Inclusions	Notes
1	Y88.4.1.1	**B.1**	**1d**	300	122	3.49	Pale green/ Grey-green	Chaff/Undissolved clay	Filled-in base.
2	V85.157.1.1	**B.1**	**3**	340	137	4.76	Green/Green	Rough chaff	
3	Z88.8.5.2	**B.2**	**1c**	250			Pale green/Pale green	Chaff	X-rayed.
4	Z88.14.14.2	**B.2**	**1d**	255	94	1.77	Green/Green	Chaff	X-rayed.
5	Y82.18.2.1	**B.3**	**1b**	220			White-cream/ White-cream	Chaff (preserved)	
6	Y82.21.3.2	**B.3**	**1a**	300			Pale green/Pale pink	Chaff (preserved)/ Sand	
7	Y82.16.6.1	**B.3**	**1b**	255			Pale pink/Pink	Chaff (preserved)	
8	Y88B.3.8.7	**B.3**	**3**	280			Pale orange/Pale orange	Chaff	
9	Y82.3.1.3	**B.4**	**3**	450			Pale green/Pale green	Chaff (preserved)	
10	V85.17.1.1	**B.4**	**2**	400-450			Pink-orange/ Pink-grey	Rough chaff/Voids	
11	Y82.9.3.1	**B.5**	**1c**	330			Pink/Buff/Grey	Chaff (preserved)	

Table 7.5 Type B vessel attributes.

in their rim shapes (Figure 7.4 and Table 7.5). These rim shapes determine Family B's five distinct Types:

- **Type B.1.** Ripple-sided body, with a simple, everted rim. The body often exhibits a characteristic 'wobbly' effect.
- **Type B.2.** Straight or slightly curved body, with a sharp curve/carination high up the body, and a grooved rim band.
- **Type B.3.** Straight or curved body, with a flat ledge rim. There is occasionally an indented notch in the exterior surface directly beneath the rim.
- **Type B.4.** Curved body, with rounded/bevelled rim, often folded over the exterior. It is possible that some of these rims may be the same as those of Type J.1.
- **Type B.5.** Straight-sided, with hammer-head rim.

Typical of this Family are the wide range of rim diameters (225-450 mm) and the more elaborately shaped vessel rims, which are usually thickened or everted. These more exaggerated features may well have served to aid vessel grip, and therefore portability. Bases, where preserved, are always flat and often roughly shaped. In fact, judging by the few complete vessels we have from this Family, many Type Z.3 open base shapes may originally have been associated with Family B Types. Complete volumes of Family B vessels (1.47-4.76 L; n=3, Figure 7.7) are significantly larger than those of Family A, and would have been more suited to communal consumption of food or drink.

Significant stylistic similarities exist between Type B.1 vessels and various local and inter-regional sites, including Tell Imlihiye and Tell Zubeidi,[49] Failaka island, Period 4A-B,[50] and Tell ed-Der,[51] all of which date to periods LB II-III. Two less common Kani Masi bowls, both from Phase 1c, find solid external comparisons: a Type B.2 bowl (Figure 7.4.3) shares a precise stylistic parallel at Tell Zubeidi,[52] while the isolated example of a hammer-head bowl (Type B.5, Figure 7.4.11) fits well with those more commonly found in Mittani and Middle Assyrian contexts at Tell Bderi[53] and Tell Sabi Abyad.[54]

While medium-large Family B bowls are infrequent at Kani Masi compared with smaller variants (Family A), they show a general increase in frequency from Phase 1c onwards (Figure 7.5.A), indicating a potential trend of the Kani Masi community towards shared forms of food consumption. This is especially evident in the Area III Phase 2 food production area discussed in detail in Chapter 8.2.2.1.

7.3.1.3 C: Cups

Cups are an extremely common component of the Kani Masi assemblage (Figure 7.6 and Table 7.6). They are often very well preserved in comparison with other vessel Families, with 44 vessels surviving at least up to the base of the neck. Cups are identifiable by their closed, round body shapes, and well-defined necks. These necks can be squat or tall, but are always vertical to slightly concave in profile, and invariably end in subtly everted, rounded rims (Type Z.1-2). The main differences between the four Types of this Family lie in the shape of the bases/feet, which fall into two main categories: flat disc bases (C.1) and shaped feet (C.2-4). Where preservation allows, further Sub-Types can also be determined by differences in the shape of the body:

- **Type C.1.** Flat disc base.
- **Type C.1a.** Flat disc base, with squat round body and, where preserved, a short cylindrical neck.
- **Type C.1b.** Flat disc base, with elongated body and, where preserved, a short cylindrical neck.
- **Type C.2.** Narrow and flaring stemmed foot.
- **Type C.2a.** Narrow and flaring stemmed foot, with a squat round body and, where preserved, usually a tall cylindrical neck.
- **Type C.2b.** Narrow and flaring stemmed foot, with an elongated body and, where preserved, usually a tall cylindrical neck.
- **Type C.3.** Broad and flaring stemmed foot, with a sharply defined turn into a squat body and, where preserved, a tall cylindrical neck.
- **Type C.4.** Rough, stump foot, with a round body and, where preserved, a tall cylindrical neck.

Rim diameters of cups, where preserved, consistently fall between 55-70 mm, regardless of neck height. While base/foot diameters are consistently fairly restricted, almost always ranging between 25-50 mm, they are, with the exception of Type C.4, designed to allow them to stand upright on a flat surface. Vessel volumes yield clearly identifiable patterns. While all cups have small volumes (avg. 0.15 L; range 0.05-0.27 L; n=38), consistent with individual consumption, footed cup Types C.2 have especially low capacities (avg. 0.12 L; range 0.05-0.2 L), approximately half that of Type C.1 vessels (avg. 0.2 L; range 0.08-0.27 L). The starkness of this differential clustering of Type C.1 and C.2 cups towards two ends of the vessel Family range, clearly illustrated in a boxplot (Figure 7.7), has significant functional repercussions, with Type C.2 vessels only holding a single mouthful, or indeed shot, of liquid.

Cups are generally undecorated. While numerous vessels exhibit what appears to be a light slip (perhaps an incidental self-slip) on their exterior surfaces, very few

49 Boehmer *et al.* (1985, Pls. 28.28-34, 114.143, 148, 151).
50 Højlund (1987, 79).
51 Armstrong and Gasche (2014, Pl. 15.1-3).
52 Boehmer *et al.* (1985, Pl. 16.194).
53 Pfälzner (1995, Pl. 3.a, d).
54 Duistermaat (2008, Fig. IV.20, 51).

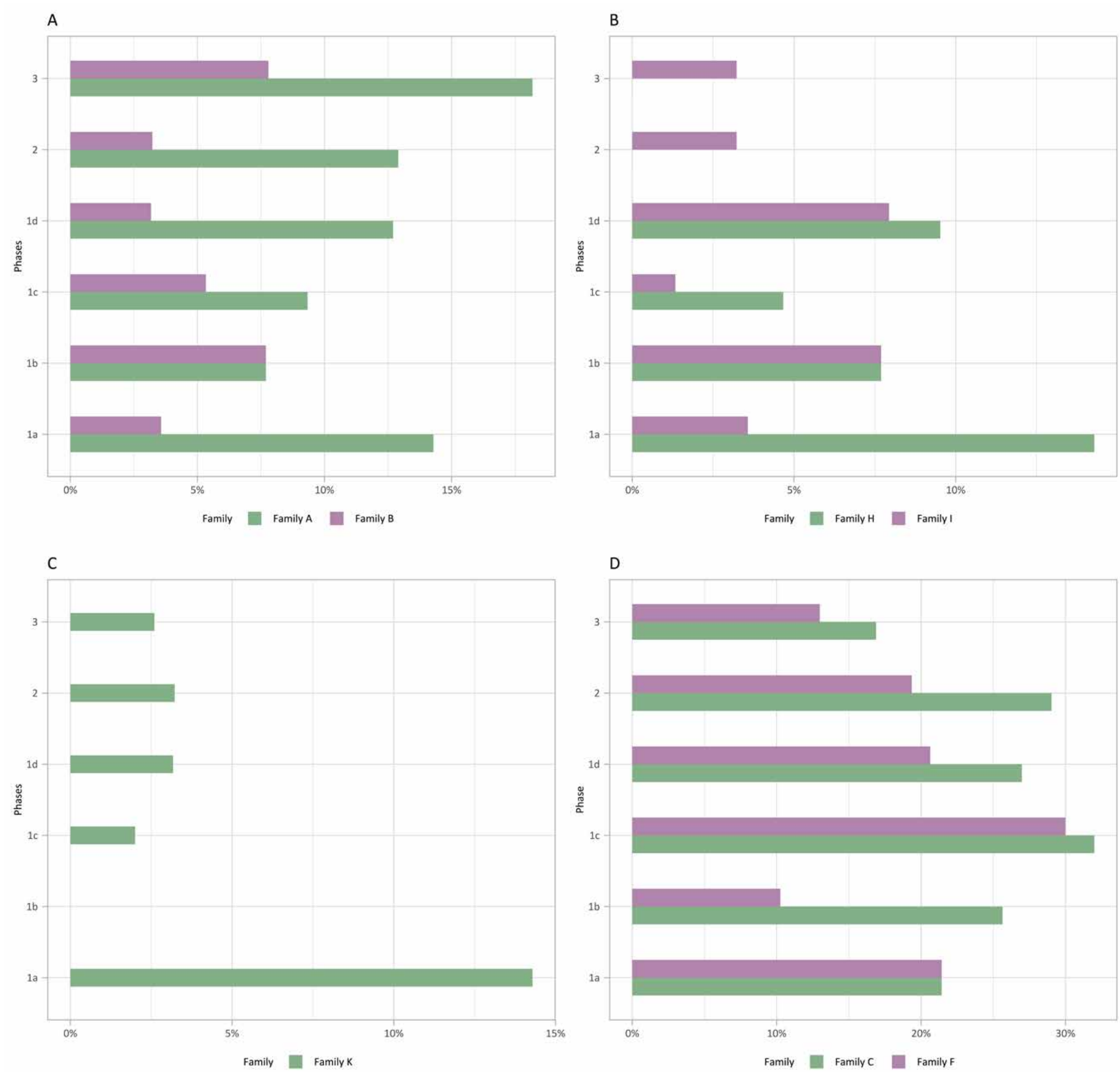


Figure 7.5 Bar charts showing the relative frequencies of various vessel Families compared to the total assemblage in each phase.

examples show more definitive evidence for deliberately slipped exterior surfaces. Approximately 10% (11 of 106) of the analysed cups can be categorised as fine-ware, in that they have one or more of the following attributes traditionally associated with highly specialised production: thin walls, extensive surface finishing, and well-worked clay matrices (usually of Fabric A, see Section 7.4.1.1). These attributes do not necessarily correspond with one another, however. Some vessels have slipped or extensively smoothed and finished feet/surfaces, yet are acutely lopsided in their overall shape, while others are neatly shaped and finished, yet have thick or relatively coarse fabrics.

Stemmed cups (Type C.2) are by far the most common, with other Types relatively infrequent. Despite this general dominance, it is interesting to note that Type C.2 vessels are entirely restricted to Phases 1a-2, with no examples in Phase 3: while the squatter, Type C.2a cups with very restricted capacities, have a fairly consistent distribution between Phases 1a-2, elongated Type C.2b cups are very common in Phase 1c (Figure 7.3.B). Disc-base cups (Type C.1) exhibit very different chronological patterning: while squatter Type C.1a are fairly infrequently represented

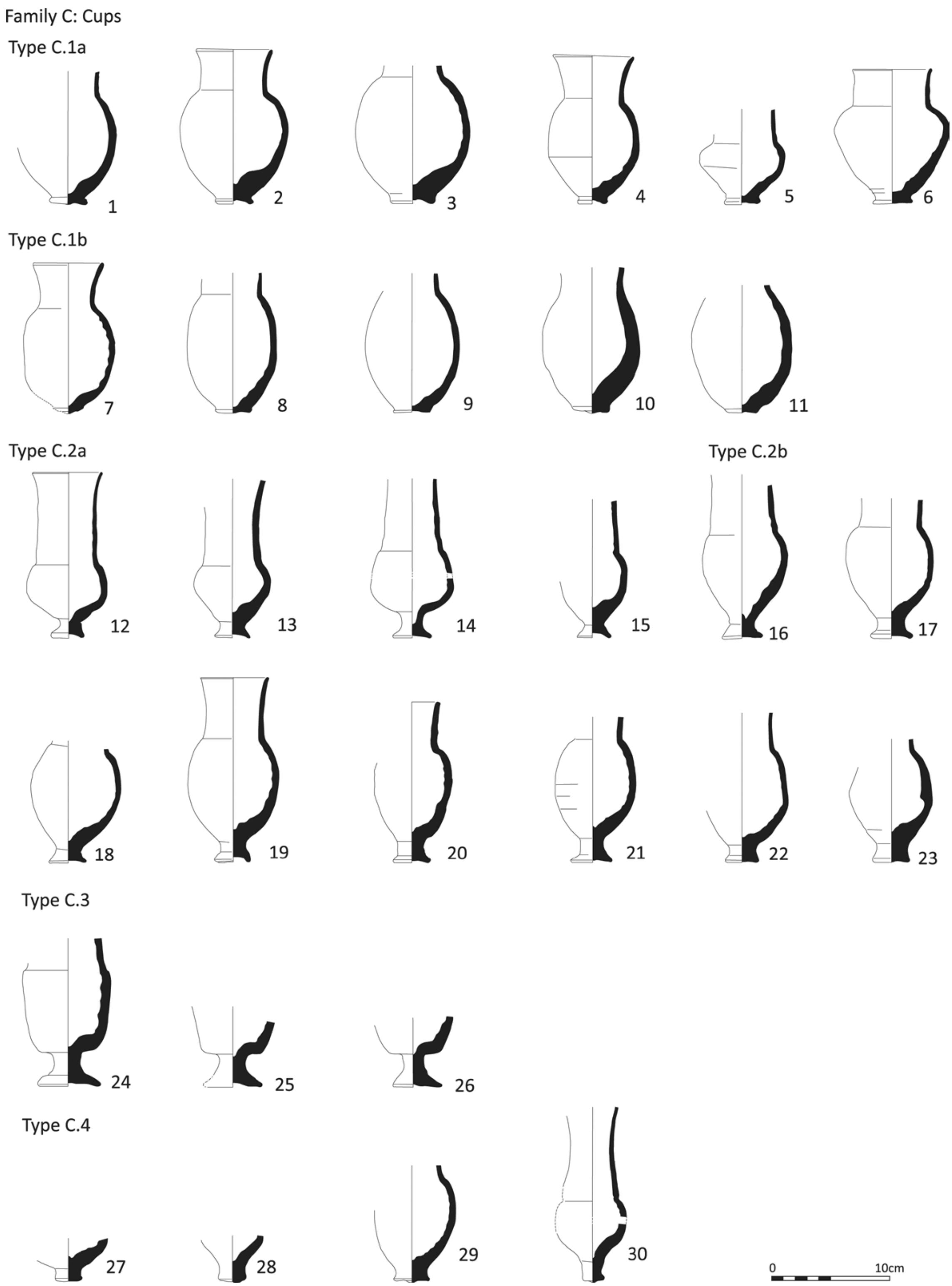


Figure 7.6 Type C: Cups.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Vol. (L)	Colour (Surface / Fabric)	Inclusions	Notes
1	Z88.16.2.2	**C.1a**	**1b**		32	0.19	Pale green/Pale green	Few inc. fine matrix.	X-rayed. Impressed band on neck. Smoothed/finished interior surface.
2	Y88.110.1.1	**C.1a**	**3**	65	32	0.26	Pale green/Pale green		
3	Y88.110.1.2	**C.1a**	**3**		38	0.27	Pale green-cream/ Grey-green	Sandy	
4	Y88B.2.4.2	**C.1a**	**3**	69	26	0.16			Coil joins visible.
5	V85.164.2.1	**C.1a**	**2**		30	0.08	Pale green/ Grey-green	Fine chaff/Sand	Fine ware.
6	Y88B.3.10.1	**C.1a**	**3**	67	34	0.25			Well finished base (turned). Ridges visible on exterior. Joins visible.
7	Y88B.2.4.3	**C.1b**	**3**	60	broken	0.19			Asymmetrical profile. Coils visible on int. and ext. Small ring base chipped off.
8	N94.102.9.1	**C.1b**	**3**		31	0.21	Pale green/Pale green	Fine chaff/grit	
9	N94.102.9.3	**C.1b**	**3**		32	0.23	Green/Green	Fine chaff/grit	Spiral cracks on int. base.
10	N94.103.4.1	**C.1b**	**3**		32	0.13	Pale pink/ Cream-brown	Chaff/Grit. Undissolved clay.	X-rayed. Slipped(?). Poorly worked clay matrix.
11	N94.102.9.4	**C.1b**	**3**		27	0.23	Pale green/Pale green	Fine chaff/grit	X-rayed. Slipped(?). Roughly made. Excess of clay on int.
12	Y82.16.1.1	**C.2a**	**1b**	55	28	0.08	Cream/Cream	Fine chaff	Joins visible on exterior, lower body and midpoint of body.
13	V85.176.1.1	**C.2a**	**1b**		30	0.06	White-pale pink/ Pale pink	Few inc.	Slipped(?).
14	Y82.14.2.3	**C.2a**	**1c**		32	0.09	Cream/Pale brown	Fine chaff	
15	V85.164.4.2	**C.2a**	**2**		28	0.05			
16	Y82.17.1.1	**C.2b**	**1b**		35	0.11	Pale yellow-buff/Pale yellow	Few inc.	Lopsided. Coil join at bottom of neck.
17	Y88.121.1.1	**C.2b**	**1b**		36	0.14	Pale green/Pale green	Fine chaff	X-rayed. Deformation at lower body, where it was lifted while the clay was still soft?
18	Y88.121.1.2	**C.2b**	**1b**		32	0.17	Pale green/Pale green	Fine chaff	X-rayed. Lopsided.
19	Y88B.20.35.10	**C.2b**	**1c**	58	30	0.17			
20	Y88B.7.11.1	**C.2b**	**1d**		32	0.11			Roughly made.
21	Y89.5.2.1	**C.2b**	**1c**		36	0.14	Pale pink-white/Pink	Fine chaff/grit	
22	Y89.5.2.5	**C.2b**	**1c**		29	0.17	Pale green/ Pink-brown	Fine chaff	X-rayed. Slipped ext.
23	Y89.5.2.7	**C.2b**	**1c**		31	0.1	Pink-orange/Pale orange	Fine chaff/grit	X-rayed.
24	V85.127.2.1	**C.3**	**2**		53	0.14	Pale green/ Grey-green	Sandy	Filled-in base.
25	V85.110.1.2	**C.3**	**2**		50		Yellow-green/ Cream-green	Fine chaff/sand	
26	V85.164.5.2	**C.3**	**2**		50				
27	Y82.16.6.2	**C.4**	**1b**		22		Pale pink/Pink	Fine chaff/Sand	
28	DD89.8.2.1	**C.4**	**1c**		24		Pale orange/Pale orange	Fine chaff (preserved)/Sand	Rough stump foot.
29	Y89.5.2.6	**C.4**	**1c**		31	0.15	Pink/Pink	Fine chaff/Grit	X-rayed.
30	Y88A.15.23.1	**C.4**	**1d**		18				Rough stump foot.

Table 7.6 Type C vessel attributes.

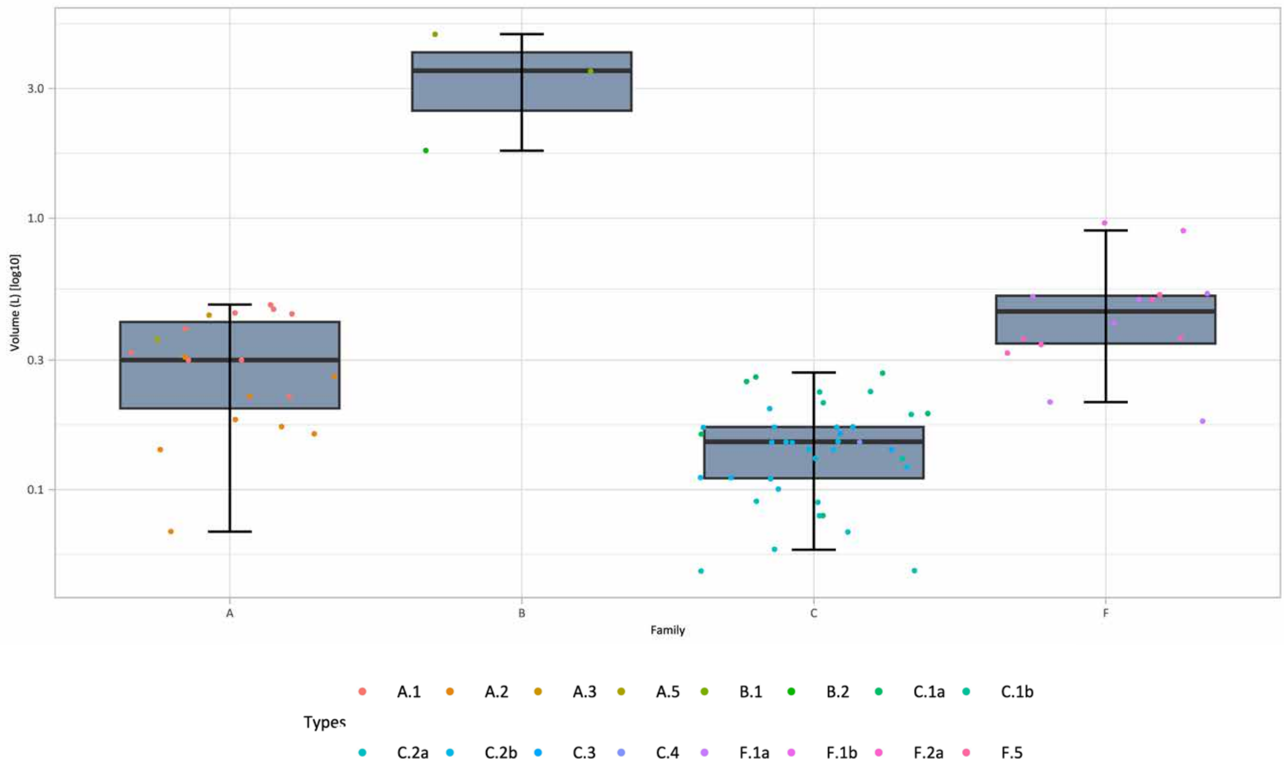


Figure 7.7 Boxplots for vessel volumes of Families A, B, C and F.

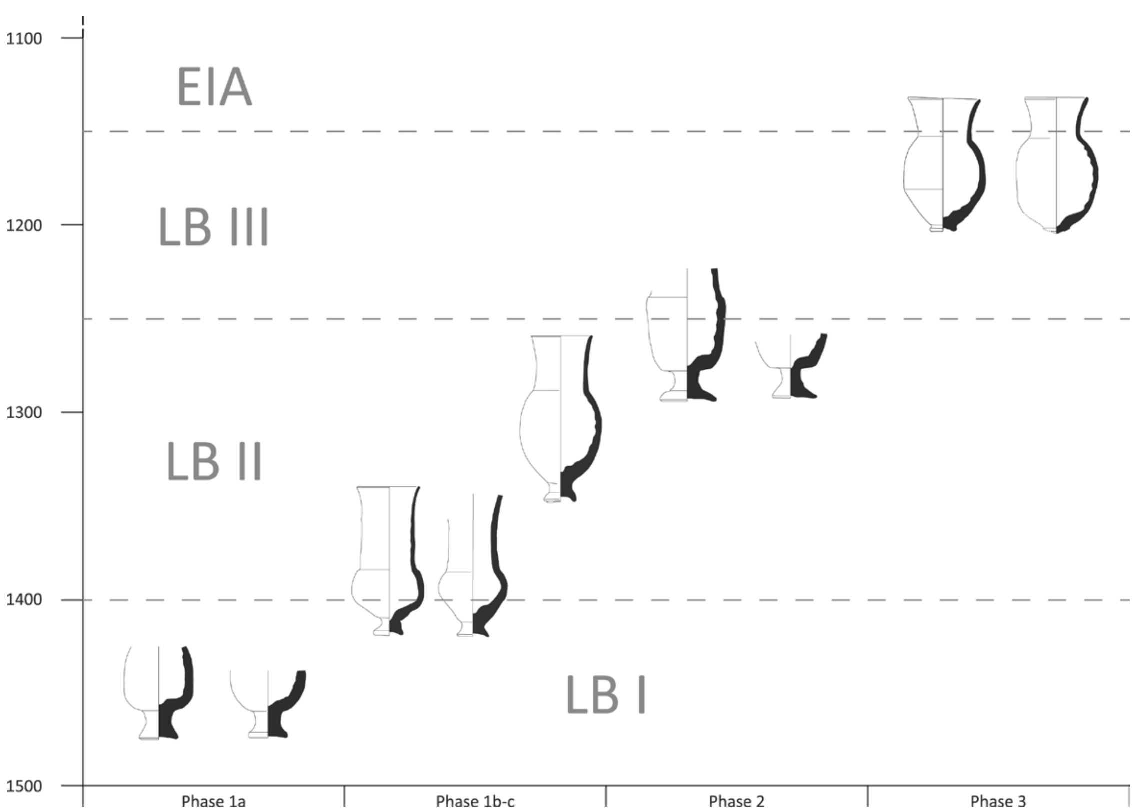


Figure 7.8 Cup progression Phase 1a to Phase 3.

across Phases 1b-3, the ovoid Type C.1b variant represents a type fossil for Phase 3, found only in Area VI and in the upper deposits of Area I. Overall, this indicates a general trend through time, moving from squatter stemmed cups towards disc-base cups with elongated ovoid bodies, with the sharpest break occurring between Phase 2 and Phase 3 (Figure 7.8). Type C.3 cups, on the other hand, are a type fossil for Phase 2 in Area III, while Type C.4 occurs infrequently in Phases 1b-3.

Both stemmed cups and disc-base cups are typical of the Kassite style, but are not common in other cultural traditions of northern Mesopotamia or Middle Elamite Iran. Both vessel types have been identified at numerous sites in the alluvial plains,[55] as well as in the Hamrin, at Tell Imlihiye[56] and Tell Zubeidi.[57] Stemmed cups have been identified in the Zagros piedmont zone, at Tepe Guran, GII Layer P,[58] while disc-base cups of precisely the same style as those from Kani Masi have been recovered from graves at Duruyeh and Kutal-i Gulgul.[59]

Kani Masi's less common cup Types, such as those with rough, stump feet (Type C.4) are not common to the Kassite tradition. Instead, they align better with MB cups from Tepe Kalan (Figure 5.16), Sealand period cups from Tell Khaiber,[60] Level II cups from Tell Yelkhi,[61] or even Middle Assyrian 'standard ware' cups, which have nipple/button feet and either rounded bodies and closed shapes, or straight tapering bodies with open rim shapes.[62]

7.3.1.4 D: Bottles

Bottles are very rare in the Kani Masi assemblage, with just three complete vessels found (Figure 7.9 and Table 7.7). These vessels have unstable bases, squat bodies, and tightly restricted necks and openings. They come in two main Types:

- **Type D.1.** Round, slightly pointed base, with elongated body and narrow neck.
- **Type D.2.** Round base, round body, with narrow neck and internally folded rim.

Only three bottles have been identified at Kani Masi. The first is a single example of an elongated tear-drop shaped bottle, with few direct stylistic parallels, other than a vessel made of frit from Babylon.[63] The two examples of Type D.2 found in Burial AI.1 (Phase 1b) are noticeably different in appearance from any vessels in the rest of the assemblage (see also Chapter 9.2.2.1). Their production sequence did not involve the wheel at any point: they were coiled and pinched, with internally folded rims to form a cradle for a stopper. They were made of a brown-orange fabric and covered in a now heavily degraded pink/purple slip, which drips down the interior neck. This is perhaps an alternative style of decoration to that applied to identically shaped vessels discussed by Armstrong and Gasche,[64] which were "painted entirely in red, on top of which white-painted designs were applied", although it is possible that the white painted designs have eroded on the Kani Masi examples. These vessels are typically found in funerary contexts spread throughout Babylonia and the Hamrin, and are said to have been introduced in the late LB III (twelfth century BCE) before continuing to circulate into the Early Iron Age (EIA).[65] Radiocarbon dates associated with these vessels at Kani Masi, however, securely place these bottles significantly earlier, somewhere in the fourteenth century BCE.

Vessel volumes are low (avg. 0.14 L; range 0.09-0.22 L; n=3) and the narrow rim diameters (32 mm) would have limited vessel access, both functional characteristics that point towards the storage of special liquids, perhaps perfumes or oils.

7.3.1.5 E: Jugs

Jugs, represented by just one Type, are very similar in overall shape to Kani Masi's disc-base cups (Type C.1) (Figure 7.9 and Table 7.7):

- **Type E.1.** Flat disc base, with round, globular body, and, where preserved, a short well-defined neck.

Type E.1 jugs differ from cups in terms of their size and therefore functional potentialities. While cups were suitable for individual liquid consumption, jugs were more suited to communal consumption, or for filling associated cups. Base diameters of jugs are always ≥40 mm (avg. 52 mm) and reach up to 72 mm.

Jugs are generally more common in Phases 1a-2. Their style matches well with a number of LB I jugs from across the wider region, including Tell Yelkhi Level II,[66] Tell Khaiber,[67] and Tell ed-Der Burial 392.[68] They are also

55 Armstrong and Gasche (2014, Pls. 94-98, Types 205A-210A).
56 Boehmer *et al.* (1985, Pl. 50.214-219).
57 Ibid., Pl. 129.358-360.
58 Thrane (2001, Pl. 30).
59 Overlaet (2003, Pl. XXI and Pl. 88.29-30).
60 Calderbank (2021a, Pls. 34-40).
61 Valtz (2002-3, Pl. 148.1-14).
62 Pfälzner (2007, Pl. 28.315-321); Duistermaat (2008, Figs. IV.90-91).
63 Boehmer *et al.* (1985, Fig. 8.a).
64 Armstrong and Gasche (2014, 102, Pl. 93.1-11).
65 Ibid., 101-102.
66 Valtz (2002-3, Pl. 152).
67 Calderbank (2021a, Pls. 42-46).
68 Armstrong and Gasche (2014, Pl. 83.2).

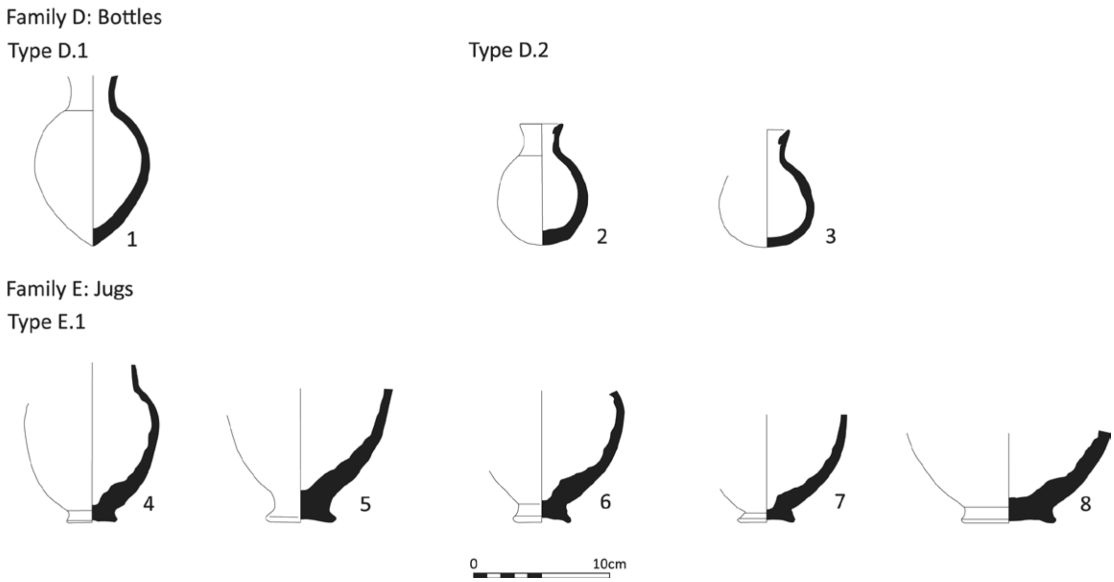


Figure 7.9 Type D: Bottles and Type E: Jugs.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Vol. (L)	Colour (Surface / Fabric)	Inclusions	Notes
1	Y88B.20.35.8	**D.1**	**1c**		0	0.22	Pink/Pink	Few grits	Quite fine.
2	Z88.16.2.1	**D.2**	**1b**	32	0	0.09	Pink/Pale brown	Fine grit	Fine/well worked. Pink/purple slip, dripped down interior.
3	Z88.16.2.3	**D.2**	**1b**	32	0	0.1	Pale orange-pink/ Pale orange	Few inc.	Fine/well worked. Worn exterior with traces of red/purple slip. Paint/slip on int. neck.
4	Z88.17.2.1	**E.1**	**1b**		37	0.31	Green int/ext.	Fine chaff. Well worked.	Wet-smoothed/finished ext. Join visible at midpoint of vessel.
5	Y88A.40.47.1	**E.1**	**1c**		51		Pale green/Pale green	Chaffy	
6	V85.110.1.3	**E.1**	**2**		42		Pale green/Green	Fine chaff/sand	
7	V85.164.5.1	**E.1**	**2**		42				
8	Y88A.13.15.1	**E.1**	**Unstrat.**		72				

Table 7.7 Type D and E vessel attributes.

similar to better-known LB II examples from Nippur[69] and Uruk.[70]

7.3.1.6 F: Goblets

Goblets are well attested at Kani Masi, with 15 examples preserved at least up to the neck (Figure 7.10 and Table 7.8). These vessels almost invariably demonstrate flaring feet, steep-sided bodies, and well-defined cylindrical necks with simple, rounded rims. While sharing these general traits, goblets demonstrate significant differences in three key characteristics: the height of the foot, the shape/height of the body, and the height of the neck. Since the neck/rim is only occasionally preserved, variations in the combination of the first two features, the foot and the body height, account for Kani Masi's main Types and Sub-Types:

- **Type F.1.** Short flaring foot.
- **Type F.1a.** Short flaring foot, with relatively short body and cylindrical neck.
- **Type F.1b.** Short flaring foot, with tall, slightly rounded body and cylindrical neck.
- **Type F.2.** Tall flaring foot.
- **Type F.2a.** Tall flaring foot, with relatively short body and cylindrical neck.

69 Armstrong (1993, Pl. 82a).
70 van Ess (2014, Pl. 4.68).

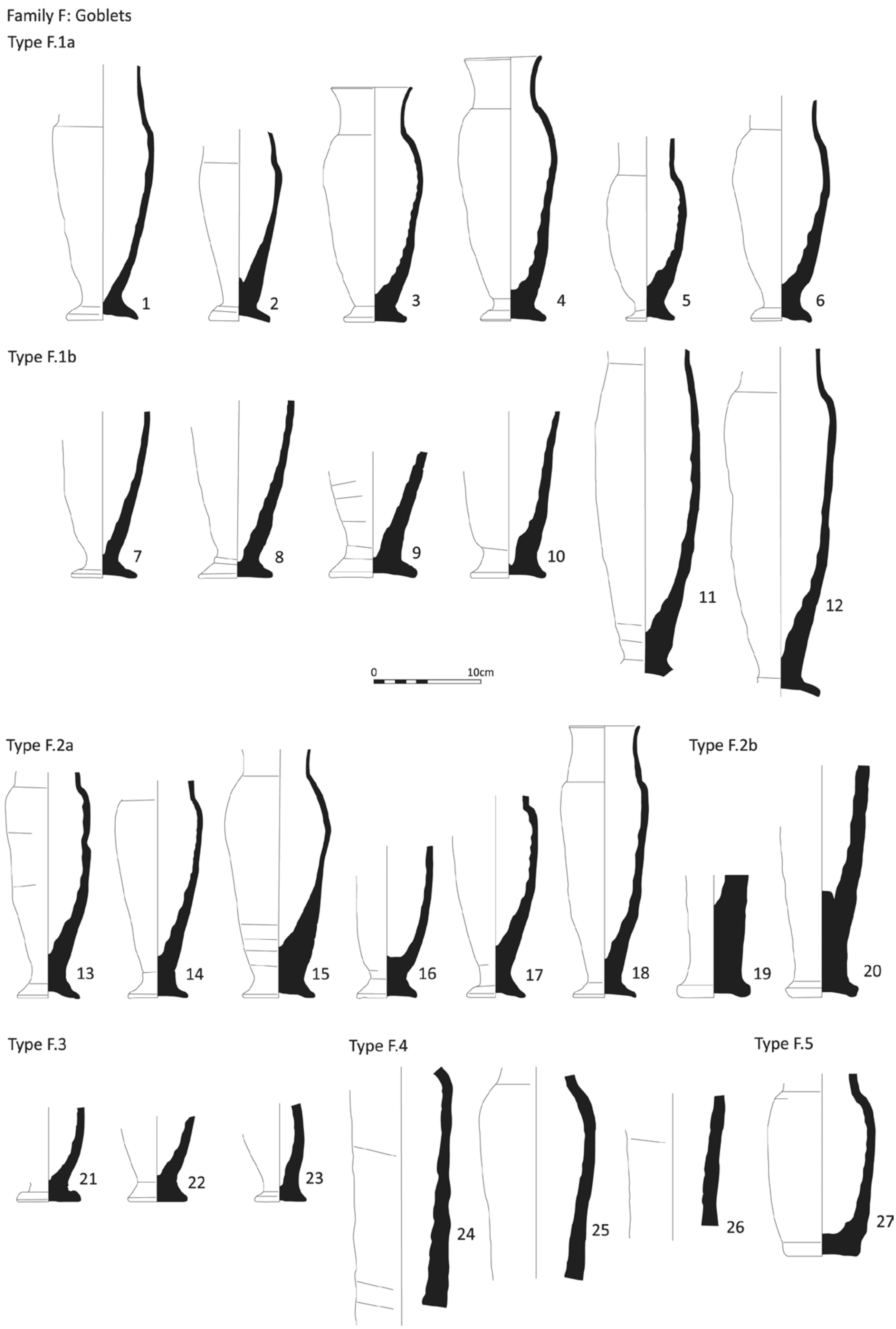


Figure 7.10 Type F: Goblets.

- **Type F.2b.** Tall flaring foot, with tall, straight-sided body and cylindrical neck.
- **Type F.3.** Flat flaring foot.
- **Type F.4.** Tall, straight-sided body, but no surviving foot.
- **Type F.5.** Flat string-cut disc base, with short body and cylindrical neck.

Rim diameters of goblets, where preserved, fall between 62-76 mm, while foot diameters usually measure between 50-75 mm (avg. 61 mm). These features show fairly limited differences between Types. Feet are designed in a way that allows them to stand upright on a flat surface, a feature reinforced by the thick, solid foot of Type F.2 variants, which adds to their centre of gravity. Vessel volumes vary significantly (range 0.18-0.96 L; avg. 0.47 L; n=14, Figure 7.7), but overall demonstrate low capacities relative to their size and weight, rendering them both impractical as storage vessels and unwieldly as serving and drinking vessels. These vessels, particularly the taller variants (F.1b and F.2b), certainly do not cater to practicality of use.

The relative distributions of goblets and cups remains fairly consistent between phases, peaking in Phases 1c, 1d, and 2 (Figure 7.5D). Like cups, subtle variations in the main shape characteristics of goblet Types and Sub-Types have chronological implications. Goblet types F.1, F.1a F.1b, F.2a, and F.3, while fluctuating, are common throughout Phases 1a-2, but are relatively infrequent in Phase 3 (Figure 7.3C). Each of these Types demonstrates a short hollow-foot, apart from vessels of Type F.2a, which have tall, solid feet but relatively squat bodies. Type F.2b vessels, on the other hand, with tall feet and tall bodies, only occur after the abandonment of the Area I building (e.g. Phase 1d, Phase 3 and the mixed, unstratified deposits). Therefore, while tall feet or tall bodies, in isolation, were features present in all phases of occupation, the combination of the two, resulting in the most unwieldy and impractical vessels, only seems to have come into play at Kani Masi late in the sequence, especially in Phase 3 (Figure 7.11). Armstrong and Gasche noticed a similar trend of goblets tending towards 'tallness', identifying a pattern of goblets with short feet and more globular bodies (c. 1450-1300 BCE) being displaced by goblets with tall feet and tall straight-sided bodies (c. 1300-1150 BCE).[71]

A small number of Kani Masi's goblets (e.g. Figure 7.10.23) are acutely lopsided, a feature also observed in a goblet recorded from Tell Imlihiye.[72] It is unlikely that these vessels would have been so poorly or carelessly made. An alternative reading might therefore be that they were deliberately designed in this way to help to care for and feed those less able, for example the old or infirm.

Goblets are typical of two main cultural traditions: the Kassite tradition from Babylonia, and the Middle Elamite tradition from southwest Iran. While there has been extensive discussion about some of the similarities and differences of these traditions, especially when it comes to understanding the goblets found at Tepe Guran,[73] it is the Kassite-style tradition, found at LB sites across the lowland alluvial plains, that is most clearly visible in Kani Masi's vessels. Goblets of the Middle Elamite tradition, as recovered from Susa,[74] tend to be rounder in shape, have shorter feet, and never reach the level of functional impracticality of some LB II-III Kassite-style goblets (e.g. Type F.2b). Footed goblets are not a shared part of the Mitanni or Middle Assyrian pottery traditions, being found only occasionally at these sites, for example at Nuzi.[75]

7.3.1.7 G: Beakers

Beakers have flat, usually string-cut, disc bases, vertical, to slightly concave walls, and squared ledge rims (Type G.1, Figure 7.12 and Table 7.9). The few examples from Kani Masi tend to be plain and undecorated. However, a single elaborately decorated body sherd with a sharp inward turn at the shoulder, impressed on the exterior with alternating linear and wavy band decoration (Type G.2) has a solid parallel with a LB II period vessel from Tell Khaiber.[76] Cylindrical beakers have traditionally been interpreted as grain measures,[77] while contextual analysis suggests some diversity to their use in contexts of food preparation and drink consumption.[78]

Despite being a fairly common component of LB assemblages across the wider region,[79] forming a characteristic part of the Middle Assyrian and Babylonian traditions, beakers are extremely rare at Kani Masi, and are found mostly in the Area I collapse (Phase 1d), Phase 3, and unstratified topsoil deposits.

7.3.1.8 H: Jars

Jars are extremely common in the Kani Masi assemblage (Figure 7.13 and Table 7.10). These vessels are almost always broken, with only two mostly complete examples recovered from which to construct vessel profiles and to measure capacities (c. 4.8 and 12-15 L). Jars are identifiable by their rounded, or 'baggy', body shapes and short, well-

71 Armstrong and Gasche (2014, Pl. 99-103); Armstrong (2017, 424, Fig. 15.03).

72 Boehmer *et al.* (1985, Pl. 56.209).

73 Thrane (1999).

74 Gasche (1973, Pl. 19-24).

75 Starr (1939, Pl. 57).

76 Calderbank (2021a, Pl. 48.3).

77 Mallowan (1946, 148-150); Pfälzner (2007, 243).

78 Calderbank (2021b, 47-49).

79 Valtz (2002-3, Pl. 147); Pfälzner (2007, 243); Calderbank (2021a, Pl. 19-22).

Figure	Sherd	Type	Phase	Rim di.	Base di.	Vol. (L)	Colour (Surface / Fabric)	Inclusions	Notes
1	Y82.18.2.6	**F.1a**	**1b**		67	0.53	Green/Green	Fine chaff/grit	Finely made. Neck chipped to form crescent.
2	Y82.14.2.1	**F.1a**	**1c**		57	0.21	Cream/Cream	Fine chaff/grit	
3	Y88A.44.50.1	**F.1a**	**1c**	76	59	0.5			Neat base. Exterior shows lines where grits have been dragged during scraping.
4	L80C.6.2.1	**F.1a**	**2**	72	62	0.51			Scraped/finished ext.
5	Y89.5.4.3	**F.1a**	**1c**		45	0.18	Cream/Beige-cream	Fine chaff/grit	
6	Y89.6.1.1	**F.1a**	**1c**		56	0.41	Pale pink-orange/ Grey-brown	Few inc.	
7	Y82.13.1.4	**F.1b**	**1c**		62		White-pale green/ Pale brown	Chaff (preserved)	Some evidence for joins.
8	Y82.13.3.3	**F.1b**	**1c**		70		Pale pink/Pale brown	Grit/Calcite	Heavily wet-smoothed.
9	Y82.21.2.1	**F.1b**	**1a**		82		Pale pink/Orange	Few inc., dense	Heavy ridging.
10	Y89.5.23	**F.1b**	**1c**		71		White-pale pink/Pink	Chaffy	Poorly worked fabric.
11	DD89.10.1.1	**F.1b**	**1c**		broken	0.96	Pale green/Green	Undissolved clay.	Slipped(?). Torpedo shaped. Some evidence for joins.
12	V85.164.4.1	**F.1b**	**2**		75	0.9	Pink-orange/ Pink-brown	Few inc.	Some evidence for joins.
13	V85.180.1.1	**F.2a**	**1a**		59	0.36	Yellow-green/Pale orange-brown	Fine sand	Coil joins and localised deformation.
14	Y88A.44.50.2	**F.2a**	**1c**		56	0.34			Burning on ext./int. neck.
15	Y88B.22.36.1	**F.2a**	**1c**		68	0.5			
16	Y89.5.24	**F.2a**	**1c**		57		Green/Green	Chaff	X-rayed.
17	Y89.5.4.2	**F.2a**	**1c**		56	0.32	Pale orange/ Grey-green	Fine chaff/grit	
18	V85.164.4.4	**F.2a**	**2**	62	60	0.36	Orange-pink/ Pink-brown	Few inc.	Some evidence of joins.
19	Y88A.21.29.1	**F.2b**	**1d**		68		Pale green/Pale green	Chaffy	
20	M81.6.1.1	**F.2b**	**3**		67		Yellow-green/ Grey-green	Rough chaff/Large grit	Poorly worked fabric. Filled-in base.
21	Y82.22.3.3	**F.3**	**1a**		60		White-pale-green/ Pale green	Fine sand	
22	Y88.45.51.2	**F.3**	**1c**		56		Grey-pink/Grey-pink	Chaff/grit	
23	Y89.4.3.1	**F.3**	**1d**		48				Very lopsided when stood on foot.
24	N94.103.5.3	**F.4**	**3**				Pale green/Pale green	Chaffy	X-rayed. Joins visible.
25	N94.103.5.2	**F.4**	**3**				Pale green/Pale green	Large chaff. Poorly worked.	Clay becomes rough/shows stress fracture high up vessel.
26	N94.103.5.4	**F.4**	**3**				Pale green/Pale green	Chaffy	
27	N94.103.5.1	**F.5**	**3**		68	0.52	Orange/Orange	Chaff	X-rayed. Pale orange slip(?). Plugged base. Finishing/ scraping lines.

Table 7.8 Type F vessel attributes.

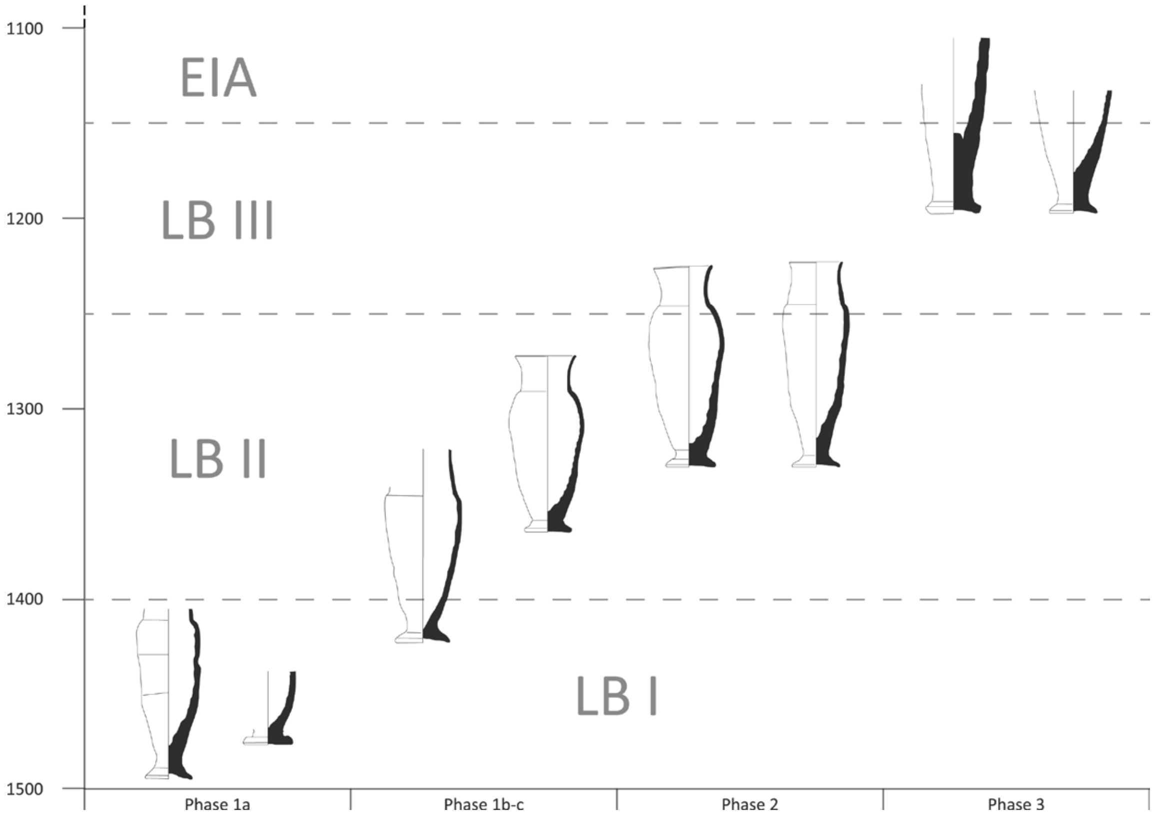


Figure 7.11 Goblet progression Phase 1a to Phase 3.

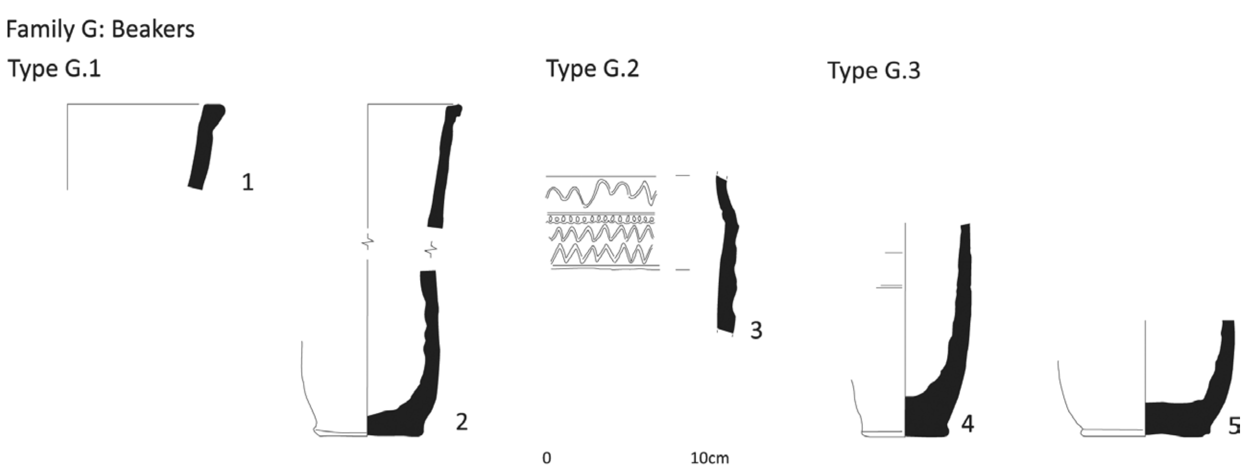


Figure 7.12 Type G: Beakers.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Colour (Surface / Fabric)	Inclusions	Notes
1	Y82.20.2.5	**G.1**	**1b**	200		Pale green/Pale brown	Chaffy	
2	Y88B.8.13.1	**G.1**	**1d**	120	70			S-cut base. Plugged.
3	V85A.7.1.1	**G.2**	**3**					Wavy bands, impressed bands and incised dots. Slightly angled upper body.
4	Z88.5.1.5	**G.3**	**1d**		56	Yellow-green/ Yellow-green	Fine chaff	Rough incised lines on ext. S-cut base.
5	Y88.0.1	**G.3**	**Unstrat.**		82	Pale orange/Pale brown	Chaff (preserved)	Join at angle of base. S-cut.

Table 7.9 Type G vessel attributes.

defined necks. When bases survive, they are rounded, with a typical spiral dimple on the interior surface (Type H.4). This dimple is the only diagnostic feature by which one can separate base sherds from body sherds. Round bases would have aided transport, allowing jars to be rocked and spun over the ground. While stationary, it is likely that these vessels sat in cylindrical pot stands for stability (Family L). Indeed, the rim diameters of Family L cylindrical stands (range: 150-225 mm; avg. 187 mm) align well with the lower body diameters of preserved jars. While direct evidence is lacking, it is also possible that some jars had solid platform bases (Type Z.4).

Typological differences between jars are determined by rim shape, which can be split into three main Types, and one Type dedicated to base sherds:

- **Type H.1.** Round, folded rim band, defined neck.
- **Type H.2.** Triangular, folded rim band, defined neck.
- **Type H.3.** Grooved, folded rim band, defined neck.
- **Type H.4.** Rounded base.

The thickened bands of all jar rim Types are suited to the secure fastening of a cover to help seal contents during storage. Jars are invariably plain and undecorated, apart from one sherd of Type H.1 which was decorated with incised dots on the rim band and wavy bands directly beneath. This has solid parallels with two jar rims from mixed LB deposits at Tell Khaiber.[80] While all rim Types are spread across all phases at Kani Masi, jars as a functional Family are especially well represented in Phases 1a and 1d (Figure 7.5.B).

7.3.1.9 I: Pithoi

Pithoi are common, albeit not well preserved, elements of the Kani Masi assemblage (Figure 7.14 and Table 7.11). Even when uncovered complete and *in situ* (e.g. Figure 6.11.E-F), their significant weight and coarse fabrics leads them to disintegrate on lifting. As such, while their squat barrel-shape is easily recognisable, we have no complete illustrated examples. Five Types make up this Family, four of which are determined by rim shape and one by base Type. Sub-Types are also established based on vessel size, as determined by rim diameter (large: ≥ 400 mm; small: <400 mm).

- **Type I.1.** Rounded rim.
- **Type I.1a.** Rounded rim, large, open shape, with vertical/slightly curved body.
- **Type I.1b.** Rounded rim, small, open shape, with vertical/slightly curved body.
- **Type I.2.** Squared rim.
- **Type I.2a.** Squared rim, large, closed shape, with slightly curved body.
- **Type I.2b.** Squared rim, small, closed shape, with slightly curved body.
- **Type I.3.** Grooved rim, large, open shape, with vertical/ slightly curved body.
- **Type I.4.** Indented rim, open shape, with vertical/ slightly curved body.
- **Type I.5.** Applied ring base.

Subtle variations exist between broadly open (Types I.1 and I.3) and closed (Type I.2) pithos shapes, although the difference between these is one of degree. As with jars, the thickened rim bands of pithoi and the recesses directly below these bands are designed to enable the fastening of a cover to seal vessel contents. The thick coarse walls, enormous capacities and fixed ring bases mean that pithoi should perhaps be considered as architectural features rather than portable vessels. Little chronological information can be gathered from the distribution of pithos Types given that they were recovered with a consistent frequency in each phase (Figure 7.5.B).

80 Calderbank (2021a, Pl. 59.1-2).

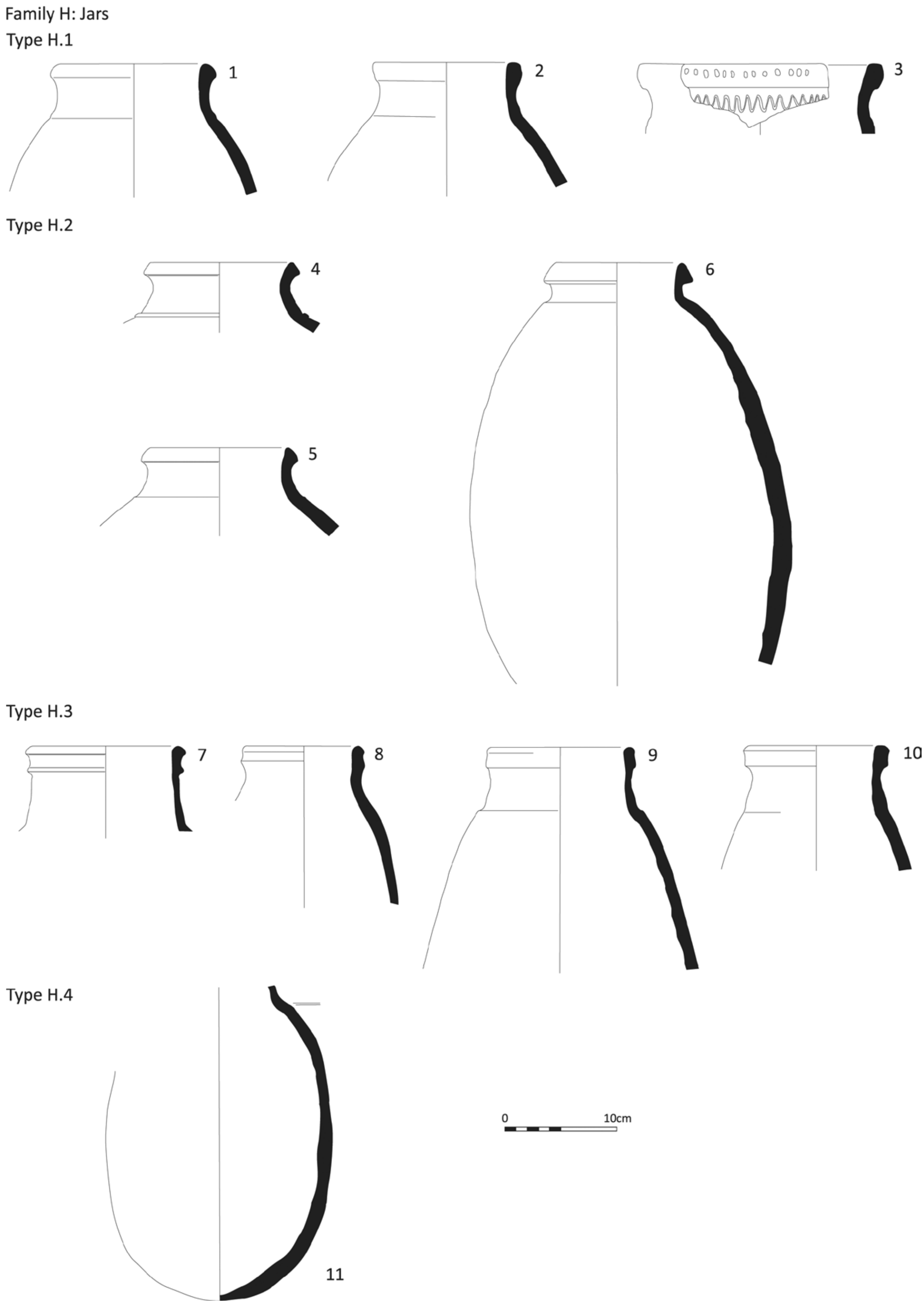


Figure 7.13 Type H: Jars.

Figure	Sherd	Type	Phase	Rim di.	Vol. (L)	Colour (Surface / Fabric)	Inclusions	Notes
1	Y82.22.4.2	**H.1**	**1a**	130		Cream/Cream	Chaff	Join beneath rim band on int. Incised band just below neck.
2	Y88.108.4.1	**H.1**	**1c**	132				
3	N94.102.5.2	**H.1**	**3**	220		Pale green/Pale green	Chaff	Incised dots on rim band. Tight and regular wavy band beneath rim.
4	Y82.21.3.3	**H.2**	**1a**	?		Buff/Grey	Chaff (preserved)/ Sand	Raised ridge at base of neck.
5	Y82.20.1.1	**H.2**	**1b**	140		Buff/Pink-brown	Chaff (preserved)	
6	DD89.10.2.1	**H.2**	**1c**	131	ca.12-15 l	Yellow-green/Green	Chaffy	Heavy ridging (wheel-coiling) of upper 1/3. Finger impressions covering lower 2/3.
7	Y82.21.3.4	**H.3**	**1a**	130		Pale pink/Pink	Chaff (preserved)/ Sand	Quite fine.
8	Y88B.12.14.2	**H.3**	**1d**	106		Pale orange/Pale orange	Chaff/Grit	Fingerprints on int. surface.
9	Y88.121.1.3	**H.3**	**1b**	125				X-rayed. Ridged int.
10	Y89.5.3.1	**H.3**	**1c**	130		Cream/Pale brown	Sand	Roughly made.
11	Z88.14.4.1	**H.4**	**1d**		4.8 l	Green/Green	Chaff	Roughly made. Incised band at base of neck. Ridging on upper 3rd. Finger impressions on lower third. Broken at base of neck (deliberately for burial?).

Table 7.10 Type H vessel attributes.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Colour (Surface / Fabric)	Inclusions	Notes
1	L80C.10.2.1	**I.1a**	**2**	450	265	Green/Green		High-fired.
2	N94.103.3.1	**I.1a**	**3**	ca.600	440	Pale green/Pale green	Chaffy	Raised ridge beneath rim.
3	Y82.18.1.1	**I.1b**	**1b**	380 (irr.)		Pale green/Green-cream	Chaffy/Large grits	
4	N94.102.7.1	**I.1b**	**3**	370	280	Pale green/Pale orange	Chaffy	Wavy band/Incised crescent dec.
5	Y82.20.2.1	**I.2a**	**1b**	470		White-pale green/Pale green	Chaffy	Roughly made. Soot-stained ext.
6	Y88.104.4.1	**I.2a**	**3**	580		Pale green/Pale green	Chaffy	
7	Y88B.20.25.5	**I.2b**	**1c**	290		Yellow-green/Pale brown	Chaffy	
8	Y88B.4.6.2	**I.2b**	**1d**	370		Pale brown/Pale brown	Chaffy/Fine grit	
9	Z88.5.1.3	**I.3**	**1d**	>500		Pale brown/Grey	Chaffy	Fine rilling on ext.
10	Y82.18.2.2	**I.4**	**1b**	?		Cream/Grey	Chaff	
11	Y82.21.2.4	**I.5**	**1a**		260	Green/Green	Chaffy	

Table 7.11 Type I vessel attributes.

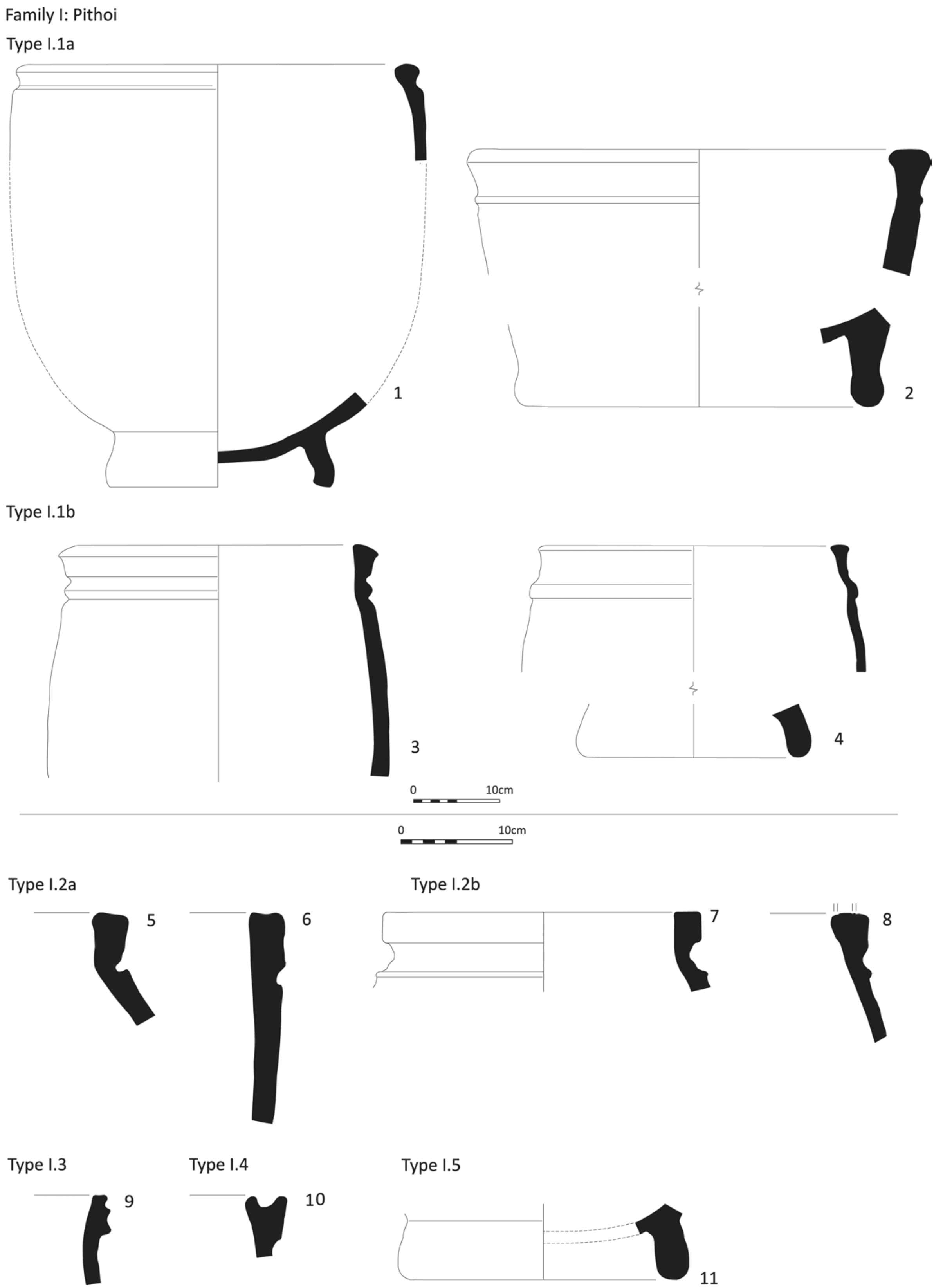


Figure 7.14 Type I: Pithoi.

7.3.1.10 J: Vats

Family J consists of barrel-shaped vessels with open body shapes (Figure 7.15 and Table 7.12), essentially similar in overall shape to pithoi (Family I). The defining feature of Family J are their perforated 'bunghole' bases (Type J.3, Figure 7.16), formed by applying a separate ring of clay to the base of the vessel before piercing a small hole, c. 15-25 mm across. This addition fundamentally alters their intended function, from storage to brewing and filtering processes.[81] The thickened rim bands and recesses often found beneath the rim would have suited the fastening of a closure during the fermentation process, while the base hole would have enabled the effective filtering of beer mash from the wort.

Vats were never equipped with ring bases (Type I.5), but presumably instead sat in pot stands (Type L.1). They may also have sat on top of large pithoi (Family I), into which their contents drained. The main rim Types for vats are thickened ledge rims (Type J.1) and thickened bevelled rims, tilting inwards slightly on the interior (Type J.2). The rim diameters of vats, while always large, show significant variation (range 300-600 mm). Base diameters, on the other hand, stay fairly consistent (range 45-75 mm). Kani Masi's vats were occasionally decorated with impressed bands and wavy decoration, also a common feature on vats found elsewhere across the region.[82] Vats are fairly evenly distributed across Phases 1b-1d (4-5.1% of phase totals), with just a single complete example recovered from Phase 3.

7.3.1.11 K: Cooking pots

Holemouth vessels, where adequately preserved, demonstrate shapes similar to jars, albeit generally squatter and more globular (Figure 7.17 and Table 7.13). They rarely demonstrate defined necks, with their rims tending to flare directly from their inwardly oriented upper bodies. These vessels are the only Family to have noticeably different fabric compositions, with most clay matrices containing large angular grit inclusions suited to withstanding significant and repeated thermal stress (Fabric G, see Section 7.4.1.7 below). Three rim Types have been identified:

- **Type K.1.** Round-triangular, sometimes uplifted rim.
- **Type K.2.** Squared, sometimes uplifted rim.
- **Type K.3.** Round, inwardly turned rim.

The bulbous shape and heavy grit inclusions are typical for cooking pots, an interpretation that is supported by the regular sooting pattern on the exterior surfaces of these vessels (Figure 7.18). Their frequency in the Kani Masi assemblage challenges the claim made by Armstrong that "cooking pots have not been reported" for the LB period.[83] Vessels exhibit medium-sized rim diameters (range 100-250 mm; avg. 199 mm), therefore enabling ease of access to vessel contents during the processing and cooking of food. Occasionally, these vessels have irregularly positioned lugs around the exterior rim. These would not have provided much purchase for lifting these heavy vessels, but may well have been useful for twisting and turning a vessel positioned over the fire. Holemouth cooking pots are recovered in fairly low relative frequencies in all phases (0-3.2%), but are found in significant numbers in Phase 1a (14.3%), indicating a prominence of cooking activities early in Kani Masi's occupation (Figure 7.5.C).

7.3.1.12 L: Cylindrical stands

Cylindrical stands always demonstrate hollow, concave profiles, with the narrowest part of the vessel around the midpoint (Figure 7.17 and Table 7.13). The main difference between the two constituent Types is their relative height:

- **Type L.1.** Medium-large diameter, short body, with thickened, rounded rim/base.
- **Type L.2.** Medium-large diameter, tall body, with squared/bevelled rim.

Rim diameters of cylindrical stands are approximately the same as their base diameters (range 165-215 mm; avg. 188 mm), but are usually more neatly shaped and finished than bases, which tend to be roughly folded. The rim diameter of these stands (range 150-225 mm; avg. 187 mm) align well with the known lower-body diameters of round-bottomed jars (Family H), suggesting a likely relationship between the two.

7.3.1.13 M: Miscellaneous types

This vessel Family represents several miscellaneous Types that do not fit neatly into any of the other vessel categories presented above (Figure 7.19 and Table 7.14). Each individual Type is represented by just a single example, or a small group of examples sharing specific characteristics.

- **Type M.1a.** Small disc lid or stopper with a string-cut upper part (the 'grip'), a sharply flaring body, and rounded 'rim'. The grips have a tight range of diameters (25-35 mm), as do the preserved rims (80-84 mm). This maximum diameter aligns broadly with the average rim diameters of cups and goblets, suggesting possible functional associations. This Type is only identified in Phases 1c, 2, and 3. *Selective Comparanda:* Tell

81 Zarnkow *et al.* (2011, 44-46); Calderbank (2021b).

82 Ibid., 45.

83 Armstrong (2017, 421).

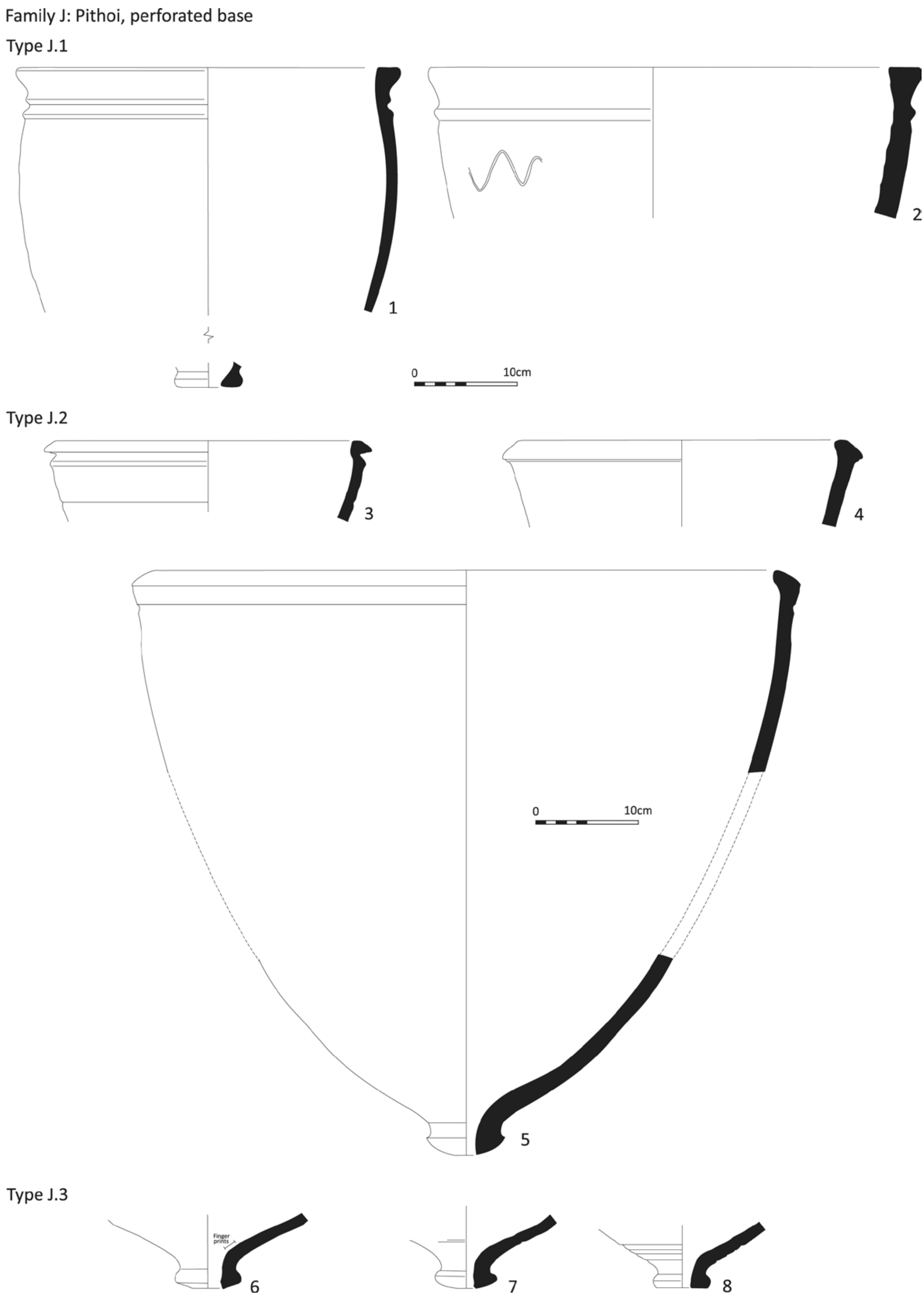


Figure 7.15 Type J: Vats.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Colour (Surface / Fabric)	Inclusions	Notes
1	Y89.6.1.4	**J.1**	**1c**	370	65 (25)			X-rayed. Raised relief band and indent beneath rim.
2	Y88B.8.1.1	**J.1**	**1d**	480				Raised relief band and faint wavy band on ext. Fingerprint impressions on int.
5	Y88B.3.9.1	**J.2**	**3**	ca. 600	76 (20)	Yellow-green/ Yellow-green	Chaff	Smoothed ext.
3	Y82.21.3.5	**J.2**	**1b**	300		Buff/Pink	Chaff (preserved)/ Sand	Raised ridge with incised circles on it. Impressed band on body.
4	Y82.13.1.2	**J.2**	**1c**	350		Buff/Pink	Chaffy	
6	Y82.20.2.2	**J.3**	**1b**		64 (26)	Pale green/Pale green	Chaffy	Fingerprints on int.
7	Y82.13.4.4	**J.3**	**1c**		60 (18)	White-cream/ White-cream	Chaff (preserved)/ Sand	
8	Y82.13.5.2	**J.3**	**1c**		55 (15)	White-cream/Grey	Chaffy	Rough incised lines around lower body. Not evenly spaced.

Table 7.12 Type J vessel attributes.

Figure 7.16 Examples of pierced 'bunghole' vat bases (Type J.3). Left: Y82.13.5.2, right: Y82.20.2.2.

Yelkhi Level Ic,[84] Nippur Level III[85] and Tell Khaiber Phases 2.2, 2.3, and mixed upper deposits.[86]

- **Type M.1b.** Flaring vessel bases of cups and jugs that have been chipped around lower body to form a makeshift lid or stopper. The grip elements have a fairly wide range of diameters (28-48 mm), as do the preserved rims (39-95 mm), suggesting their potential association with a range of vessels. Almost all examples of this Type were recovered from the Phase 1b-c floors in several rooms of Area I. *Selective Comparanda*: examples of vessel reuse are rarely recorded in previous publications, but some similar examples are attested from Tell Khaiber Phases 2.2, 2.3, and mixed upper deposits.[87]
- **Type M.2.** A sieve-neck vessel rim with seven holes, deliberately chipped directly below the rim. It has a diameter of c. 57 mm, which could have fitted in the top of a narrow-necked cup to act as a makeshift stopper or filter. For a detailed comparative and contextual discussion of this object, see Chapter 9.3.2.
- **Type M.3.** Sections of two miscellaneous vessels. Their lower bodies are hollow and shaped like cylindrical stands (Family L), but with the addition of a fragmentary upper section oriented inwards to form a narrow cylinder. While their full profiles are unknown, they may have formed the lower section of elaborate tall stands. Although fairly roughly shaped and finished,

84 Valtz (2002-3, Pl. 157.1-13).

85 Armstrong (1993, Pl. 68.j-k).

86 Calderbank (2021a, Pl. 72.1-3).

87 Ibid., Pl. 76.1-7.

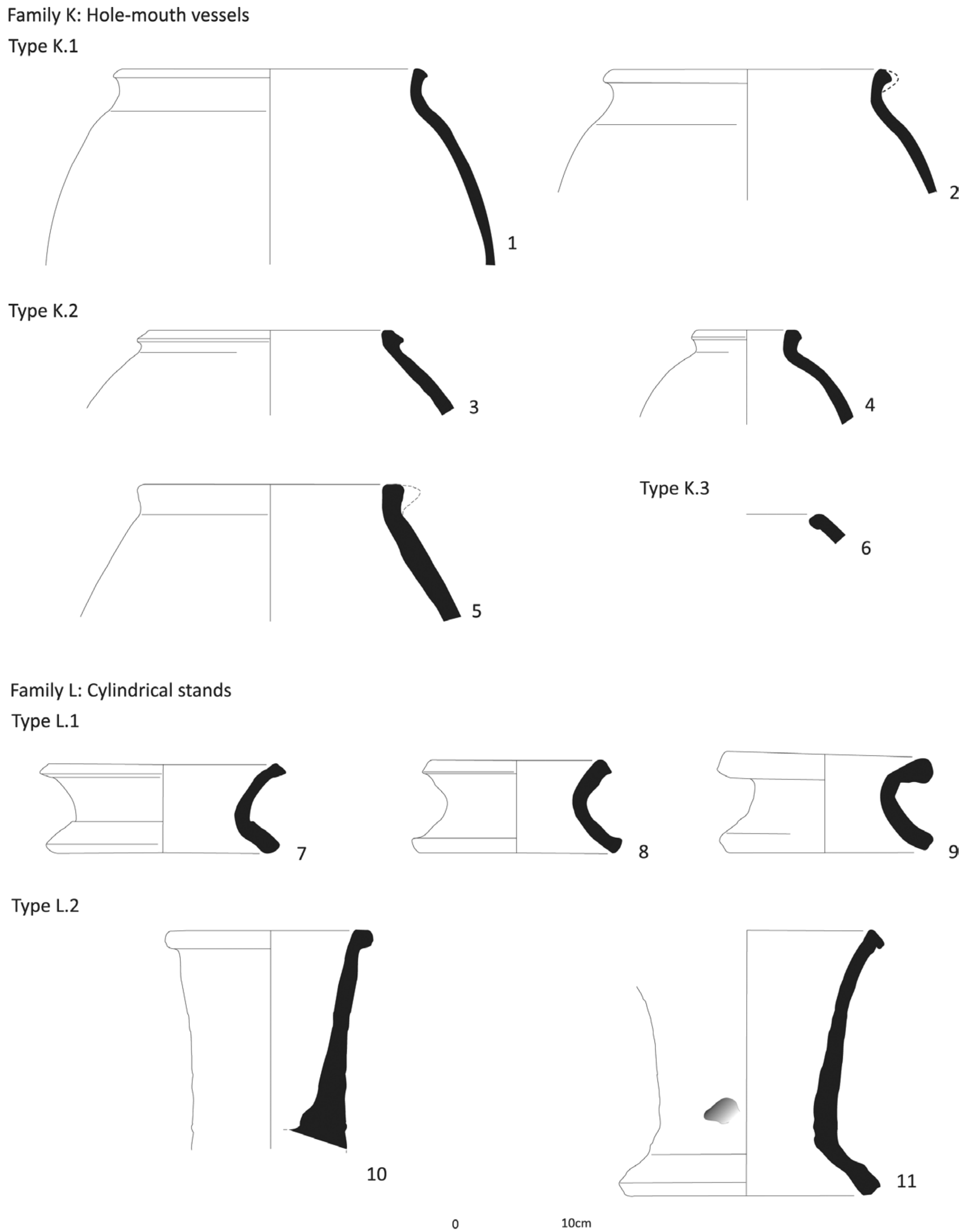


Figure 7.17 Type K: Cooking pots and L: Cylindrical stands.

Figure	Sherd	Type	Phase	Rim di.	Base di.	Colour (Surface / Fabric)	Inclusions	Notes
1	Y82.22.3.2	**K.1**	**1a**	240		Pink-brown/Dark grey	Coarse angular grit	Sooted ext.
2	Y82.13.1.6	**K.1**	**1c**	220		Buff/Buff	Large angular grit	Applied lug.
3	Z88.5.1.1	**K.2**	**1d**	220		Grey-orange/Pale orange	Large angular grit	Sooted patches on ext. rim and body.
4	V85.102.3.3	**K.2**	**3**	100			Coarse angular grit	
5	V85.127.2.2	**K.2**	**2**	220		Pink-orange/Pale brown	Large angular grit/ Rough chaff	Applied lug.
6	Z88.24.1.2	**K.3**	**1d**	?		Grey/Grey	Coarse angular grit/ Quartz(?)	Rim folded over on int.
7	Y82.9.3.4	**L.1**	**1c**	210	195	Pale green/Pale green	Chaffy	
8	Y82.14.2.4	**L.1**	**1c**	150	165	Green/Green	Chaffy	High-fired.
9	Y89.5.33	**L.1**	**1c**	178	175	Green/green	Chaffy	
10	Z90D.2.5.1	**L.2**	**3**	225	215	Pale brown-Green/ Pale brown	Voids	Fingerprints visible on lower body. Lifted when still wet?
11	Y82.13.5.1	**L.2**	**1c**	170		Green/Green	Chaffy	Visible coil joins on ext.

Table 7.13 Types K and L vessel attributes.

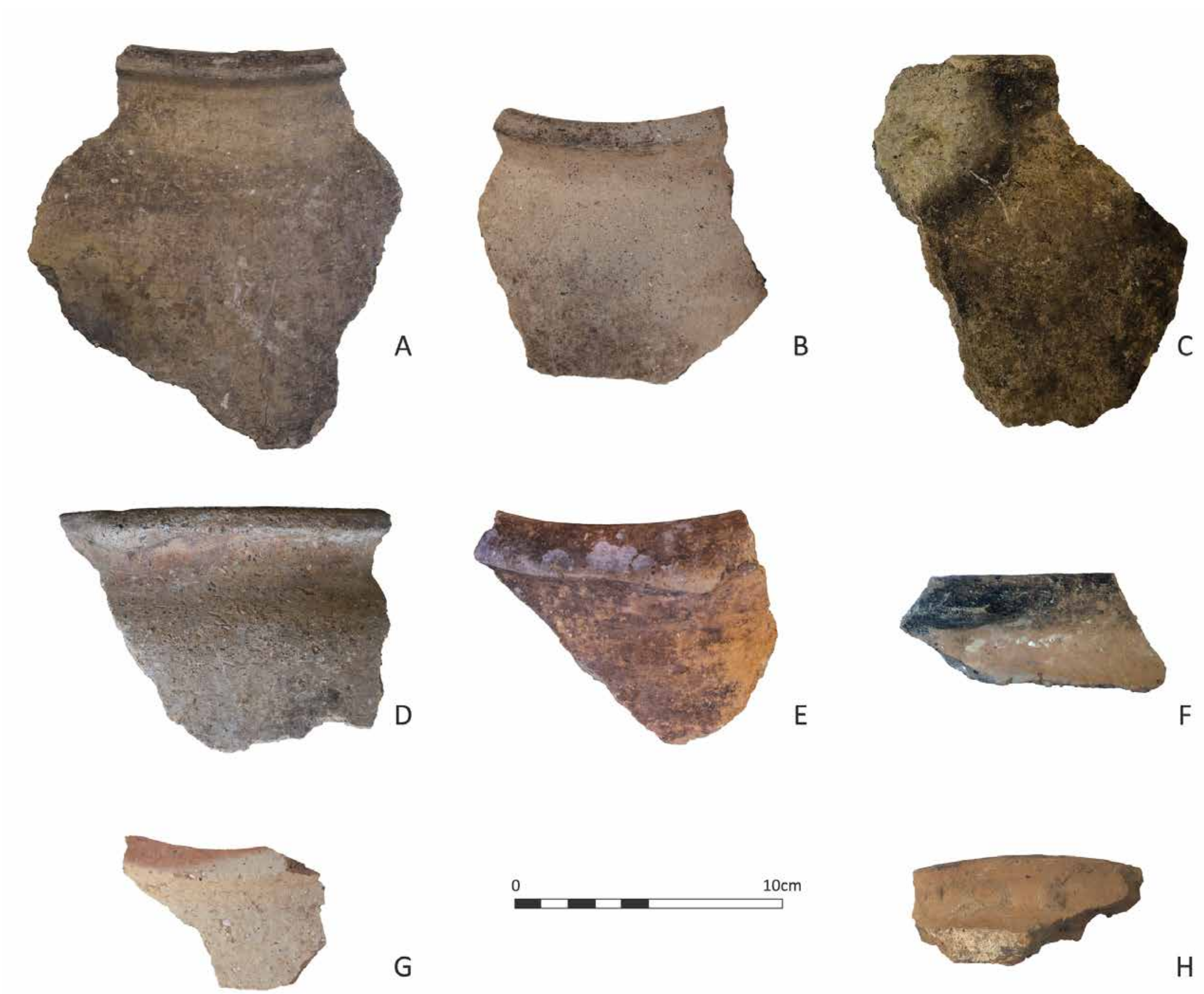


Figure 7.18 A selection of cooking pot sherds showing different levels of sooting: A) Y82.22.3.5, B) V85.175.1.4, C) Y82.21.2.3, D) Y82.13.1.6, E) Y82.13.5.3, F) Y82.22.3.4, G) Y89.7.1.1, H) V85.175.1.2.

Family M: Special types

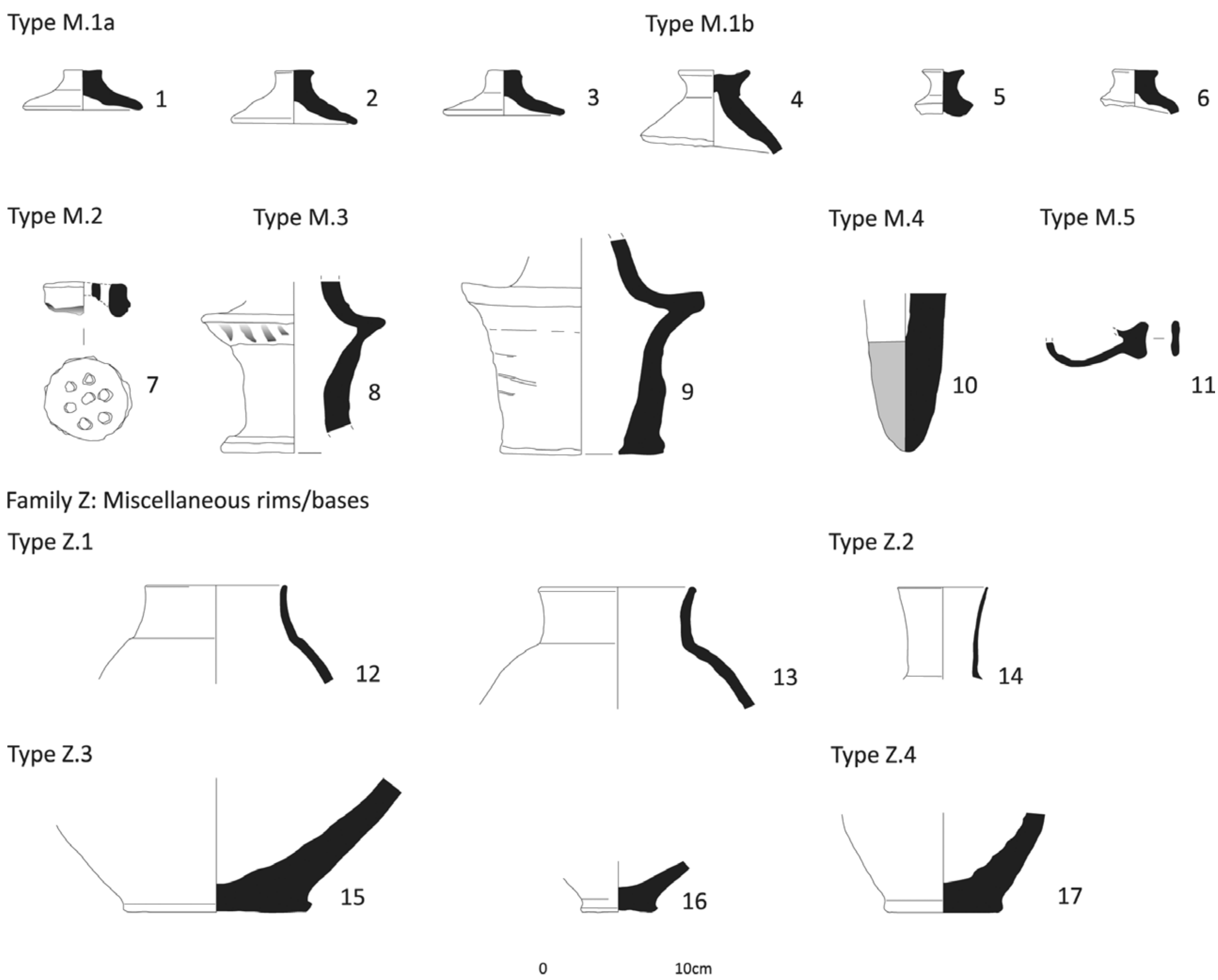


Figure 7.19 Type M: Miscellaneous Types and Z: Miscellaneous rims/bases.

both vessels show remnants of surface decoration, one with a dark red-purple slip (Figure 7.19.8) and the other with a white plaster coating (Figure 7.19.9). Both examples were recovered from Phase 3 in Area VI and have no clear regional parallels.

- **Type M.4.** A roughly rolled coil of clay, formed into a coarse point coated in black paint. A single example was found on the Phase 1b floor of Area I, Room 1. The function of this item is unclear, since there is no wear to suggest its use as a tool. No parallels could be identified.
- **Type M.5.** A rough handmade object, consisting of a flat, elongated 'grip' at one end and a small hollow sphere at the other, which together take the form of a 'fish'. A cow's tooth was found alongside the fragmented hollow sphere of the object, and was probably originally contained within. It is therefore possible that it was used as a rattle. The object was found in Phase 3 of Area VI.

7.3.1.14 Z: Miscellaneous rims/bases

This Family consists of miscellaneous rim and base sherds that could be associated with vessel shapes of more than one Family (Figure 7.19 and Table 7.14):

- **Type Z.1.** Squat cylindrical neck with simple rounded rim. These are vertical to slightly concave in profile and would originally have belonged to cups or jugs (Families C or E). Examples have been recovered from Phases 1b-d.
- **Type Z.2.** Tall cylindrical neck with simple rounded rim. These are vertical to slightly concave in profile and would likely have belonged to cups or goblets

Figure	Sherd	Type	Phase	Rim di.	Base di.	Colour (Surface / Fabric)	Inclusions	Notes
1	Y82.13.4.2	**M.1a**	**1c**	80	26	White-pale green/ Pale pink	Chaff (preserved)/Sand	S-cut "grip".
2	V85.164.4.6	**M.1a**	**2**	84	26	White-pale green/ Pale orange	Chaff/fine grit	S-cut "grip".
3	V85.164.4.2	**M.1a**	**2**	80	24	Orange/Orange	Fine grit	"Local" ware. S-cut "grip"
4	Y82.13.4.3	**M.1b**	**1c**	95	48	Cream/Pink	Fine sand	Re-used jug. Chipped around lower body.
5	Y89.5.16	**M.1b**	**1c**	39	28	Dark green/Dark green	Fine chaff/grit	Re-used cup. Chipped around lower body.
6	Y89.5.12	**M.1b**	**1c**	53	30	Pale green/Pale green	Fine chaff/grit	Re-used cup(?). Chipped around lower body.
7	Y89.5.21	**M.2**	**1c**	57		Green/Pink-brown	Chaffy	7-pierced holes. Chipped around circumference. Would originally have been part of a large vessel lid or spout?
8	N94.102.5.3	**M.3**	**3**		100	Grey/Pale brown – Grey core	Black grit	Coiled/roughly made – no evidence for wheel-finishing.
9	N94.102.9.6	**M.3**	**3**		109 (49)	Gey/Pale brown	Chaff	Plastered ext. Elaborate stand?
10	Y88.121.2.1	**M.4**	**1b**		-	Grey/Grey	Chaffy	Rolled coil with black paint covering "pointy" end.
11	N94.102.12.1	**M.5**	**3**			Green/Green	Sandy	Soft fabric – associated with cow tooth.
12	Y82.19.2.2	**Z.1**	**1b**	95		Pale green/Brown	Fine chaff (preserved)/ Sand/Calcite	
13	Z88.14.3.1	**Z.1**	**1d**	100-110 (irr.)		Yellow-green/ Yellow-green	Chaff	X-rayed. Warped. Faint impressed lines on upper body.
14	Y88B.38.44.2	**Z.2**	**1c**	60		Pale pink/Orange	Few inc.	Fine. Smoothed ext.
15	Z88.14.14.1	**Z.3**	**1d**		126	Pale green/Pale green	Chaff	Rough s-cut base.
16	V85.110.1.1	**Z.3**	**2**		51	Orange/Grey	Chaff (preserved)/ Fine grit	S-cut. Rough.
17	Y88A.16.21.1	**Z.4**	**1d**		80			S-cut.

Table 7.14 Types M and Z vessel attributes.

(Families C or F). Examples have been recovered from Phase 1c.

- **Type Z.3.** Rough, flat base of an open vessel, as judged by several distinguishing features: string-cut bases, everted angle of the body, and finishing of the interior surface. These would likely have belonged to small or large bowls (Families A or B). Examples have been recovered from a mixture of Phases 1b-2, but are especially common in Phase 3.
- **Type Z.4.** Rough, flat base of a closed vessel, as determined by several distinguishing features: lack of string-cut base, rounded angle of the body, and lack of finishing on the interior surface. These would likely have belonged to jugs (Family E) or potentially also jars (Family H). Examples have been recovered from a mixture of Phases 1b-2, but are especially common in Phase 3.

7.4 A technological outline

Various assumptions have been made about the technologies, forming techniques, and the organisation of the LB pottery industry. Rarely, however, have these aspects been unpacked in detail using a mixture of visual, statistical, and archaeometric techniques. This section will follow the production of Kani Masi's vessels through several key stages – clay preparation, forming and finishing, and firing – to identify and interpret some of the main patterns of production. Many of these aspects will then be drawn together in an in-depth discussion of the nature and degree of standardisation identified amongst the Area I, Phase 1c, cup and goblet assemblage, especially in relation to the social context and organisational scale of the industry (see Section 7.4.4 below).

7.4.1 Clay preparation

Digital microscopic photographs were taken of the fabrics of 100 sherds at a magnification of x100-150 using a DinoLite digital microscope. This allows for the identification of the main inclusions, their types, and their relative densities. The sherds chosen for this analysis were split between the site's Phases (Phase 1a: 24; Phase 1b: 26; Phase 1c: 25; Phase 1d: 1; Phase 2: 7; Phase 3: 17). Together, the sample demonstrates a fairly limited and consistent set of inclusions, which are, as follows:

- Organics. Plant parts which, depending on the nature of the firing atmosphere, either remain present in the clay matrix as a white skeleton, or are attested by a void, small and round or long and flat, where they were burnt away during firing. Although organics occur naturally in alluvial clays, they were also deliberately added to some vessels to help improve the clay's workability. Organics may have derived from farm waste, such as chopped straw and reeds, or from manure or dung cakes, introduced during the treatment and preparation of the clay body.[88] It is this diversity of organic sources which probably accounts for the differences seen in the final clay matrices of Kani Masi's vessels. Most analysed fabrics (54%) contain evidence for organics, whether as small rounded voids, as irregular preserved skeletons, or as dense, roughly distributed voids/skeletons.
- Fine Sand. Small, rounded mineral inclusions of an even size and in a range of different colours (red, brown, orange, black, etc.). These occur naturally in riverine clays and are therefore visible in all but particularly fine fabrics at Kani Masi, where a process of intensive levigation has presumably gone into their removal.
- Coarse Sand. Appearance as with fine sand, but occur in larger sizes, often with angular or sub-angular edges. They sometimes also contain larger translucent particles.
- Calcite. White, rounded particles. These are present naturally in calcareous clays and are present in approximately a quarter of Kani Masi's assemblage, in sizes ranging from small to large. When the firing temperature rises above a certain point (700-900°C), calcite minerals de-gas and alter in colour and composition.[89] Calcite is therefore more difficult to identify in high-fired wares.
- Undissolved clay. Particles of clay, of a different colour (usually brown-orange) or texture to the surrounding clay body. It is unlikely that these were deliberate additions, but were probably the incidental products of poorly worked clay bodies.

When these inclusions are identified in specific combinations and/or relative concentrations, they constitute a 'Fabric Type'. Eight distinctive fabric types can be identified at Kani Masi, albeit with some crossover between.

7.4.1.1 A: Fine sand

Fabric A contains very fine (< 0.1 mm) rounded to well-rounded sand particles distributed evenly (Figure 7.20.A). These particles are not generally visible to the naked eye, but are visible under a high-resolution microscope. They occurred naturally within the source body, with the larger sand particles having likely been filtered during a careful process of levigation. The result is a fine textured fabric with a smooth cross-section. The clay was thoroughly worked, leaving no organics and few voids. Vessels of Fabric A occur in a range of colours, indicating their exposure to a range of firing temperatures.

7.4.1.2 B: Medium sand

Fabric B contains fine-medium (< 0.5 mm) rounded to sub-rounded sand particles of different concentrations, which are generally distributed evenly (Figure 7.20.B). Particles are just about visible to the naked eye and likely occur naturally within the source body, having not undergone the same level of filtering as Fabric A. The texture of Fabric B is quite fine, with a relatively smooth cross-section. The clay body was well worked, with only few organics or small voids attested, albeit rarely. Vessels of Fabric B occur in a range of colours, indicating their exposure to a range of firing temperatures.

7.4.1.3 C: Calcite

Fabric C, like Fabric B, contains fine-medium (< 0.5 mm) rounded to sub-rounded sand particles (Figure 7.20.C). Amongst these are also white calcite particles. These are generally fine and rounded, but occasionally take on coarser forms (0.5-1 mm). Calcite is generally distributed evenly and is just about visible to the naked eye. Their size and shape suggest that they occurred naturally within the clay source body. The texture of Fabric C is quite fine, with a relatively smooth cross-section. The clay body was generally well worked, with some organics or small voids attested, albeit rarely. Calcite particles are generally only identifiable in low-fired vessels with pink-orange fabrics.

7.4.1.4 D: Medium sand, fine organics/voids

Fabric D often contains fine-medium (< 0.5 mm) rounded to sub-rounded sand particles, similar to Fabric B (Figure 7.20.D). However, Fabric D also contains numerous fine – medium voids (< 1 mm), distributed relatively evenly. While the sand particles likely occur naturally within the source body, the voids might be the product of several

88 van As and Jacobs (1992, 541).
89 Rye (1981, 33); Velde and Druc (1999, 103, 143-144, 253).

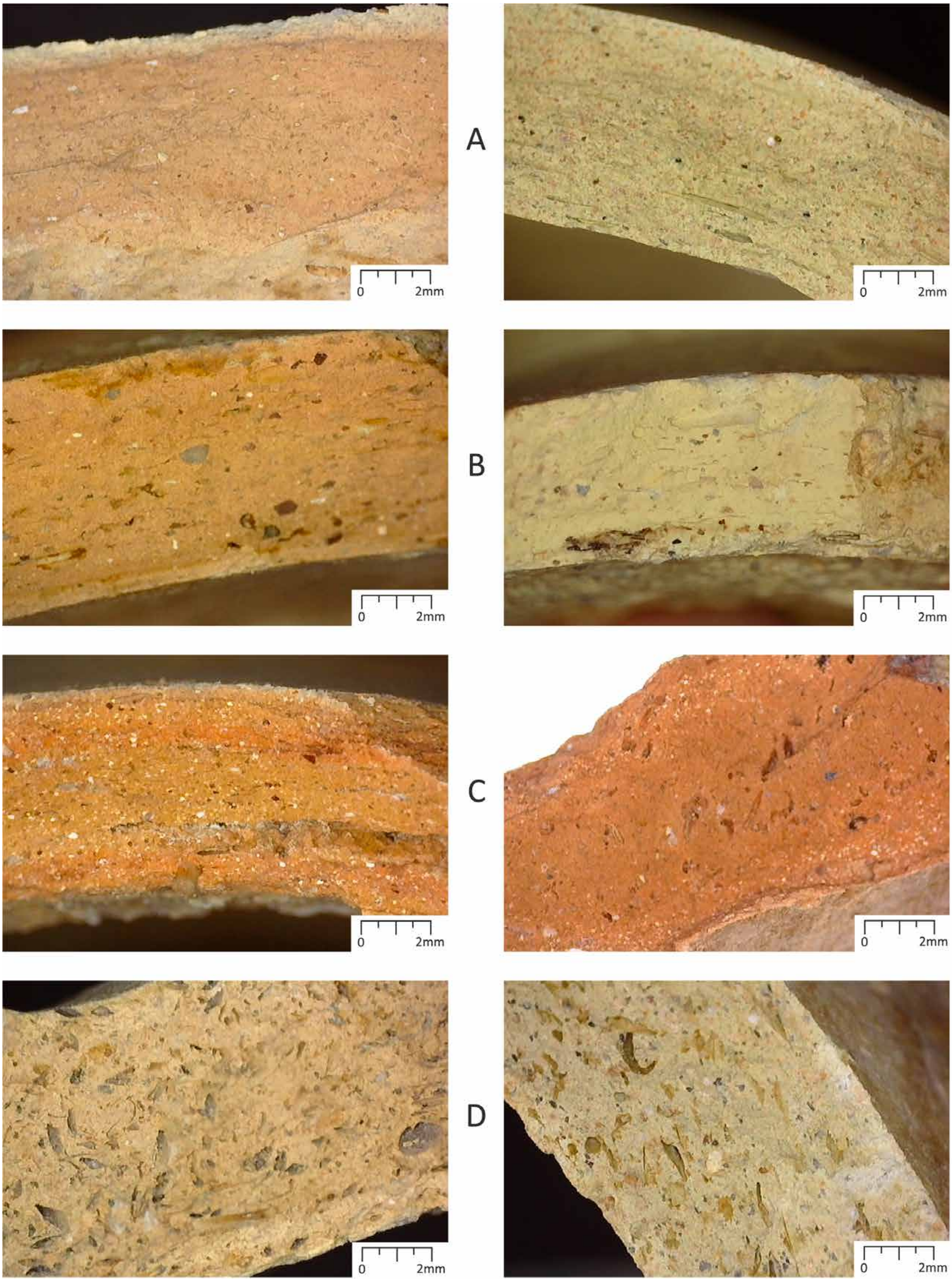


Figure 7.20 Examples of Fabrics A-D.

processes: they may represent fine organics, occurring naturally in the source body, or present in animal dung added during clay preparation, or they might simply represent incomplete working of the clay body, leaving air pockets and voids in the final product. The texture varies: Fabric D usually yields a reasonably smooth cross-section, but can sometimes be more irregular and friable. Fabric D vessels are usually cream-green in colour, suggesting an emphasis on medium firing temperatures.

7.4.1.5 E: Rough, preserved chaff

Fabric E usually contains fine-medium (< 0.5 mm) rounded sand and/or calcite particles, combined with rough elongated straw or reed skeletons, reaching > 2 mm (Figure 7.21.E). The sand is usually evenly distributed, but the straw/reed inclusions are more irregular in concentration and distribution. The organic inclusions are roughly chopped and were probably added deliberately as temper. The texture of Fabric E is usually quite fine, with a relatively smooth cross-section. The lack of air pockets and voids suggests that the clay body was generally fairly well worked. The skeletal straw or reed inclusions tend to occur in low-fired vessels with a cream-orange-pink colours. In higher fired vessels, the organic material can burn away, leaving large voids in their place.

7.4.1.6 F: Rough, dense chaff

Fabric F is typified by dense concentrations of rough, elongated organic inclusions of c. 1-5 mm in length (Figure 7.21.F). These organic inclusions are either preserved or attested by large elongated voids, depending on the firing temperature. Generally, these organics or voids are irregularly distributed. The roughly chopped material was almost certainly added deliberately to the clay body during preparation. The texture of Fabric F tends to be quite friable, with a hackly, stepped cross-section. The numerous air pockets and voids suggest that the clay body was not thoroughly worked. Fabric F vessels are usually cream-green in colour, suggesting an emphasis on medium firing temperatures, but can also be present in low-fired pink-orange colours with well-preserved organics.

7.4.1.7 G: Coarse grit

Fabric G differs significantly from the other fabrics in that it is composed of a range of medium-very coarse, (c. 0.2-0.5 mm) non-plastic inclusions (Figure 7.21.G). These vary in density and evenness, with some densely packed and evenly distributed and others sparse and irregular. Inclusions are most commonly of a rounded, translucent quartz. Sub-rounded to angular calcite or undissolved clay inclusions are more infrequently attested. Rough organic inclusions and voids, both fine and coarse, are occasionally also present. The texture of Fabric G tends to be rather friable, with a hackly, stepped cross-section. Fabric G is more common in grey, brown, pink, and orange fabrics, indicating that these vessels tended to be fired at low temperatures.

7.4.1.8 H: Poorly levigated

Fabric H contains diverse inclusions – some fine (< 0.1 mm) rounded sand particles, fine-medium voids (0.1-0.5 mm), and rough organic inclusions (> 0.5 mm) – similar to Fabrics B, D, and E (Figure 7.21.H). What separates Fabric H, however, are irregularly distributed medium-coarse (0.2-1 mm) conglomerations of clay, of a different colour and consistency to the rest of the clay matrix. These clay conglomerations may represent clay particles that were not thoroughly dissolved during levigation or manual working.[90] The texture of Fabric H varies, but tends to exhibit an irregular hackly cross-section. Fabric H vessels are commonly cream-green in colour, indicating medium-high firing temperatures.

7.4.1.9 Clay preparation patterns

There are several significant diachronic and functional interpretations that can be drawn from this digital microscopic analysis. Firstly, there is a trend from diversity and an even distribution of fabric types in Phase 1a to a relative restriction of types and their distribution in Phases 1b-2 (Table 7.15). This can best be observed in the relative abundance of fabric types containing organic inclusions (Fabrics D, E, and F), which rose from just 29% in Phase 1a to consistently over 55% in Phases 1b-2 (range: 56-77%). The second significant chronological development occurs between Phase 2 and Phase 3, where fabric types again appear to become more restricted: fine wares (Fabric A) and fabrics with calcite inclusions (Fabric C) are not represented in Phase 3, with a significant increase instead in the prominence of vessels with poorly worked fabrics (Fabric H), which reach 29% of the Phase 3 assemblage.

Fine wares (Fabric A) are extremely rare across the entire assemblage and, when identified, tend to be restricted to stemmed cups with tall necks (Type C.2) and occasionally also wavy-sided bowls (Type A.2). There is little coherent spatial patterning to these fine wares with which to define potential social divisions at the site.

Fabric types generally appear to have been governed by performance characteristics relating to vessel forming and intended use. Larger vessels, for example jars, pithoi, and vats (Families H, I, and J) tended to be given higher concentrations of organics (Fabric F), firstly to aid plasticity during production and secondly to prevent their thicker walls from developing catastrophic cracks during drying and firing.[91] Jars (Family H) would also have needed to

90 van As and Jacobs (1992, 533).
91 van As and Jacobs (2014).

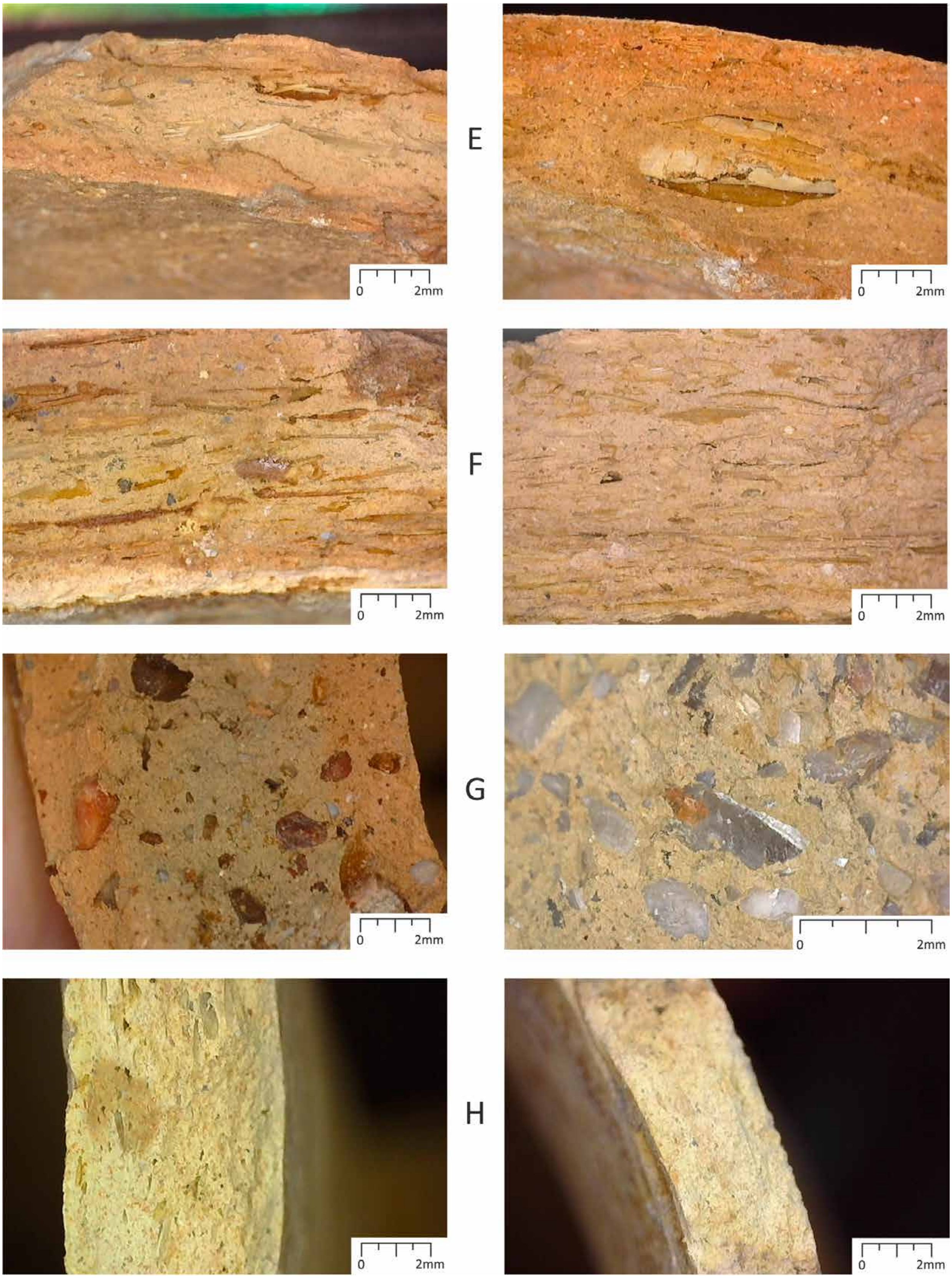


Figure 7.21 Examples of Fabrics E-H.

Phase	A		B		C		D		E		F		G		H		Total
3	-	-	3	18%	-	-	6	35%	2	12%	1	6%	-	-	5	29%	17
2	3	43%	-	-	-	-	1	14%	3	43%	-	-	-	-	-	-	7
1d	-	-	-	-	-	-	-	-	-	-	-	-	1	100%	-	-	1
1c	3	12%	-	-	5	20%	8	32%	5	20%	1	4%	2	8%	1	4%	25
1b	1	4%	2	8%	2	8%	13	50%	6	23%	1	4%	-	-	1	4%	26
1a	4	17%	2	8%	5	21%	3	13%	3	13%	1	4%	6	25%	-	-	24
Total	11		7		12		31		19		4		9		7		100

Table 7.15 Fabric distributions identified using digital microscopic analysis, according to phase.

be semi-permeable to encourage "sweating", a process by which water slowly leaches to the exterior surface where its evaporation helps to maintain the coolness of vessel contents.[92] Cooking pots (Family K) required enhanced thermal stress resistance and so were almost always furnished with large, angular grits (Fabric G). Smaller tablewares (Families A-C), on the other hand, would have needed to be light and portable, and so generally had higher concentrations of organics and/or voids (Fabrics D-E). These patterns of inclusion choice, as determined by intended function, are consistent with broadly contemporaneous assemblages across the region,[93] therefore indicating a robust and inter-connected community of practice during the LB using widespread clay preparation techniques.

7.4.2 Forming and finishing techniques

The recent implementation of a range of scientific techniques permits fine-grained identifications of diverse pottery forming processes. X-ray analyses of vessels especially have yielded significant insights into Bronze Age Mediterranean and Mesopotamian primary forming signatures.[94] This is because the application of pressure to soft clay causes inclusions and voids to take up specific orientation patterns that are more clearly discernible in X-ray images than by visual analysis.[95] These patterns of inclusion orientation are almost always fixed during primary forming, which makes it possible to differentiate not only between vastly different techniques, such as slab-building and wheel-throwing, but also to recognise subtle differences between wheel-throwing and diverse methods of wheel-coiling.

The visibility of inclusions, both macro- and microscopically, may be masked to an extent by secondary forming and finishing techniques, such as scraping, burnishing, painting, or slipping. Indeed, it is these secondary forming techniques, such as turning or beating, that can usually be identified more successfully through visual analysis. Nevertheless, the signatures of primary forming are never obliterated entirely.[96] It is therefore important to combine X-ray and visual analysis when identifying the complexities of vessel forming, combining analysis of pore orientations and joins identified in X-ray images with visual analysis of vessel surfaces.[97]

X-rays were taken of 40 vessels from Kani Masi, most of which are presented and discussed in this section (Figure 7.22-7.31). The aim of this analysis is primarily to establish technological trends amongst the most common tablewares, both open (bowls) and closed (cups, jugs, and goblets), with more limited information provided on less common vessel types.

7.4.2.1 Open tablewares

Family A bowls were wheel-coiled. Many examples demonstrate off-centre bases and irregularities in rim curvature (e.g. Figure 7.22.E), features which are generally inconsistent with wheel-throwing. Bowls started out as a coiled spiral of clay, which was wound to form a roughout. Only then was it joined and shaped using the rotative kinetic energy (RKE) of the wheel. Spiral coiling is determined in the X-rays by the oblique direction of inclusions/pores (Figure 7.22.A-B), visually by the irregular oblique ridge patterns on the vessel surface (Figure 7.22.C), as well as by the identification of cracks and breaks which tend to follow original coil joins (Figure 7.22.E). Lots of water appears to have been used during the wheel-based joining and final shaping of at least some bowls, as exhibited by the heavy wet-smoothing and smudging of surfaces (Figure 7.22.C).

Bowl bases usually have fairly rough concentric circles, indicating the point at which they were removed

92 Skibo (1989, 129-131).
93 Pfälzner (1995, 28-30); Duistermaat (2008); Calderbank (2021a).
94 Berg (2008; 2011); Romano and Zingale (2019); Calderbank (2021a); see Pierret (2019) for a general discussion of the method.
95 Rye (1977, 206; 1981, 51-53).
96 Berg (2011).
97 Roux and Courty (2019, 180-185).

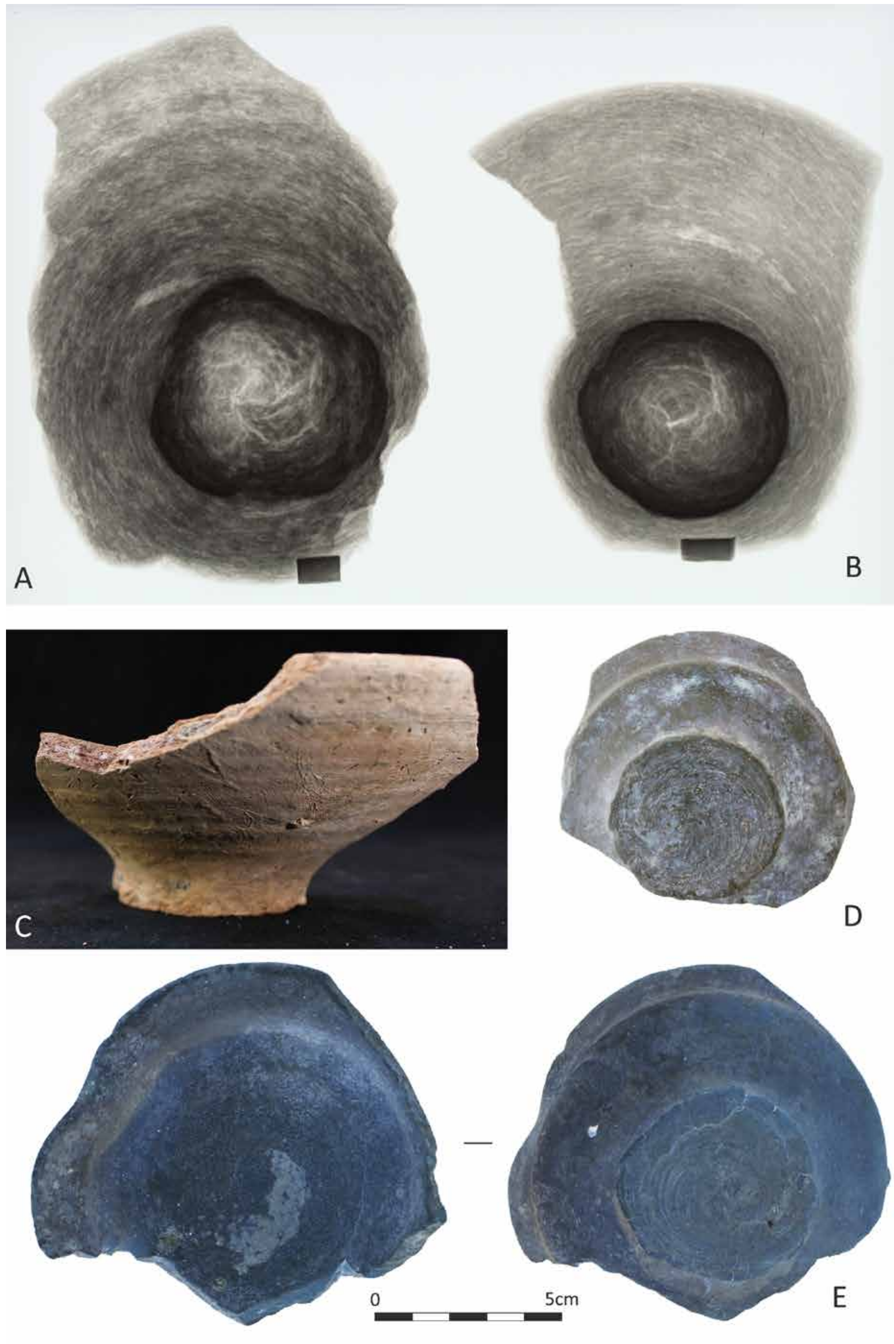


Figure 7.22 Technological signatures of bowls. Vessel X-rays A) N94.102.9.2.2, B) N94.102.9.2.7 and surface details C) Y82.22.4.1, D) Y82.22.2.2, E) V85.164.3.2.

from the wheel-head using string (Figure 7.22.D-E). The risks of base cracking during drying and firing was regularly offset by the addition of chaffy clay to the interior base during the forming process. This practice is more common amongst cups, jugs, and goblets, and is discussed further below.

7.4.2.2 Closed tablewares

Kani Masi's closed tablewares encompass all small, closed vessels associated with the serving and/or consumption of drink, and therefore includes cups, jugs, and goblets (Families C, E, and F). These vessels underwent complex, composite sequences of production, incorporating several forming techniques and discrete stages. A general process is presented in this section by way of introduction, but there is an enormous amount of small-scale technological diversity underpinning the forming of individual vessels that cannot be captured here and is instead discussed in Section 7.5 below.

The first step in producing Kani Masi's closed tablewares seems to have mirrored the manufacture of bowls discussed above. The potter wound a coiled spiral of clay to form the lower body. This coil was then joined, thinned, and shaped using RKE, as can be observed in the irregular horizontal-oblique orientation of the ridging on the interior surface, which tends to show asymmetrical alignment across opposite walls of these vessels. The exact height to which this technique was used varies on each vessel, and it was occasionally applied to the entire body, up to the base of the neck (e.g. Figure 7.26.A, V85.180.1.1). During this first forming phase, the potter probably left a small hole in the base of the vessel, ready for the foot to be attached later in the process.

With most cups, jugs, and goblets, the coil spiralling technique was replaced at around the mid-point by the building of the upper body using coiled segments. These separate segments were placed one on top of another, before being joined, thinned, and shaped by applying RKE in combination with manual pressures.[98] The wheel-coiled segment technique can be recognised, firstly, by the horizontal alignment of coil ridges and the relative symmetry of wall thickness along the horizontal plane. A further indication of the use of coiled segments is differentiation in wall thickness on the radial plane, with walls occasionally becoming thicker higher up the vessel (e.g. Figure 7.25.B, Y88.121.2.1, Figure 7.26.C, Y88A.44.50.1); this pattern is inconsistent with wheel-throwing, which almost always results in vessels becoming thinner higher up the vessel. It is, however, typical of the building of vessels with separate coils, where a coil placed above may be slightly thicker than the one placed below. The precise execution of these coiled segments varies markedly, with some vessels demonstrating thin and tightly packed coils (e.g. Figure 7.26.D, Y88A.44.50.2) and others thicker and roughly joined ones (e.g. Figure 7.27.A, L80C.6.2.1). Manual pinching and drawing processes used to join the lower and upper bodies of cups and goblets are clearly identifiable by irregular vertically oriented concavities visible in the X-ray images of several vessels.

The sequential wheel-coiling processes outlined above generally leave horizontal-obliquely orientated inclusions/pores, visible most easily in the X-ray imagery. This orientation is caused by the original alignment of the inclusions, which followed the orientation of the placed coil, combined with the exertion of diagonal manual pressures (with RKE) to consolidate joins and to thin and shape the vessel.[99] These diagonal manual pressures reoriented at least some of the inclusions/pores to assume their oblique orientation.

The necks and rims of closed tablewares were probably added as an extra spiralled coil. These necks are usually relatively neat, with little evidence of interior ridging, thus reflecting the increased attention paid by the potter to finishing these elements. The resulting smoothness would, of course, have better facilitated the controlled pouring of liquids. Only some taller necked vessels retain interior ridges. The increased manual pressures applied during joining and finishing of the neck and rim results in an often more pronounced oblique orientation of inclusions/pores than the rest of the body (e.g. Figure 7.25.A, Y88.121.1.1). In many cases, the joins between coils on the body and at the base of the neck can be identified by horizontal curvilinear fissures (e.g. Figure 7.27.B, Y89.6.1.1), which forms a common point of fracture for many vessels.

The final stage of producing the vessel rough-out or preform for a cup, jug, or goblet was the production and attachment of the foot. This appears to have taken place once the body of the vessel had dried to a leather-hard consistency, at which point the potter inverted the vessel onto its rim to attach and shape the foot.

The feet of wider footed jugs and goblets were generally, though not always, produced by wrapping a coil of clay around a tenon of chaffy clay, often referred to as the "plugged" or "filled-in" base. This tenon of chaffy clay was added by potters as a preventative measure to help stop the total mass of wet clay from cracking during subsequent drying and firing. This technique has long been recognised and discussed as part of the second millennium Mesopotamian potting tradition.[100]

For other vessels, usually narrower stemmed cups, the foot would have been formed of a simple coil of clay without the added chaffy tenon. Either way, the foot was manually applied to the hole left earlier at the bottom of the vessel, being twisted and drawn to join and shape, as can be seen clearly by a curvilinear fissure, usually at the top of the foot, visible in many X-ray images (e.g. Figure 7.29.A-M).

The visual signatures of this process are generally well hidden by finishing processes to the exterior surface. The join is consolidated through manual pressures, while excess clay is trimmed by scraping around the lower body and foot while turning on the wheel. Indeed, vessels show their tightest rilling and wet-smoothing at this point, indicative of the attention paid by potters to this finishing process. Less attention is paid to masking these processes on the interior surface. Here, many vessels show a tell-tale raised dimple at the centre of the interior (e.g. Figure 7.29.O, T, U), formed by excess clay from the foot as it was pushed into the base. In almost all cases, this joining process is visible in X-ray images: the chaffy tenon of clay can be identified as a mottled area in the centre and the join between the foot and the body as a curvilinear fissure. The chaffy tenon

98 Roux and Courty (1998, Fig. 2).
99 Roux and Courty (2019, 185).
100 van As and Jacobs (1987, 42-51; 2014, 81); Glatz and Casana (2016, 141-143).

A

Y89.5.2.2

Inclusions: numerous circular-elongated inclusions/pores. Horizontal-oblique orientation (whole body); oblique orientation (neck).

Shape: asymmetrical twisted foot. Regular horizontal ridge pattern (middle-upper body). Relatively symmetrical shape on horizontal plane. Even wall thickness on horizontal and radial planes (body), but uneven wall thickness on horizontal and radial planes (neck), becoming thicker higher up the vessel.

Coil Seams: joins visible (top of foot/base of neck).

B

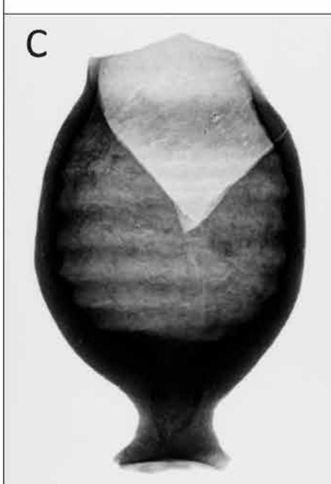
Y89.5.2.3

Inclusions: elongated inclusions/voids. Oblique orientation.

Shape: symmetrical foot. Even wall thickness on horizontal and radial planes, where preserved.

Coil Seams: joins visible (middle of foot/lower body).

C



Y89.5.2.4

Inclusions: few inclusions/pores. Sharp oblique orientation (upper body).

Shape: asymmetrical twisted foot. Irregular spiral ridge pattern (whole body). Relatively symmetrical shape along horizontal plain. Even wall thickness on horizontal plane.

Coil Seams: joins visible (top of foot/below shoulder). Evidence for pinching/smudging (middle-upper body).

D

Y89.5.2.5

Inclusions: elongated inclusions/pores. Oblique orientation (whole body and neck).

Shape: spiral ridge pattern (lower body), becoming an irregular, tight horizontal ridge pattern (middle-upper body).

Coil Seams: possible joins visible (top of foot/lower body/base of neck). Evidence for pinching/smudging (lower/upper body).

0 5cm

Figure 7.23 X-rays of cups with information on technological signatures identifiable.

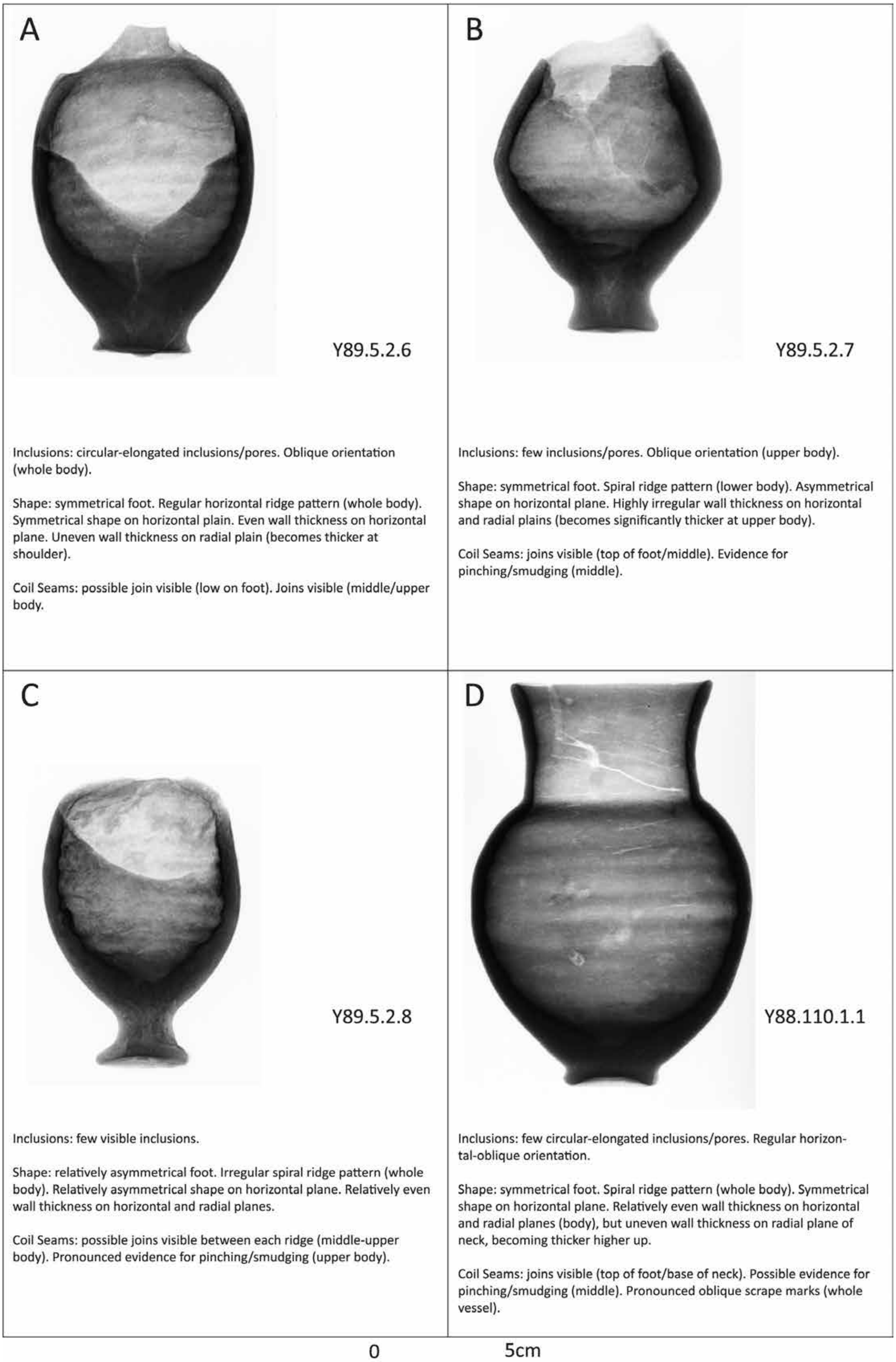


Figure 7.24 X-rays of cups with information on technological signatures identifiable.

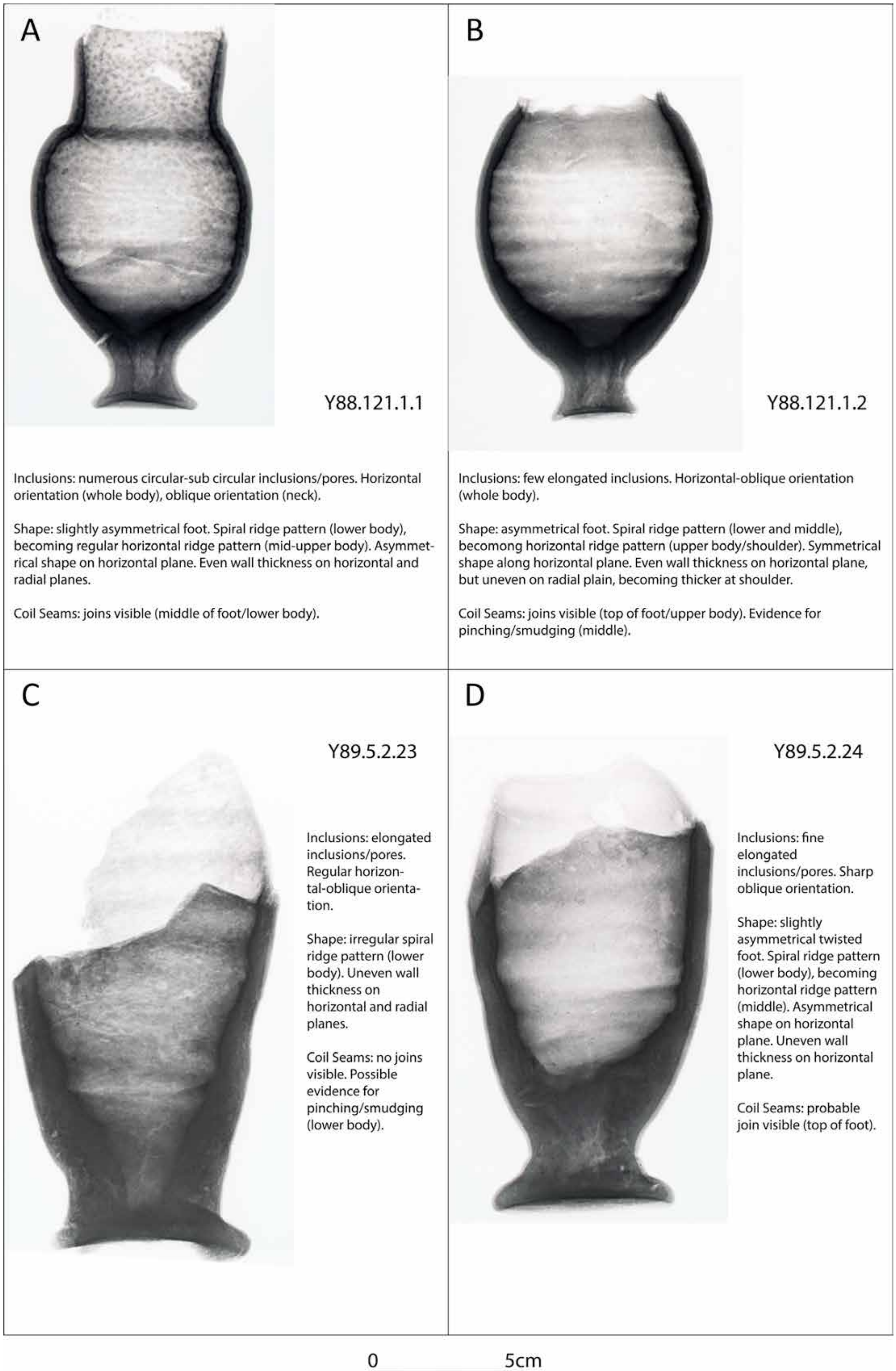


Figure 7.25 X-rays of cups and goblets with information on technological signatures identifiable.

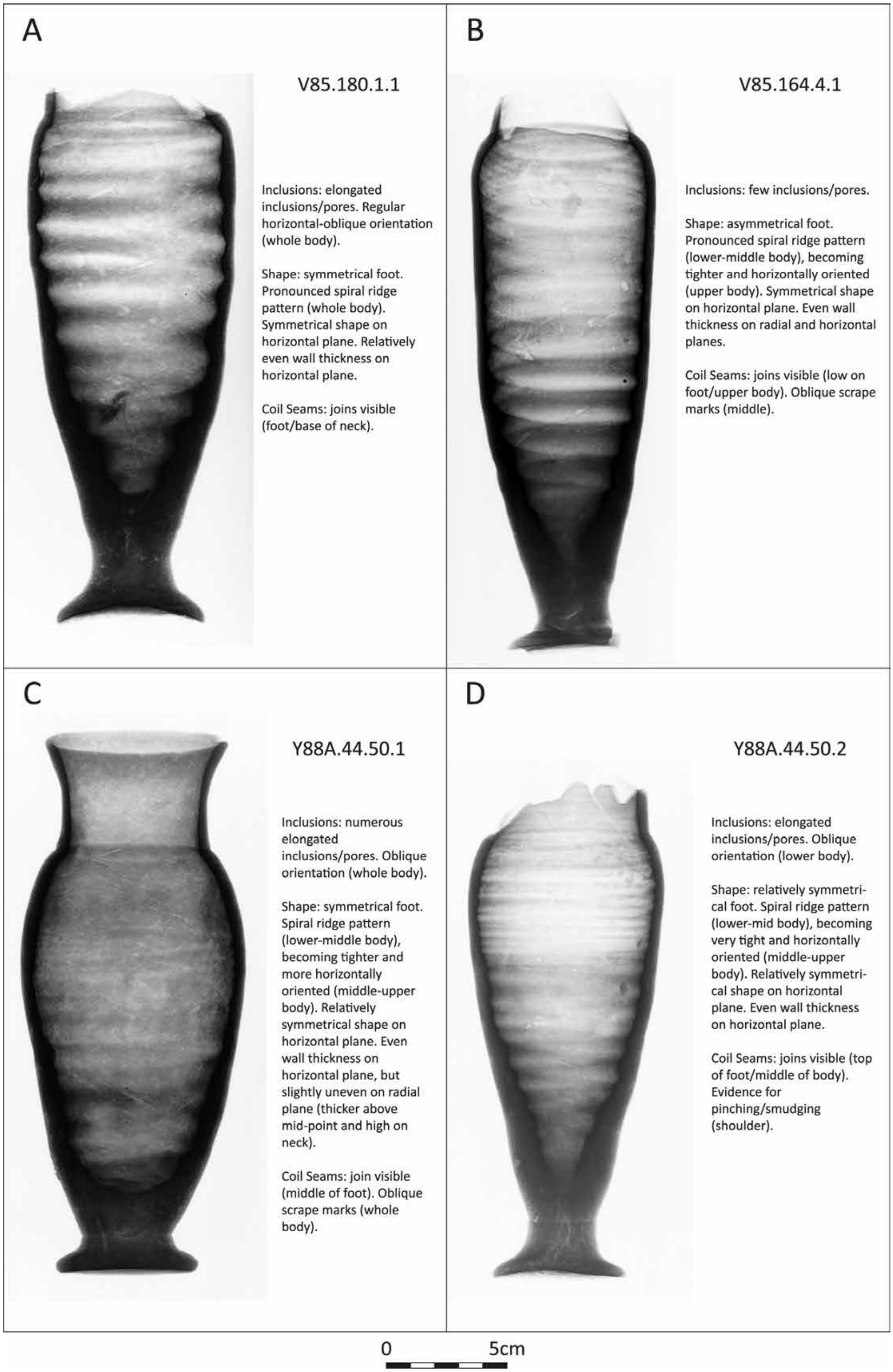


Figure 7.26 X-rays of goblets with information on technological signatures identifiable.

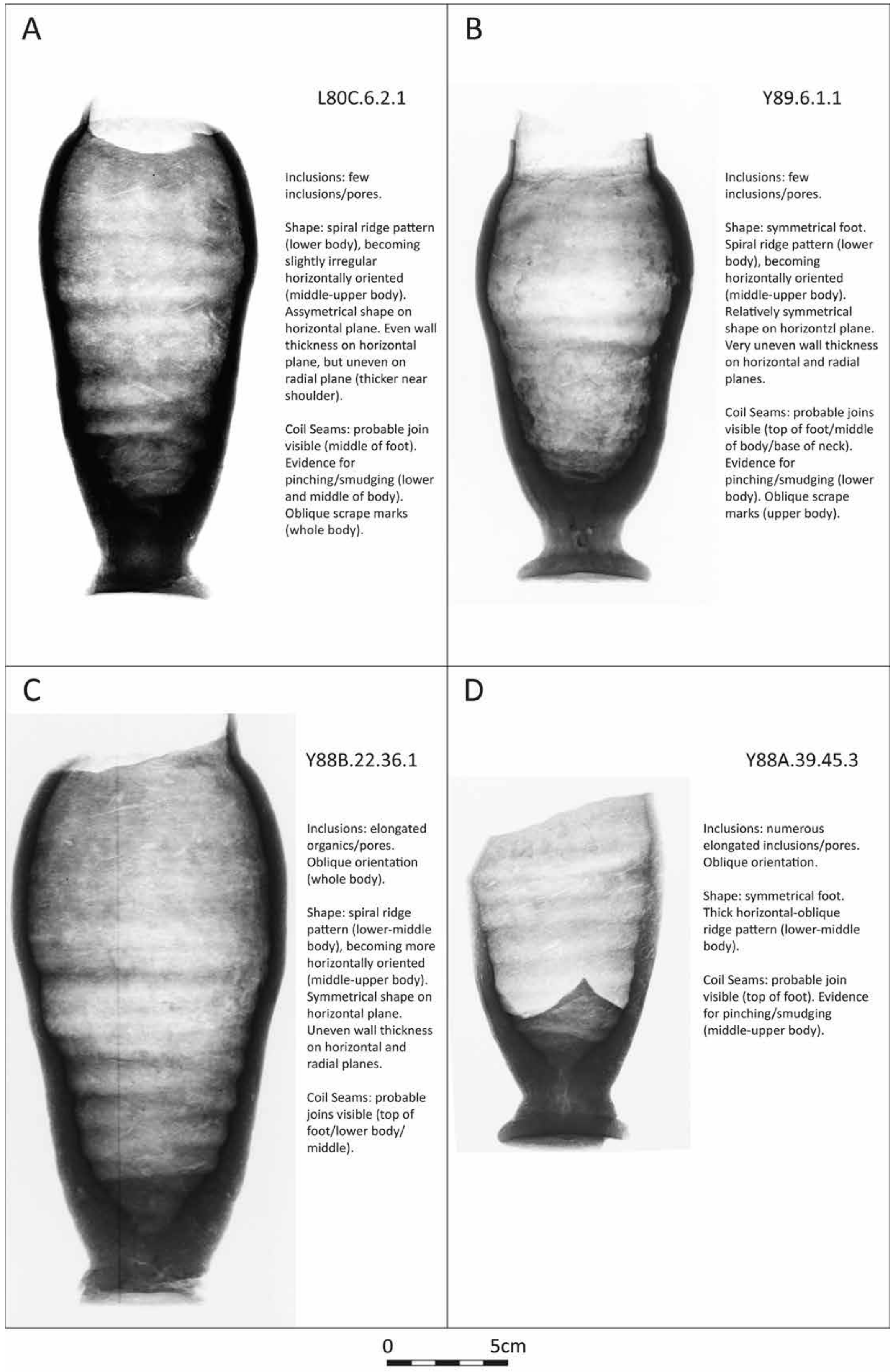


Figure 7.27 X-rays of goblets with information on technological signatures identifiable.

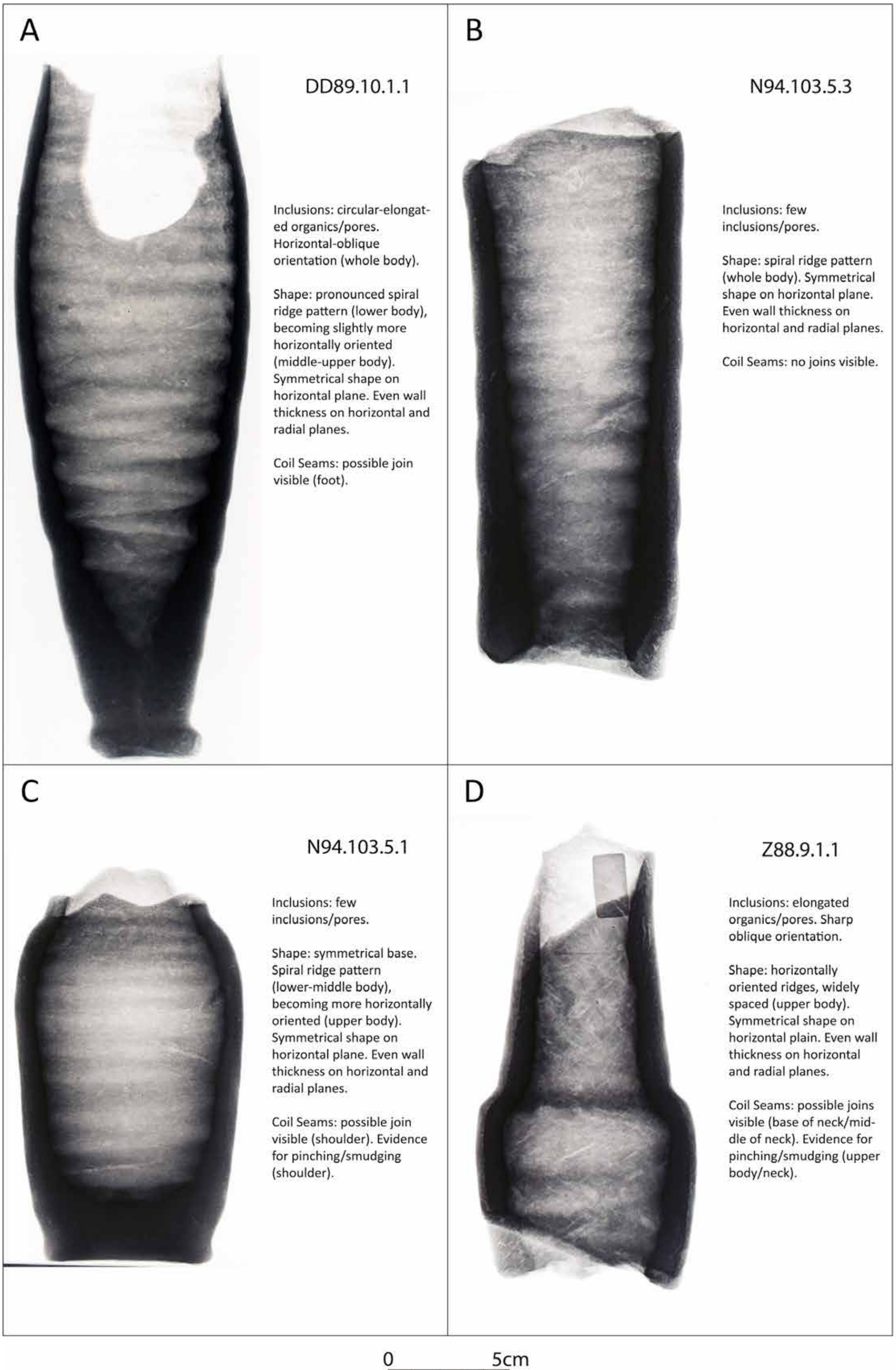


Figure 7.28 X-rays of goblets with information on technological signatures identifiable.

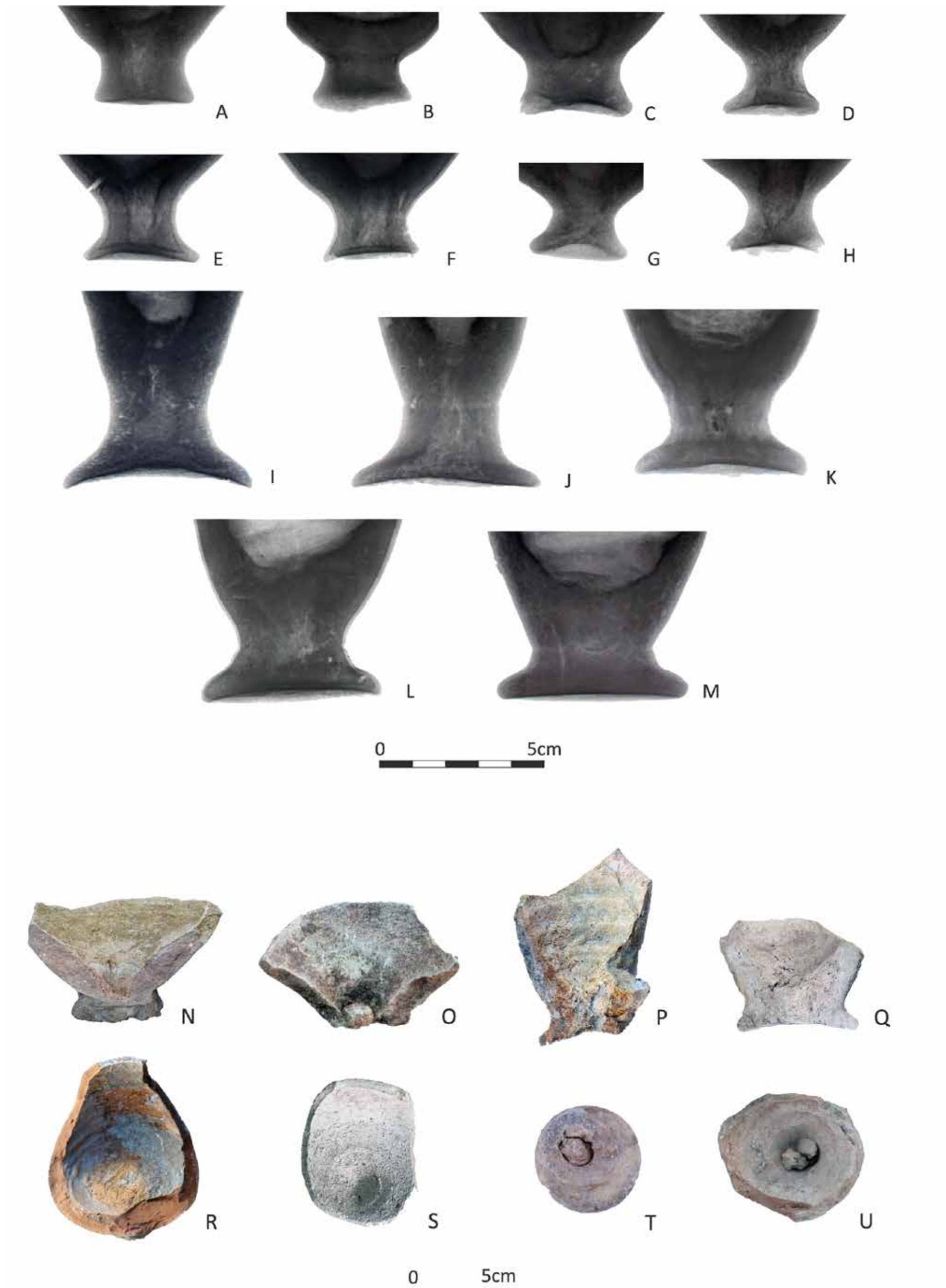


Figure 7.29 Technological signatures of cup, goblet, and jug feet. Vessel X-rays of cup (A-H) and goblet (I-M) feet, visual analysis of bases, side-on (N-Q), and top-down (R-U).

can also be clearly seen for broken vessels, especially when the fracture exposes the profile of the base (e.g. Figure 7.29.N-S).

7.4.2.3 Other vessels

Bottles (Family D): from the limited evidence for bottles, it appears, like cups, they were formed from a coiled spiral of clay. This coil was closed at the base, joined, thinned, and shaped using manual pressures of pinching and drawing, without any use of RKE. These manual pressures can be recognised by the irregular, vertically oriented concavities visible in the X-ray imagery (Figure 7.30). The neck was then added separately, likely of another coiled segment. Each of the three bottles in the assemblage have broken at the neck. For Type D.2 bottles, the top of the rim was folded over to form a rough inward bevel, which was not extensively tidied or finished.

Jars (Family H): no complete jar profiles are available for full technological investigation. Since the lower sections of these vessels tend to fragment, it is not possible to reconstruct their production sequence with certainty. The rounded bases (Type H.4), with their typical spiral

Figure 7.30 Profile photograph and X-ray of bottle Z88.16.2.1.

dimple, suggests a large spiral coil formed the lower body shape, before being pressed manually to join, as is the case with jars at Tell Khaiber.[101] Above the mid-point, jars tend to be better preserved. The pronounced horizontal ridge pattern on the interior, irregular along the radial plane, coupled with more pronounced rilling and evidence of wet smoothing on the exterior, strongly suggests that the upper profiles of jars were built from individual coils, which were joined, thinned, and shaped in turn using RKE.[102] This is supported by horizontal-oblique patterning of inclusions and voids, which become more sharply oblique at the neck (Figure 7.31.A-B). Once the walls of the jar had been built, the characteristic thickened rim band, formed from an extra coil of clay, was attached, before being joined and finished using RKE.

Stands (Family L): Vessel stands were produced using similar techniques to the upper body of jars. Individual coiled segments were joined, shaped, and finished using RKE.

Pithoi and Vats (Families J-I): most of the bodies of pithoi were built of thick coils, which were joined without RKE, by extensive drawing of the coils. This manual drawing and pinching is identifiable by the oblique orientation of inclusions and pores and the circular casts visible in X-rays (Figure 7.31.C-D). The fine horizontal rilling present on the surfaces of pithoi demonstrate that extensive final surface smoothing took place using RKE, perhaps with the vessel inverted on the wheel. These finishing processes obliterated much of the visual evidence for coiling and drawing. Families I and J diverge in the manufacture of their bases. For Family I, the vessel body was upturned and a thick ring base, shaped from a large clay coil, was attached around the lower body. For Family J, a smaller clay coil was attached to the centre of the exterior base, which was then pierced to form the protruding 'bunghole' shape.

Cooking pots (Family K): Cooking pots were handmade. The high density and large size of mineral inclusions in these vessels (Fabric G) would have reduced vessel plasticity in a manner incompatible with wheel-based production.[103] Cooking pot bases were not preserved for analysis, probably since they were simple and rounded in shape and therefore difficult to distinguish from a typical body sherd. No X-ray analysis was conducted on Kani Masi's cookpots, but it is likely that they were produced from large oblique coils/slabs, similar to the technique used for the same shaped vessels from Tell Khaiber.[104] Joins between slabs/coils were consolidated and the walls thinned using the paddle and anvil technique, as is demonstrated by regular circular casts on the interior surfaces.[105] The exterior was sometimes heavily wet-smoothed, probably with organic material such as reeds or a cloth, as can be recognised by extensive surface smudging (see Figure 7.18).

7.4.2.4 Identifying patterns

Kani Masi's assemblage shows no definitive evidence for wheel-throwing on a fast, continuously turning wheel. This appears to have remained the case throughout the site's LB occupation, despite strong evidence for the introduction

101 Calderbank (2021a, 54-55, Fig. 4.13).
102 van As and Jacobs (2014, 88).
103 Rye (1981, 61).
104 Calderbank (2021a, 54-55).
105 Rye (1981, 84-85, Fig. 70.f).

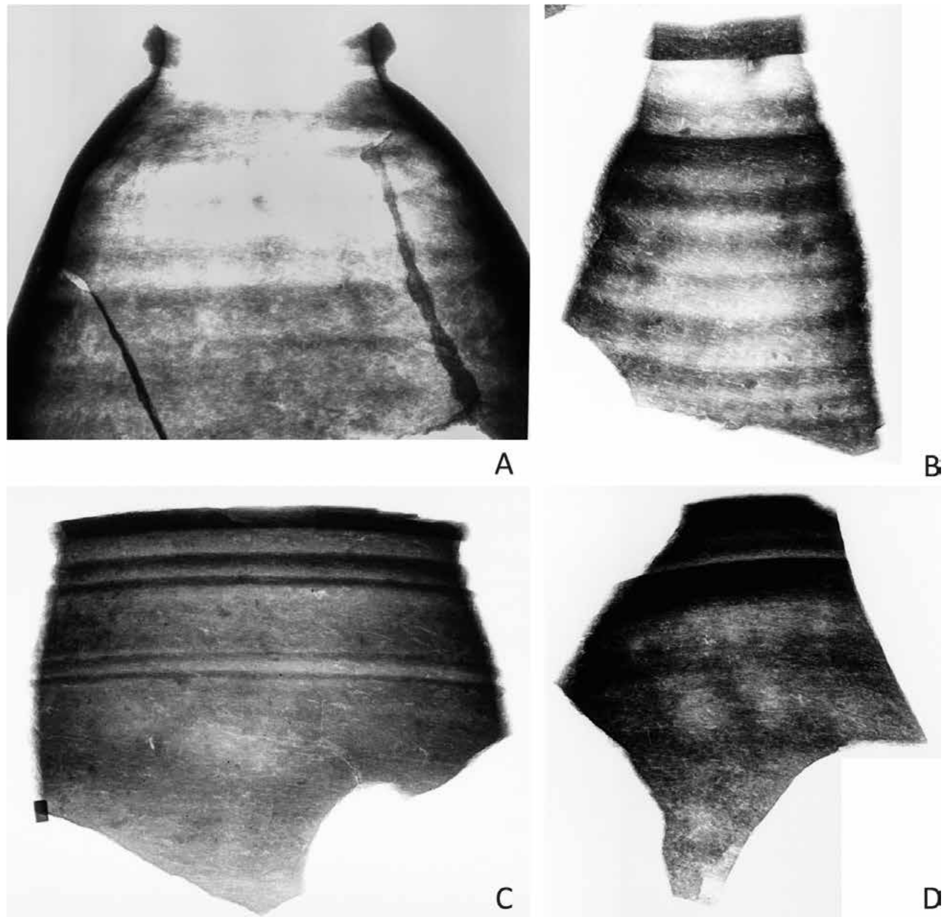


Figure 7.31 X-rays of jars: A) DD89.10.2.1, B) Y88.121.1.3 and pithoi: C) Y89.6.1.4, D) N94.102.7.1.

of wheel-throwing technology across the wider region, for example at Middle Assyrian Tell Sabi Abyad in northern Syria.[106] Instead, Kani Masi's vessels demonstrate a heavy reliance on wheel-coiling techniques and a marked preference for using RKE to shape and finish vessels along the horizontal axis, rather than harnessing these rotary forces to raise vessel walls. These composite, segmental techniques were well suited for dealing with persistent limiting factors, such as the lack of plasticity amongst local alluvial clays. Similar composite forming techniques have been identified at Tell Khaiber during the LB I.[107]

7.4.3 Firing conditions

Firing conditions, including the location, temperature, and atmosphere in which vessels were fired can be established based on various types of direct and indirect evidence. We have already, in Chapter 6.2.2, discussed in some detail the pyrotechnological installations that we suspect to have been directly involved in pottery production, including large domed updraft kilns in Area III, and an elaborate hemispherical kiln (Kiln VII.1) in Area VII. It is unclear precisely what was used to fuel these kilns. Various types of fuel would have been possible, including bitumen/crude oil,[108] agricultural produce/waste, or perhaps even deliberately prepared dung cakes (e.g. Chapter 8.2.1.2). The latter two options seem most likely, given that the temperatures achieved using shrubs, waste straw, or dung cakes would have been easier to control, and would have released fewer noxious gases. Waste straw is the most frequently attested fuel in second millennium texts.[109]

The most extensive evidence for firing processes, while indirect, comes from the vessels themselves, specifically their surface and core colours. General differences in surface colour are mostly determined by firing temperature, while the consistency of colour throughout the clay matrix is usually the result of firing atmosphere. At Kani Masi, surface/core colours were recorded based on visual analysis. Estimates of firing temperature could then be made based on results of firing tests conducted on Middle Assyrian ceramics from Tell

106 Duistermaat (2008, 379-383).
107 Calderbank (2021a, 48-55).
108 van As and Jacobs (2014, 91-92).
109 Sallaberger (1996, 17-18).

	Very low (reducing) c. <700 °C Grey / Red, Grey / Blue core	Low (oxidising) c. 700-800 °C Brown / Buff / Pink / Orange	Medium (oxidising) c. 800-950 °C Pale Orange / Yellow / Cream	High (oxidising) c. 950-1100 °C Green / Olive Green
A		**22**	12	9
		51.2%	27.9%	20.9%
B		5	**8**	**8**
		23.8%	**38.1%**	**38.1%**
C		**31**	27	22
		38.8%	33.8%	27.5%
D		**2**	1	
		66.7%	33.3%	
E		3	4	**6**
		23.1%	30.8%	**46.2%**
F		**21**	19	**21**
		34.4%	31.1%	**34.4%**
G			1	**2**
			33.3%	**66.7%**
H		5	10	**11**
		19.2%	38.5%	**42.3%**
I		2	3	**10**
		13.3%	20.0%	**66.7%**
J		2	**4**	**4**
		20%	**40%**	**40%**
K	**4**	**4**		2
	40%	**40%**		20%
L			1	**4**
			20%	**80%**
M	1	**5**	2	3
	9.1%	**45.5%**	18.2%	27.3%
Z		**8**	2	**7**
		47.1%	11.8%	**41.2%**
Total	**5**	**110**	**94**	**109**
	1.6%	**34.6%**	**29.6%**	**34.3%**

Table 7.16 Firing temperature according to vessel Family. Highest relative percentage for each Family highlighted in orange.

Sheikh Hamad[110] and Tell Sabi Abyad.[111] Due to similarities in geological conditions, these results are considered to be representative of Kani Masi's clays too.

At Kani Masi, the lowest temperatures were reserved for cooking pots; these vessels were often fired below 700°C, making them grey/red in colour, and often in a reducing atmosphere, resulting in a grey/black/blue core. Other lower fired sherds (c. 700-800°C) took on a brown/buff/pink/orange hue, while pale orange/yellow/cream wares were fired at medium temperatures of approximately 800-950°C. Sherds fired at high temperatures (c. 950-1100°C) were green to olive green, becoming darker as the temperature rose.

Vessels bearing colours consistent with each of these temperature classes are common in the Kani Masi assemblage. Judging by the general consistency of colour between the surfaces and the core, most Kani Masi vessels were kiln fired under well controlled, completely oxidising conditions.[112] Only cooking wares, with their darker, often clearly defined cores appear to have been routinely fired under incompletely oxidising conditions, with 80% fired at low temperatures and 40% under reducing conditions (Table 7.16). Low-firing made them better equipped to deal with repeated heating and cooling during cooking. Many smaller tablewares also show a preference for low-medium temperature firing (Families A, C, and D; c. >75%). Larger vessel Types,

110 Schneider (2006, 395).

111 Duistermaat (2008).

112 Rye (1981, 25).

	Very low (reducing) c. <700 °C Grey / Red, Grey / Blue core	Low (oxidising) c. 700-800 °C Brown / Buff / Pink / Orange	Medium (oxidising) c. 800-950 °C Pale Orange / Yellow / Cream	High (oxidising) c. 950-1100 °C Green / Olive Green
3	2	7	16	**26**
	3.9%	13.7%	31.4%	**51%**
2	-	**9**	6	6
	-	**42.9%**	28.6%	28.6%
1d	2	5	**23**	20
	4%	10%	**46%**	40%
1c	3	**49**	40	36
	2.34%	**38.28%**	31.25%	28.13%
1b	1	**15**	13	8
	2.7%	**40.5%**	35.1%	21.6%
1a	1	**18**	6	3
	3.6%	**64.3%**	21.4%	10.7%
Total	**8**	**104**	**104**	**99**
	2.5%	**33%**	**33%**	**31.4%**

Table 7.17 Firing temperature according to phase. Highest relative percentage for each Family highlighted in orange.

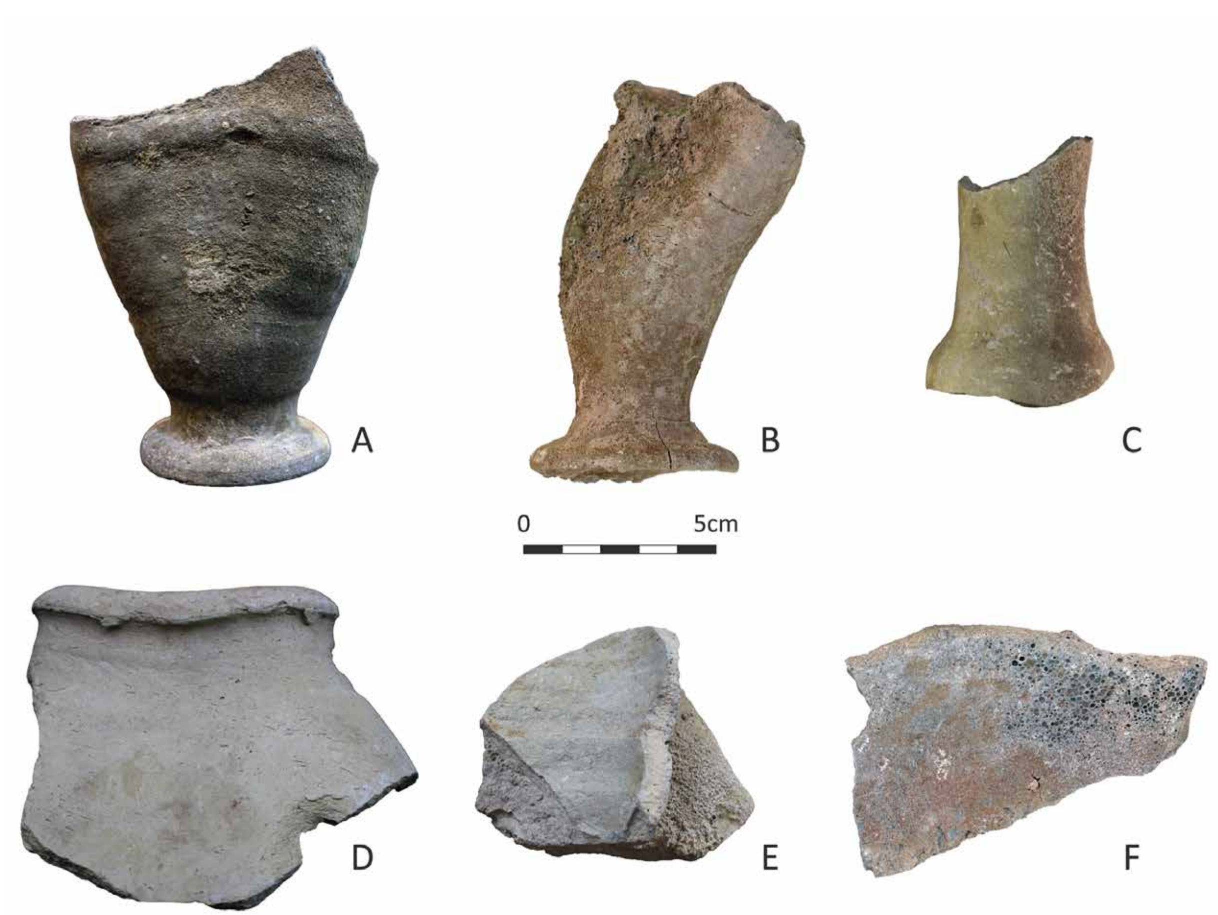


Figure 7.32 Waster sherds found across Areas II and III: A) V85.164.2.4, B) V85.164.1.1, C) Y82.3.2.2, D) Y82.13.5.4, E) Y82.21.2.5, F) Y88.122.1.1.

on the other hand, tend towards medium-high firing temperatures (Families B, E, H, I, and J; >75%).

Furthermore, Table 7.17 demonstrates a clear change in preferred firing temperature through time. While Phase 1a vessels show a far higher percentage of low-fired vessels (68%), with very few high-fired wares (11%), Phases 1b-c and Phase 2 show an increasing number of medium-high-fired vessels, although low-firings were still most common (38-43%). The proportion of high-fired vessels rose significantly in Phase 1d (40%), before reaching a majority of the assemblage in Phase 3 (51%). Just 10% of Phase 1d and 14% of Phase 3 vessels were low-fired.

Some especially high-fired wares (>1100°C) were also present, albeit infrequently, in the Kani Masi assemblage. These vessels demonstrate dark green surfaces, with a distinct grey-black core, and were occasionally vitrified and warped to the point that they were unusable; these sherds, often termed 'wasters', are the result of failed firings. Two warped goblets were recovered from a refuse heap directly associated with Kiln III.1 and Kiln III.2 in Area III (Figure 7.32.A-B), while several sherds were found scattered across nearby Areas I-II (Figure 7.32.C-F). Significantly, the sherds from Area II derive from several distinct phases of occupation: two fused cup sherds from Phase 1a, a jar neck from Phase 1c, and a tall cup/goblet neck from Phase 3. This demonstrates the longevity of pottery production at Kani Masi, with at least some localised production taking place very early in the site's occupation, pre-dating the larger-scale industrial reinterpretation in Phase 2. Other than a loose association between goblets and kilns, however, these wasters give little indication as to the socio-economic organisation of the industry, for example the scale of production, separation and control in the manufacture of different vessel types, or the links between kilns and individual potters or pottery workshops.

7.4.4 Understanding standardisation

To understand the structure and organisation of the pottery industry at Kani Masi further, it is important to analyse in detail the concept of standardisation. Mesopotamian pottery of the historical periods is often referred to as 'standardised' in style.[113] Other than analyses of third-millennium waster stacks from Tell Leilan,[114] however, little has been done to unpack this term, to measure levels of standardisation in specific assemblages, or to understand the motivations, cultural or economic, underpinning standardisation. Rice usefully distinguishes between two intersecting aspects of craft standardisation: the 'intentional', which is driven by an increasingly narrow concept of what constitutes an acceptable vessel, and the 'mechanical', which depends on the skill of the potter in achieving that concept.[115] Intentional standardisation is therefore a social process determined by numerous cultural and economic factors, whereas mechanical standardisation is governed entirely by high-intensity production by potters conforming to a tight standard.

These two interconnected aspects of standardisation can be teased apart through close material analysis. The Area I, Phase 1c assemblage at Kani Masi provides the perfect opportunity for this. It was part of a single event in which 65 cups and 59 goblets were used and deposited, mainly in Room 1, but also in Rooms 2, 4, and the courtyard (see Chapter 9.3.2). The direct contextual association and contemporaneity of these cups and goblets mitigates many issues of 'cumulative blurring' that can impact upon traditional archaeological assessments of standardisation (Blackman *et al.* 1993, 73-76). For the following analysis, only vessels preserved up to around their mid-points, 5 cm in height for cups (n=30) and 7cm for goblets (n=20), are included, as to ensure consistency in morphometric comparison (Figure 7.33 and Figure 3.34).

7.4.4.1 Intentional standardisation

Levels of intentional standardisation amongst the assemblage can be effectively visualised by a process known as the envelope system, whereby profile illustrations of the same vessel Type are overlain to provide a composite picture of similarity or difference. The resulting 'envelopes' (see Figure 7.35.A and Figure 7.36.A) allow us to identify the key features of Mesopotamian potters' "mental template",[116] "repeat item",[117] or "ideal vessel form".[118] The envelope system was first proposed by Orton *et al.* as a useful means for testing the applicability of an archeologically created typology, and for placing individual diagnostic sherds within the most suitable Type.[119] This visual technique has been used intermittently in Mesopotamian pottery analysis for this typological purpose.[120]

The Phase 1c assemblage demonstrates a very high level of intentional standardisation, conforming to a tightly conceived mental template. Area I cups (n=30) all have flaring feet of a broadly consistent diameter (range 23-38 mm; avg. 31 mm), most of which were finished and slightly indented. The feet consisted of a

113 Armstrong and Gasche (2014, 95).
114 Blackman *et al.* (1993); Roux (2003).
115 Rice (1981).
116 Deetz (1967, 45-47).
117 van As (1984, 136-137).
118 Glatz (2015, 17).
119 Orton *et al.* (1993, 158-159).
120 Wright (1969, 73, Fig. 22); Romano and Zingale (2019).

Figure 7.33 Phase 1c cups from Area I.

Figure 7.34 Phase 1c goblets from Area I.

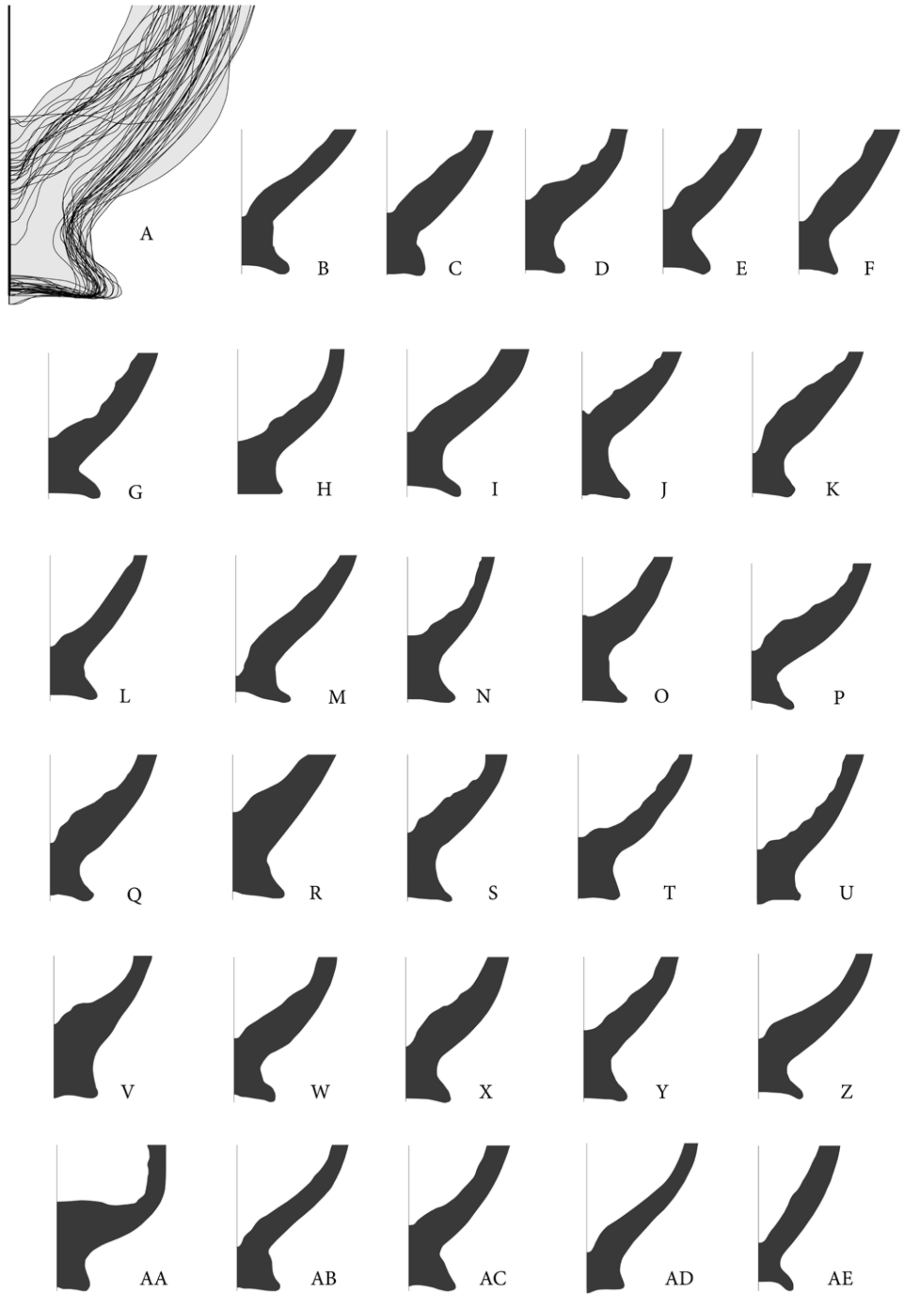


Figure 7.35 Phase 1c cups from Area I, all illustrated to a height of 5 cm: A) Envelope system for all cups, B-H) Y88B.20, I) Y88B.22, J-Z) Y89.5, AA-AB) Y89.6, AC) Y88A.39, AD-AE) Y88A.40.

narrow stem (range 15-26 mm; avg. 21 mm) of variable height (range 9-21 mm; avg. 15 mm), before everting outwards into a rounded lower body of fairly consistent width (range 64-75 mm; avg. 71 mm). There are occasional outliers to this shape: some feet are not indented, but are flat or have a short external protrusion at the centre (e.g. Figure 7.35.U); some examples are not sharply constricted above the flare of the foot, but are instead more of a cylindrical platform (e.g. Figure 7.35.V); some cups are sharply angled above the foot instead of having gently curved lower bodies (e.g. Figure 7.35.AA).

A similar pattern is demonstrated by the illustrated goblets (n=20). These all have wide flaring feet (range 45-78 mm; avg. 58 mm), most of which were finished and indented, before constricting sharply (range 26-50 mm; avg. 35 mm) and then immediately tapering outwards above a variable foot height (range 15-31 mm; avg. 22 mm). The body then tapers at a

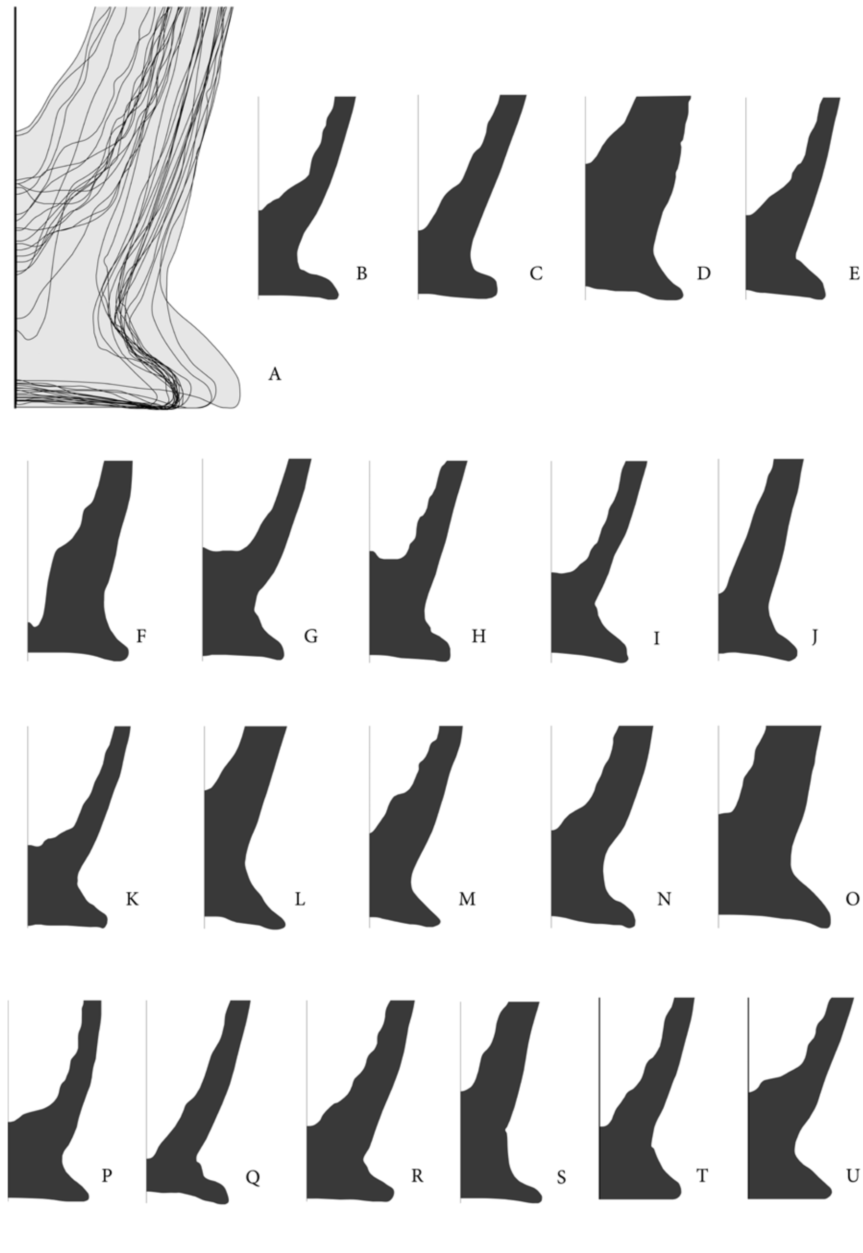


Figure 7.36 Phase 1c goblets from Area I, all illustrated to a height of 7 cm: A) Envelope system for all goblets, B-C) Y88B.20, D) Y88B.22, E-M) Y89.5, N) Y89.6, O) Y88A.36, P) Y88A.39, Q) Y88A.40, R-S) Y88A.44, T-U) Y88A.45.

consistent angle (range 64-75°; avg. 70°) into a straight or lightly curved lower body.

7.4.4.2 Mechanical standardisation

Mechanical standardisation can be determined using a combination of methods, including analysis of fabrics and visual and X-ray analysis of forming techniques. The most frequently applied indicator for determining the degree of standardisation, however, is morphological variability. Such measures tend to be qualified in terms of Coefficient of Variation (CV) figures, achieved by dividing the standard deviation of a given variable (e.g. foot diameter) by the sample mean, and then multiplying the result by 100.[121] Roux has directly investigated the relationship between scale of production, routinised motor-habits and the level of product standardisation, and has identified two fundamental rules.[122] Firstly, that high-intensity production, and therefore routinised motor-habits, invariably leads to increased product

121 Orton and Hughes (2013, 147-148).

122 Roux (2003); also Roux and Karasik (2018).

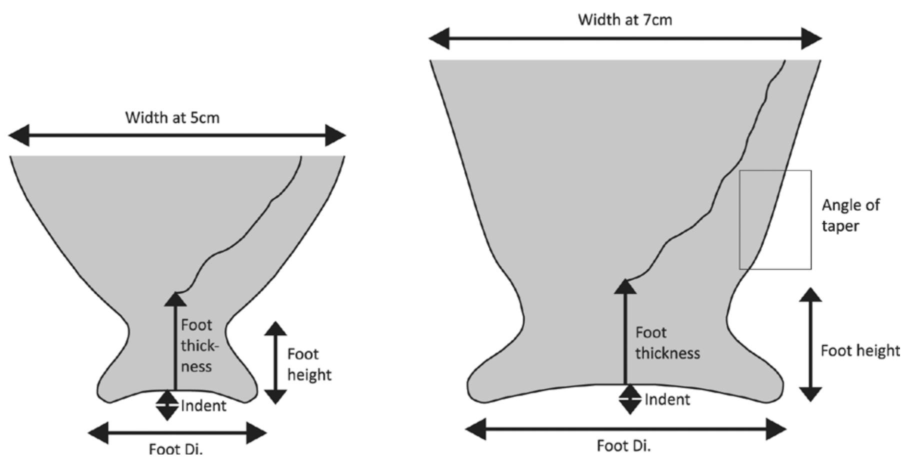


Figure 7.37 Stylised cup and goblet illustrations indicating key morphometric variables.

Types	Foot diameter	Foot thickness	Foot indent height	Width of foot constriction	Foot height	Angle of taper	Width at 5cm (cups) / 7cm (goblets)
Cups (all)	11.4 %	23.2 %	81.1 %	12.4 %	16.1 %	-	5.8 %
Sample	n=30	n=30	n=30	n=25	n=30	-	n=11
Cups (Room 1)	10 %	25.7 %	72.3 %	10.3 %	17.5 %	-	5.6 %
Sample	n=19	n=19	n=19	n=15	n=19	-	n=9
Goblets (all)	11.9 %	28.3 %	58.8 %	16.5 %	21.2 %	5.7 %	10.4 %
Sample	n=20	n=20	n=20	n=17	n=20	n=20	n=12
Goblets (Room 1)	11.2 %	28.7 %	37.2 %	20.8 %	20.5 %	6.8 %	9.3 %
Sample	n=10	n=10	n=10	n=8	n=10	n=10	n=6

Table 7.18 CV values for Area I Phase 1c cup and goblet assemblage, with figures for Room 1 also provided (green: very low variability, orange: relatively high variability, red: significant variability).

uniformity (<5% CV values) *regardless* of the potter's and the community's desire for standardisation. Secondly, that small-scale production contexts are determined by the potters' skill level *and* attitudes to standardisation, and therefore tend to deliver higher CV values (>5%). For reference, scientific analysis derives a highest degree of standardisation attainable for human production of 1.7%, with human perceptions of exact replication taking place at around 2-3%.[123]

Kani Masi's Phase 1c cup and goblet metrics (Figures 7.36-7.37 and Table 7.18) generally yield middle to high CV values, most typical of a context of low mechanical standardisation. The lowest CV values, and therefore highest levels of mechanical standardisation, correspond to those attributes that are most immediately visible. Both cups and goblets yield good levels of uniformity in foot diameters (CV: 11.4% and 11.9%), but less so for the width of the foot constriction (CV: 16.5% and 12%), and much less so for the height of the foot (CV: 16.1% and 21.2%). The most standardised measurements come in the width of vessels at 5 cm for cups and 7 cm for goblets (CV: 5.8% and 10.4%), with figures indicative of attempted conformity to a set standard and the probable use of an independent measure (e.g. a ruler). For goblets, the angle of the tapering body, from where it flares outwards above the foot, demonstrates the highest levels of standardisation (CV: 5.7%), again consistent with intentional standardisation being achieved with some mechanical success.

The less immediately visible features for both vessels, such as foot thickness and foot indent height, show significant variability and very high CV values. For both vessel Families, the foot thickness (CV: 23.2% and 28.3%) and foot indent (CV: 81.1% and 58.8%) show very low standardisation. These visually discrete attributes are the best indicators of mechanical standardisation, since they better demonstrate routinised motor habits rather than the use of a set standard, such as a ruler, as a guide.

Significant mechanical diversity is also demonstrated amongst vessel fabrics. Cups exhibit a range of surface

123 Eerkens (2000); Eerkens and Bettinger (2001).

colours – brown, cream, green, orange, pink, white, and yellow -, some of which are deliberately slipped, while others have surfaces left untreated. A range of fabric types are also attested, including A, B, D, E, F, and H (for detailed descriptions of fabrics, see Section 7.4.1 above). Goblets show similar diversity in surface colours – brown, cream, green, orange, pink, and white – and fabric types – A, D, E, F, and H. Likewise, as discussed in detail in Section 7.4.2, cups and goblets found across Area I demonstrate numerous subtle differences in the precise execution of their forming techniques, including the method of foot treatment, the way the foot was attached to the body, the position and prominence of coil joins, and precise execution of forming method on the body.

Together, this variability and lack of mechanical standardisation challenges any ideas that the Area I, Phase 1c vessels were the product of centralised, high-intensity workshops supplying vessels for this specific Area I event. Instead, the observed patterns are more consistent with three possible scenarios:

- Scenario 1: vessels were manufactured by an individual potter/small workshop of potters with low skill and low frequency production.
- Scenario 2: vessels were produced by a few different potters/workshops directly servicing the community of Kani Masi.
- Scenario 3: vessels were brought to Area I by a dispersed community stretching beyond Kani Masi, each of whom brought their own vessel(s).

Scenario 1 is unlikely given the diversity of vessel fabrics and diverse forming techniques; Scenario 2, while possible, is also unlikely given the lack of discrete clustering of fabrics/forming techniques. This leaves Scenario 3 as the most likely explanation, especially given the presence of unique non-local vessel types found amongst this assemblage (see Chapter 9.3.2).

7.5 Discussion: Chronological implications

The LB pottery sequence at Kani Masi demonstrates two main strands: the first runs broadly unchanged between Phases 1-2 and the second corresponds to Phases 3-4/5. While technologically and stylistically related, these two strands are nevertheless separated by a period of ceramic discontinuity marked by the (dis)appearance of specific vessel types following the abandonment of the Area I building at the end of Phase 1c-d. The detail of these stylistic and functional (dis)continuities will be discussed in the following sections.

When attempting to assess diachronic change amongst LB ceramic assemblages, it is generally useful to make a distinction between larger vessels (e.g. jars, pithoi, and cooking pots), which demonstrate significant consistency across broader regions and periods of time, and tablewares (e.g. bowls, cups, jugs, and goblets), which often provide more archaeologically useable spatial and temporal patterns. The presence and relative frequency in the *Types* that comprise these tableware Families, presented in Table 7.19, provides the basis for the following chronological discussion. Table 7.20, on the other hand, focuses on changes in the relative percentages of vessel *Families* between phases. Since shape Families correspond well with the intended function of vessels, tracing changes in the frequencies of Families through time also yields useful information on patterns of site function. These functional insights are discussed in Chapter 8.

7.5.1 Phase 1a

Various loci across Areas I-III at Kani Masi are difficult to associate with specific architectural features, and pre-date the Phase 1b walls of the Area I building (see Chapter 6.2.1). A relatively small assemblage of vessels can be associated with these early strata, and these hint at different pottery shapes and more diversity in fabrics compared to the bulk of the Phase 1b-2 assemblage.

Most of the key Kassite-style LB shapes are already well established in Phase 1a (e.g. Types A.2, C.1-2, and F.1-2). There is limited evidence for alternative ceramic traditions, for example those styles common in the Syrian Jazirah, Upper Tigris, and Erbil plain, connections which are more clearly visible in the Tell Yelkhi Level II assemblage.[124] Already typical, however, is the iconic 'Kassite' goblet, with a typical example being recovered from Burial AIII.1 (Figure 7.10.13, see also Chapter 9.2.1.1). This represents one of the earliest excavated loci on site, with charcoal from the overlying deposit producing a radiocarbon date range of 1505-1418 cal. BCE (see also Chapter 6.2 and Appendix II.1).

There are, however, subtle stylistic differences, in shape, finishing and firing techniques, demonstrated within the Phase 1a assemblage. Bowls display perhaps the most variety, as shown by two examples from the lowest levels in Area II:

- a complete profile of a bowl with a slightly in-turned rim (Type A.5; Figure 7.38.C). This has no precise regional parallels, but may represent a derivative form of the thickened, often inwardly bevelled rims of shallow bowls/trays dating to the MB period,[125] for example those recovered from Tepe Kalan (Figure 5.16.1-2); and
- a simple carinated bowl (Figure 7.38.B), which aligns precisely with vessels common in Level II at Tell

124 Oselini (2020).
125 Armstrong and Gasche (2014, Pl. 17.1-6).

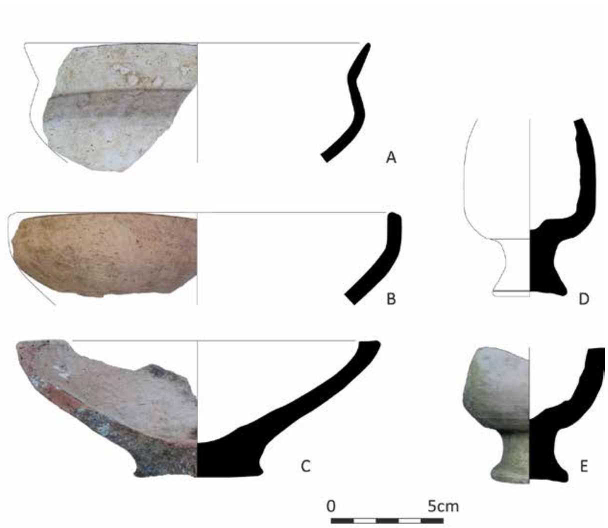


Figure 7.38 Phase 1a tablewares: A) Y82.20.2.4, B) Y82.22.3.1, C) Y82.4.1, D) Y82.22.1.1, E) Y82.22.1.2.

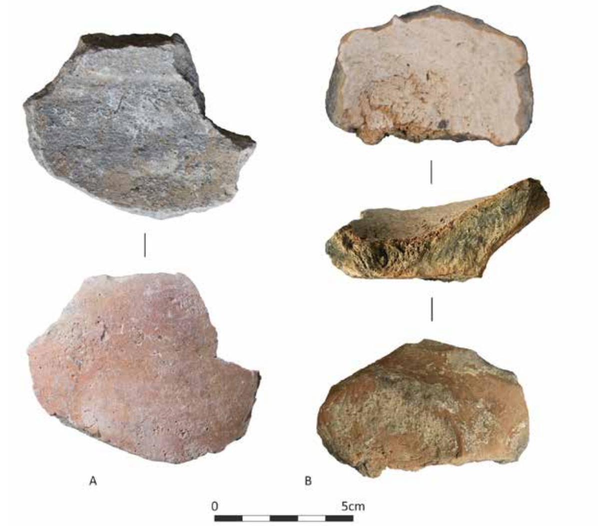


Figure 7.39 Slipped/burnished surfaces from Phase 1a: A) Y82.21.2.3, B) V85.175.1.1

Yelkhi,[126] from the Fortified Building at Tell Khaiber,[127] and in Period 3B at Failaka island.[128]

Even some of the more typical Babylonian shapes, such as wavy-sided bowls (Type A.2), are unusually finely produced in Phase 1a (Figure 7.38.A); these bowls, produced with fine sandy fabrics (Fabric A), find a precise parallel at Tell Yelkhi, Level II.[129] The comparisons with mostly sixteenth and early fifteenth century contexts across the region might point us toward the earlier end of the radiocarbon date range for the Area II deposits (1488-1292 cal. BCE), and therefore to the late LB I period.

Technologically, the Phase 1a assemblage demonstrates a wider range of surface colours than Phases 1b-3, particularly in the common presence of pink/orange wares. Infrequent, albeit distinctive amongst the small assemblage, are sherds with slipped surfaces. These include a body sherd of a small jar with a slipped exterior (Figure 7.39.A), as well as a typical Babylonian-style bowl with a plugged base and an orange slipped exterior (Figure 7.39.B). Both sherds have dark grey-blue cores, suggesting they were fired at very low temperatures and probably in reducing atmospheres. This is atypical for the Kani Masi assemblage, as well as for the Kassite tradition more generally (see Section 7.4.3 above). These technological peculiarities do, however, show similarities to survey material analysed from several MB sites in the Hawasan valley (Figure 5.18), as well as with the Shamlu tradition of the Shahrizor region.[130] It is unclear as to whether these selective Phase 1a vessels were imported to Kani Masi, or whether they were in fact locally manufactured, using subtly different traditions to the vessels of Phases 1b-2. Refined identification and analysis of these 'hybrid-style' vessels in future might provide important insights into the MB-LB transition in the lower Sirwan region.

7.5.2 Phases 1b-c

Phase 1b-c are by far the best represented phases in the Kani Masi assemblage. Despite the clear architectural renovations and a movement towards increased industrial activity across the site between Phases 1b and 1c (see Chapter 6.2.1), the pottery shows almost complete stylistic continuity. Only subtle differences are observable. Firstly, in the introduction of two bowl types: curved bowls with a notch beneath the rim (Type A.3), a type fossil showing excellent parallels with Level II vessels from Tell Yelkhi,[131] and Bakr Awa,[132] as well as ripple-sided bowls (Types A.1 and B.1), which go on to become the dominant bowl types in Phase 3. Secondly, there is a general shift from stemmed cups with squat bodies (Type C.2a) to a higher frequency of those with taller bodies (Type C.2b). This pattern of squat to taller, ovoid body cups appears to be reflected at Tell Yelkhi between Level II (c. 1500-1400 BCE) and Levels Ic-b (c. 1400-1200 BCE).[133]

126 Valtz (2002-3, Pl. 142.1-7).
127 Calderbank (2021a, Fig. 2.2, Pls. 1-3).
128 Højlund (1987, 121-124).
129 Valtz (2002-3, Pl. 142.6).
130 Mühl (in prep.).
131 Valtz (2002-3, Pl. 141.46-48).
132 Miglus *et al.* (2013, Fig. 14b).
133 Valtz (2002-3, Pls. 148-149).

	LB I		LB II								LB III-Early IA		Mixed	
	1a		1b		1c		1d		2		3		Unstratified	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
A.1					1	2.1			1	2.1	**8**	**17**		
A.2	2	4.3	**3**	**6.4**	**3**	**6.4**	**4**	**8.5**	2	4.3	**3**	**6.4**		
A.3					**5**	**10.6**	2	4.3			2	4.3		
A.4	1	2.1			**2**	**4.3**	1	2.1	1	2.1				
A.5	**1**	**2.1**			**1**	**2.1**					**1**	**2.1**		
A.6					**2**	**4.3**	1	2.1						
B.1					**3**	**14.3**	1	4.8			2	9.5		
B.3	1	4.8	**3**	**14.3**	2	9.5					2	9.5		
B.4					1	4.8			1	4.8	**2**	**9.5**		
B.5					**1**	**4.8**								
C.1a			1	1	1	1			1	1	**4**	**3.8**		
C.1b											**5**	**4.8**		
C.2	1	1	1	1	**15**	**14.4**	7	6.7						
C.2a	**4**	**3.8**	3	2.9	2	1.9	3	2.9	**4**	**3.8**			1	1
C.2b	1	1	4	3.8	**27**	**26**	6	5.8			3	2.9		
C.3									**4**	**3.8**				
D.2			**2**	**66.7**										
E.1	2	12.5	3	18.8	**4**	**25**	1	6.3	**4**	**25**			2	12.5
F.1	1	1.1	2	2.2	**16**	**17.4**	2	2.2	2	2.2	1	1.1	1	1.1
F.1a			1	1.1	**4**	**4.3**			1	1.1				
F.1b	2	2.2			**6**	**6.5**	1	1.1	2	2.2			1	1.1
F.2					1	1.1	1	1.1			1	1.1	**2**	**2.2**
F.2a	1	1.1			**4**	**4.3**			1	1.1				
F.2b							**4**	**4.3**			**4**	**4.3**	**4**	**4.3**
F.3	2	2.2			**13**	**14.1**	5	5.4						
F.5											**1**	**1.1**		
G.1			**1**	**20**			**1**	**20**						
G.2											**1**	**20**		
M.1a					1	8.3			**2**	**16.7**	1	8.3		
M.1b					**3**	**25**								
M.2					**1**	**8.3**								

Table 7.19 Table presenting only those fluctuating Types and type fossils offering useful chronological information. Numbers per phase, with percentages relative to the total number of sherds of that Family. The highest relative percentages of each Type are highlighted in orange.

	LB I (?)		LB II								LB III-Early IA		Mixed			
	1a		1b		1c		1d		2		3		Unstratified		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
A	4	14.3	3	7.5	14	9.3	8	12.7	4	12.9	14	18.2			47	11.8
B	1	3.6	3	7.7	8	5.3	2	3.2	1	3.2	6	7.8			21	5.3
C	6	21.4	10	25.6	48	32	17	27	9	29	13	16.9	1	8.3	104	26
D			2	5.1	1	0.7									3	0.8
E	2	7.1	3	7.7	4	2.7	1	1.6	4	12.9			2	16.7	16	4
F	6	21.4	4	10.3	45	30	13	20.6	6	19.4	10	13	8	66.7	92	23
G			1	2.6			2	3.2			1	1.3	1	8.3	5	1.3
H	4	14.3	3	7.7	7	4.7	6	9.5			14	18.2			34	8.5
I	1	3.6	3	7.7	2	1.3	5	7.9	1	3.2	3	3.9			15	3.8
J			2	5.1	6	4	3	4.8			1	1.3			12	3
K	4	14.3			3	2	2	3.2	1	3.2	2	2.6			12	3
L					4	2.7					1	1.3			5	1.3
M			1	2.6	5	3.3			2	6.5	4	5.2			12	3
Z			4	10.3	3	2	4	6.3	3	9.7	8	10.4			22	5.5
Total	28		40		149		63		31		77		12		400	

Table 7.20 Table presenting the number/relative percentages of Family distributions for each phase compared with the total assemblage. Any figures that reach 10% above their relative distribution in the assemblage Total are highlighted in orange.

While stylistic differences between Phases 1b and 1c are subtle, functional changes at the site are more distinct. The relative percentages of drinking cups and goblets, for instance, increase markedly from a combined 36% of the total Phase 1b assemblage to 62% in Phase 1c (Table 7.20). Alongside this comes the introduction of numerous forms of processing and serving equipment, such as small lids (M.1a-b) and filters (M.2), which also point towards the increasing significance of communal drinking in the Area I building during Phase 1c, at least in its very final use-phase (see Chapter 9.3.2 for further discussion).

Like Phase 1a, the style of Phase 1b-c drinking vessels from all areas of the site are typical of the Kassite tradition, best known from the lowland alluvial plains. The assemblage is dominated by stemmed cups and goblets, most of which have short, hollow feet (Types C.2 and F.1). It is worth discussing here how well these drinking vessels from Kani Masi align with assemblages found at Tepe Guran in the Pish-i Kuh, Layer P.[134] To a lesser extent Layers T, S, and R, also yielded goblets and cups, generally also with short, hollow feet.[135] At least some of Tepe Guran's vessels were produced locally, as demonstrated by misfired goblet sherds.[136] The Tepe Guran assemblage is unique for the Zagros piedmont, since no other cups or goblets have been encountered in excavations or surveys in the Hulailan plain, and just isolated examples have been recovered elsewhere, including a stemmed cup from the Ilam cemetery[137] and a roughly manufactured cup from a grave at Bard-i Bal in the Pusht-i Kuh.[138]

The dating of Tepe Guran, Layer P, to the fifteenth century, based on radiocarbon dates from overlying and underlying deposits, was initially deemed unlikely by Thrane.[139] Yet it now seems plausible given the evidence from Kani Masi, and suggests connections in drinking cultures between these two regions at a time when similar vessels were notably rare in lowland Mesopotamia. If the Zagros piedmont material was coming from the Sirwan region, then it appears to represent a one-way flow of goods and practices, since no contemporary Zagros style pitchers with handles, or flasks with pierced lugs, thought to be "distinctive of the pottery tradition of the mountain region",[140] were found at Kani Masi, nor indeed in the wider SRP survey collection (see Chapter 11). Two beads, a seal, and an eye stone associated with three Kassite kings of the fourteenth century – Burna-Buriaš II, Kurigalzu I, and Kurigalzu II – have also been found

134 Thrane (1999; 2001, 69-74, Pls. 22-33).
135 Thrane (2001, Pls. 22-33).
136 Thrane (1999, 34).
137 Haerinck and Overlaet (2010a, 290, Fig. 7.17).
138 Overlaet (2003, Pls. XXV, 155).
139 Thrane (1999, 74).
140 Ibid., 28.

at Surkh Dum-e Luri in northern Lurestan,[141] further emphasising the continuation of Babylonian connections into the fourteenth century BCE.

Kani Masi Phase 1b-c is remarkably homogenous in its Kassite style, showing surprisingly scarce evidence for alternative stylistic traditions, other than the following exceptions:

1. Two unique hand-made bottles with internally folded rims and painted decoration (Type D.2, Figure 7.9.2-3) from Burial AI.1 in the south of the Area I building. Armstrong and Gasche have dated similar bottles to the twelfth century BCE,[142] a date supported at Tell Imlihiye,[143] Tell Zubeidi,[144] Babylon,[145] Isin,[146] and even from Kutal-i Gulgul in the Pusht-i Kuh.[147] Such a late date at Kani Masi is not possible, however, considering Burial AI.1 is sealed by Phase 1c occupation and accompanied by a radiocarbon date of 1497-1317 cal. BCE (see Chapter 6.2). Perhaps these vessels were circulating in the Sirwan region far earlier than elsewhere, or perhaps we ought to rethink the dating of this phenomenon more broadly.
2. A hammer-head bowl (Type B.5, Figure 7.4.11), with a pink-buff fabric and a grey core, dating to Phase 1b-c. This shows excellent parallels with LB I Mitanni period vessels from Tell Bderi,[148] as well as LB II-III Middle Assyrian examples from Tell Sabi Abyad.[149]
3. A disc with multiple piercings, no doubt a filter (Type M.2, Figure 7.19.7), found deposited alongside the assemblage of drinking vessels in the Area I building at the end of Phase 1c. While no comparative examples can be identified in the immediate region or across the lowland plains, parallels can be found in the Gulf throughout most of the second millennium.[150] These so-called 'sieve-neck rims' cover the openings/spouts of large jars, and occur in the Barbar style assemblages of the Royal Burial Mounds of A'ali on Bahrain,[151] areas F3 and F6 on Failaka island,[152] and at Qala'at al-Bahrain.[153] These Gulf connections are further supported by the significant overlaps in Kassite styles in Phases 1b-c, Failaka island Period 4A, and Qala'at al-Bahrain Period IIIA.[154] Recent Bayesian radiocarbon dates place Failaka Period 4A at approximately 1400-1250 BCE.[155] Similar sieve-neck rims have also been attested at Susa, Chantier B (V-VII), dating somewhere between c. 1700-1400 BCE.[156]

7.5.3 Phase 1d

Stylistically, the Phase 1d assemblage demonstrates continuity from Phases 1b-c. The assemblage is, however, characterised by a downturn in the relative percentages of tablewares, accompanied by a rise in the frequency of both jars and pithoi (Family H: 9.5%; Family I: 8%). It is unlikely that this represents a functional shift. Instead, it provides hints as to the site formation processes following the abandonment of the Area I building. These deposits appear to represent fairly rapid and perhaps deliberate architectural collapse, without any evidence for the *ad hoc* use of the abandoned rooms. The larger storage vessels, which may originally have stood upright in those rooms during Phase 1c, were consequently mixed in with approximately 30 cm of overlying architectural debris, categorised here as Phase 1d, whereas pot stands (Type L.1) and smaller tablewares, originally sat on floors, were sealed by the collapse.

7.5.4 Phase 2

The Phase 2 assemblage, recovered from Areas III and VII, stylistically reflects those of Phases 1c-d, with many of the same characteristic Kassite-style Types. The clearest differences appear to have been functionally rather than chronologically driven (see Chapter 8.2). In Area III, for example, a midden deposit (V85/164) yielding a charcoal sample with a broad range of 1391-1128 cal. BCE, also produced several examples of a specific cup, with a sharply carinated lower body (Type C.3), not found anywhere else at Kani Masi. These cups share the same defining characteristics as examples found at Tell Yelkhi, Level Ib,[157] Tell ed-Der, Chantier E3, Fosse 1,[158] and Failaka island, Period 4A,[159] all of which date to the thirteenth century BCE. This suggests continued occupation of Area III into the late LB II period, probably slightly post-dating the abandonment of the Area I building.

7.5.5 Phase 3

Phase 3 represents resettlement of the site following a break of undetermined length. Many of the dominant

141 Potts (2013, 211-212).
142 Armstrong and Gasche (2014, 101-102, Pl. 89.1-11).
143 Boehmer *et al.* (1985, Pl. 53.277-279).
144 Ibid., Pls. 132.436-437, 438-439.
145 Sternitzke (2016, Type KG-5.h.6).
146 Hrouda (1977, Pls. 28, 37; 1981, Pls. 34-35).
147 Overlaet (2003, Pl. 85).
148 Pfälzner (1995, Pl. 3a).
149 Duistermaat (2008, Fig. IV.20.a-l).
150 Højlund (1987, 20-21, Fig. 455).
151 Laursen (2017, Figs. 29, 69, 96.4-6, 363, and Appendix A, Fig. 4).
152 Højlund (1987, 20-21).
153 Højlund and Andersen (1994, 78-79).
154 Højlund (1987, 124-129, 151-161).
155 Heinemeier and Højlund (2016, 239-250); Laursen and Højlund (2023, 153-161).
156 Gasche (1973, Pl. 33.1-5); Armstrong and Gasche (2014, 12).
157 Valtz (2002-2003, Pl. 151.3).
158 Minsaer (1991, Pl. 13.3).
159 Højlund (1987, 125, Fig. 579).

vessel shapes of the previous phases, including stemmed cups (Type C.2) and short, hollow-footed goblets (Type F.1), had fallen out of use almost entirely by Phase 3. Armstrong and Gasche have argued that these vessels stopped being manufactured across Babylonia in approximately 1200 BCE,[160] an observation that may provide some resolution on the timeframe of Phase 3 reoccupation. At Kani Masi, these vessels are replaced by a more limited set of Types, including ripple-sided bowls (Type A.1), and disc-base cups with ovoid bodies and squat necks (Type C.1b). Both vessel types have been recovered from Area VI as well as several votive offerings found in Area I (see Chapter 9.4).

Phase 3 goblets tend to be tall footed with very steep sides, and often of an impractical shape for everyday use. Four goblets and sections of goblets were found in Area VI in an unusual rectangular arrangement. One of these was a squatter goblet with a flat, disc-base (Type F.5), unique to this phase at Kani Masi, but with a strong parallel at Tell Zubeidi, Schicht I.[161]

The tablewares of Phase 3 also show clear technological differences from Phases 1-2, exhibiting more consistency in vessel colours, with almost all vessels being either pale green-yellow or pale orange-pink, indicative of medium-high firing temperatures (see Section 7.4.3 above). Vessel fabrics tend to be softer in texture, with a higher concentration of sand, brown organic flecks, and more frequent occurrences of undissolved lumps of clay (Fabrics D and H). Internal/external ridge patterns, generally a product of the wheel-coiling technique, become visually more pronounced in Phase 3 tablewares (e.g. Figure 9.13). While it is possible that this latter signature was an undesirable by-product of hasty production or a lack of emphasis on surface finishing, it is equally possible that the visibility of the ridging represented a deliberate stylistic fashion in LB III.

Despite the small sample size, the Phase 3 assemblage also yields a greater share of miscellaneous shapes, including tall, elaborate vessel stands (Type M.4) and a small fish-shaped ‘rattle’ (Type M.5). Alongside the cup and faience bucket offerings, discussed in detail in Chapter 9.3.2, this supports the changing use and meaning of the site in its latest LB occupational phase.

For dating, we must look to external comparisons. Cup Type C.1b has been identified in LB II-III burial contexts across the Hamrin basin: Burial 2 at Tell Ajamat, Level IV,[162] and graves 2, 5, 6, and 13 at Tell Imlihiye.[163] A similar pattern can be observed in the Pusht-i Kuh, with disc-base cups recovered from Duruyeh tombs 3, 4, 10, 13, and 18,[164] as well as tomb A9 at Kutal-i Gulgul.[165] In most of these funerary contexts, cups formed part of a broader grave good assemblage, alongside faience buckets. In Babylonia, however, faience buckets were regularly found as funerary offerings without the associated cups, for example at Tell ed-Der (Tombe 337A).[166] At Kani Masi, faience buckets and Type C.1b cups were deposited together, but without an associated burial. Together, this evidence indicates significant crossover in the meaningful associations attached to these cups and faience buckets across the LB world, as well as the complex ways by which communities of the lower Sirwan and western Zagros embedded these objects within their shared ritual practices.

The burials from Duruyeh and Kutal-i Gulgul have been dated to approximately 1250-1150 BCE,[167] a date which sits well alongside Armstrong and Gasche’s suggested date for disc-base cups (1200-1100 BCE).[168] This, together with the broad radiocarbon date range (1277-1056 cal. BCE) of one of three jar burials (Z88/L14) cut into the ruins of the Area I building (Phase 1d), and the upper-most radiocarbon dated context in Area II (1220-903 cal. BCE) suggests that Phase 3 was relatively short-lived at Kani Masi, straddling the very end of the Late Bronze Age (LB III) and perhaps into the Early Iron Age (EIA). A more precise dating is rendered difficult due to the ostensible continuity of pottery styles accompanying the historical transition between the Late Kassite and Isin II periods.[169]

7.5.6 Phases 4-5

Phases 4-5 did not produce reliably stratified, *in situ* ceramic material. The baked brick building in Area I appears to have been meticulously cleared immediately prior to abandonment (see Chapter 6.2.4). The few fragmentary diagnostic sherds collected from disturbed deposits overlying the architecture, including tall goblet bases, show little deviation from the Phase 3, LB III period styles discussed above, thus suggesting material continuity perhaps spanning the transition into the early first millennium BCE.

7.6 Conclusions

In the archaeological imagination, plain pottery regularly assumes a role as a passive signature of centralised control and trans-local authority, with the distributions of specific diagnostic styles thought to mark the territorial reach of

160 Armstrong and Gasche (2014, 101).
161 Boehmer *et al.* (1985, Pl. 132.457).
162 Gibson (1981, 148, Pl. 116.8-9).
163 Boehmer *et al.* (1985, 5-7, Pl. 50.214-9).
164 Overlaet (2003, Pls. XXI, 127-128, 132, 137).
165 Ibid., Pl. 88.29-31.
166 Gasche (1991, 24, Fig. 4).
167 Overlaet (2003, 236-237).
168 Armstrong and Gasche (2014, 56-57, Pl. 90.1-7).
169 Ibid., 101.

the ancient state.[170] The most prominent analyses of LB Babylonian pottery consider the 'Kassite' style to have developed in a lowland Babylonian *core* during a period of political consolidation, before expanding outward to the *peripheries*, northeastward along the Diyala/Sirwan and southward into the Gulf, accelerating with Kassite expansionist ambitions in the fourteenth and thirteenth centuries.[171] Armstrong even goes as far as to state that "when [the Babylonians] came in, their potters came with them."[172]

Recent archaeological evidence flips this traditional script. The earliest and best recorded Kassite-style pottery derives from Phases 3B-4A at Failaka island, IIIA-B at Qala'at al-Bahrain, and Phase 1a at Kani Masi, all ostensibly 'peripheral' assemblages that pre-date the earliest recorded LB assemblages from the alluvial plains.[173] Each of these assemblages precede the supposed mid-fourteenth century imperial expansion of the Kassites,[174] which broadly aligns with Kani Masi Phases 1b-1c, a time when the site's material style was already fully developed. This definitive LB I evidence for Kassite-style pottery in the lower Sirwan is therefore highly significant, and may complement the fragmentary textual evidence for the historical geography of the region (see Chapter 13.5).

It would be reductive to refer to Kani Masi's assemblage as 'Kassite' in a strict socio-political sense without further contextualising some of the main patterns observed. Eating and drinking vessels were at the core of LB processes of identity performance and socialisation, operating as instruments of inclusivity or exclusivity, of cohesion or segmentation. Many LB vessels shared extensive similarities across cultural and political borders, while others demonstrated significant differences. Wavy-sided bowls (Type A.2), for instance, were common in both Babylonian and Middle Assyrian style assemblages throughout the LB,[175] suggesting shared cross-cultural food habits. These bowls did not, however, enter contemporary assemblages in the western Zagros piedmont (e.g. Tepe Guran, Layer P).[176] Drinking vessels, on the other hand, demonstrated clear stylistic similarities between Babylonia, Kani Masi, and the western Zagros during LB II and LB III, but differed significantly from those vessels more typical of Mitanni/Middle Assyrian assemblages in northern Mesopotamia, which were taller and often open-necked with unstable nipple/button-bases and sometimes elaborate painted decoration.[177] It should be noted, however, that a possible Nuzi style grey-ware cup was recovered from surface collections at SRP043, a small mound that was probably part of the extended Kani Masi LB settlement complex (see Chapter 11.2.4). While goblets also formed part of the Middle Elamite tradition, as reflected at Susa,[178] these vessels tended to have more rounded body shapes and shorter feet than those from Kani Masi, and never reach the level of functional impracticality of some LB II-III Babylonian-style goblets.

The highly diagnostic shapes of these Kassite-style drinking vessels would have limited the *Handlungsräum*e (spaces of action) of LB individuals, since the specificity of their use, accompanied by appropriate body language and gestures of hospitality, conditioned their users into specific types of serving and drinking performance, while shutting down other social possibilities.[179] Stemmed cups, for instance, with their tall feet, long necks, and tiny capacities would have required specific learned habits to master, while the often heavy and unwieldy goblets would have proven difficult to handle and pour efficiently, even for the initiated. At Kani Masi, processes of socialisation through drinking cultures seems to have started early in life, with tall goblets buried alongside children (see Chapter 9.2). The small and relatively standardised capacities of most drinking vessels show a marked focus on individual consumption, a feature also shared by Kani Masi's eating vessels. Lost by the LB, for instance, are the large communal platters that were typical of MB assemblages (Figure 5.16). Pollock considers a preponderance of individual-sized containers to be "indicative of a mental and physical disciplining", whereby people ate according to standard portions rather than by their own appetite or thirst.[180]

There is, however, no substantive evidence at Kani Masi that this social discipline was imposed by an overarching elite. Rigorous *chaîne opératoire* and standardisation analysis of the Area I, Phase 1c assemblage has instead demonstrated two clear patterns. Firstly, that the "ways of doing"[181] – clay working, forming, and firing processes – tied the potters responsible for Kani Masi's assemblage into a larger community of practice which bridged chronological and cross-cultural space; very similar forming processes have, for instance, been observed for LB I vessels from Tell Khaiber[182] and LB/IA vessels from the western Zagros.[183] Secondly, that replication of these techniques between

170 Glatz (2020, 228-263) and Calderbank (forthcoming) for counterarguments.
171 Armstrong (2017, 430-435).
172 Ibid., 432.
173 Armstrong and Gasche (2014, Table 9).
174 van Koppen (2017, 74-77); Paulus (2022, 821-830).
175 Pfälzner (2007, Pl. 24.275-280).
176 Thrane (2001).
177 Pfälzner (2007, Pls. 16.158-166, 17.167-173, 18.315-321).
178 Gasche (1973, Pls. 19-24).
179 Pollock (2013).
180 Ibid., 165.
181 Roux (2016, 2).
182 Calderbank (2021a).
183 Overlaet (2003, 119).

vessels, while following deeply embedded practices, exhibit significant mechanical variability, a pattern that is inconsistent with intensive production contexts, or with tightly centralised control over these processes.

The *Handlungsräum*e of Kani Masi's inhabitants were limited further by the remarkable homogeneity of the site's LB II Kassite-style drinking vessels, with almost no vessels typical of other cultural traditions identified. This pattern is out of step with contemporary sites located along the course of the Sirwan/Diyala. Tepe Kalan (SRP018), located approximately 15 km southwest, with its comparatively modest LB II exposures, provides robust evidence for Middle Assyrian cultural influences sitting alongside Kassite styles (see Chapter 11.2.4); Gurga Chiya, in the Shahrizor plain, demonstrates a LB II assemblage with strong Middle Assyrian styles and almost no sign of Kassite influence;[184] Bakr Awa, situated close by, exhibits mixed cultural influences, with northern Mesopotamian and Kassite-style shapes recovered from a "Hurrian-Kassite neighborhood";[185] finally, the Tell Yelkhi assemblage, especially during Level II (c. 1525-1400 BCE), reflects a confluence of diverse Mitannian, Middle Assyrian, Babylonian, and Elamite styles.[186] This mixture continues into Tell Yelkhi Level I, where typical Kassite-style shapes, such as ripple-sided bowls (Type A.1) and goblets (Family F), are either notably infrequent or entirely absent.[187] Armstrong and Gasche, have therefore interpreted only "a modest level of contact between the Hamrin and Babylonia' during the fourteenth century."[188] It is only in the LB III that other sites in the Hamrin, including Tell Imlihiye and Tell Zubeidi, demonstrate more consistent Kassite-style assemblages. It is most likely during this period that Tepe Kalan also assumed its role as a significant regional centre in the lower Sirwan, as reflected by the significant concentration of tall-footed goblets (Type F.2b) recovered in the site's surface collection.

This mosaic of localised and supra-regional influences offers us fascinating insights into the diversity of encounters in the highland-lowland interface of the Sirwan region. Boundaries between communities were not static or clearly defined – they were dynamic and culturally created, brought into being through everyday actions using everyday materials rather than being marked by distinctive geographical features, such as mountains or bodies of water.[189] Such a complex, non-contiguous pattern is far more typical of imperial territorialities.[190] The community of Kani Masi responded to the cultural context of the LB in its own unique way. While the LB I assemblage (Phase 1a) hints at cultural diversity, the LB II-III assemblages (Phases 1b-3) demonstrate little else but extensive homogeneity of Kassite styles, especially evident amongst drinking vessels. The scale of this homogeneity is inconsistent with what one might normally expect of a widely connected regional centre, and therefore suggests either a lack of inter-regional contact, or else a deliberate eschewing of the materials and performances associated with other cultural traditions. The former seems unlikely given that the mechanical diversity in production techniques demonstrated by the Phase 1c Area I assemblage suggests that at least some vessels may have come from long-distance origins (see Section 7.4.4 above). That leaves us to interpret the latter, that the LB II inhabitants of Kani Masi were deliberately choosing to limit their material repertoires, and with it their spaces of action, by increasingly buying into a set of Babylonian traditions despite surrounding communities demonstrating alternative cultural leanings and/or more openness to cultural pluralism.

184 Wengrow *et al.* (2016, 258-261).
185 Miglus (2016, 235).
186 Oselini (2019).
187 Valtz (2002-3).
188 Armstrong and Gasche (2014, 101).
189 Grosby (2020).
190 Glatz and Casana (2016, 130); Glatz (2020).

8

Food and Food Webs at Late Bronze Age Kani Masi

8.1 Introduction

A large proportion of the recovered finds from Kani Masi are associated with the production, preparation, consumption, and discard of food and drink. In this chapter, we present the activity areas that are associated with food production, related installations and material culture, alongside the results of botanical, zooarchaeological, and organic residue analyses in order to characterise the food webs and associated subsistence and culinary practices of the site's LB inhabitants. In the discussion below, we will be focusing on the spatial expressions of food-related behaviours and their transformations over time, as well as on the relationships of Kani Masi's human population with different domestic and wild animals and plants, and with the landscapes that surround the site. Continuing our practice-centred approach, we then move on to examine how documented behaviours tie into, or contrast with, regional and supra-regional subsistence and food traditions, and what identities Kani Masi's population might have developed as a result of their participation in specific communities of practice.[1]

Evidence for commensal consumption at the site and other ritual behaviours are detailed in the following Chapter 9. Each excavation area's stratigraphy is outlined in Chapter 6 alongside relevant absolute dates (see also Appendix II.1), while the pottery assemblage is presented in full in Chapter 7. For detailed presentations of the ground stone industries, faunal, botanical, and stable isotope data, see Appendices IV-VII.

8.2 Food production locales

The intra-site analysis of contextual, artefactual, botanical, and faunal data that is presented below, allows us to identify four distinct areas at Kani Masi that were involved in the production of food and its disposal. Much of the evidence for food production and discard that can be attributed to Phase 1 – especially in Area II – is closely associated with the provisioning of the central structure in Area I and its commensal events, and thus likely reflects elite tastes or special occasions. Food production and discard areas in Phase 2 are spatially closely associated with a burgeoning industrial area, where pottery was produced, and perhaps also metallurgical activities took place. In light of the differences observed between Phase 1 and Phase 2 food-related contexts, including differences in the composition of faunal and ceramic assemblages, the cooking installations in Areas III and VII likely served a different demographic than those of Area II; most plausibly the craft specialists and workers operating the nearby kilns.

1 *Sensu* Lave and Wenger (1991); Wenger (1998).

Use-Context	Eating		Drinking				Storage (Bulk)			Storage (Special)	Cooking	Brewing	Measuring	Total number
Vessel Family	A	B	C	E	F	M.1	H	L	I	D	K	J	G	
	16	2	3	-	3	-	7	-	5	-	-	-	-	
Phase 1a	44.4%	5.6%	8.3%	-	8.3%	-	19.4%	-	13.9%	-	-	-	-	36
	50%		16.6%				33.3%							
	81	13	29	4	37	5	56	8	16	-	7	-	-	
Phase 1b	31.6%	5.1%	11.3%	1.6%	14.5%	2%	21.9%	3.1%	6.3%	-	2.7%	-	-	256
	36.7%		29.3%				31.3%				2.7%	2.7%		
	130	33	96	19	104	21	130	15	67	1	32	9	-	
Phase 1c	19.8%	5%	14.6%	2.9%	15.8%	3.2%	19.8%	2.3%	10.2%	0.2%	4.9%	1.4%	-	657
	24.8%		36.5%				32.4%			0.2%	4.9%	1.4%		

Table 8.1 Numbers and relative percentages of diagnostic sherds organised according to vessel Family/main use-context and chronological distribution (by phase).

8.2.1 Phase 1

8.2.1.1 Area I

The main building in Area I featured a large tannur (Y88/L122) in the Phase 1b suite of northern rooms, and a broadly contemporaneous scatter of limestone pestles (Y88/L113, L114, L121; see also Appendix V.3) that may point to a function in food preparation. In Phase 1c, the same part of the building included a series of fireplaces, which may also have been used for food-related purposes. The structure, however, was not a primary food production area. Rather its function centred around consumption activities, including highly ritualised occasions, which we discuss in Chapter 9.3.2. As the only major building at Kani Masi exposed to a significant extent, however, it provides the best stratigraphic and spatial contexts for exploring how food storage, production, and consumption activities, as indicated by the distribution of ceramic vessel types, were organised according to architectural space and through time.

Taking as a baseline the seven use-contexts for second millennium BCE Mesopotamian pottery – eating, drinking, special storage, bulk storage, cooking, brewing, and measuring[2] – enables the division of Kani Masi's vessel Families into distinct functional categories. The statistical frequency of these vessels and their associated use-contexts can then be traced diachronically and spatially across Area I.

The Phase 1a sounding in Room 1 yielded only 36 diagnostic sherds, consisting of a mix of fragmentary goblets, cups, bowls, jars, and pithoi, which do not point definitively to any specific separation of activities occurring in Room 1. We do, however, have much more information for the two succeeding occupational Phases 1b-c, spread over several rooms (Table 8.1, Figure 8.1).

While there is a disparity in the number of diagnostic sherds per phase (Phase 1b: n=256; Phase 1c: n=657), as well as the possibility that some vessels continued to be used between Phases 1b and 1c, thus to an extent skewing their relative distributions between phases, several clear trends are nevertheless identifiable. Typically, the assemblages for Phases 1b-c are dominated by eating, drinking, and bulk storage vessels, with vessels associated with other functions (special storage, cooking, brewing, and measuring) either absent or highly infrequent in comparison. The main activity areas for the former functions must therefore be identified based primarily on fluctuations in relative percentages, and the latter activity categories identified simply by the presence/absence of associated vessels.

Several key observations emerge from the overall diagnostic vessel trends between Phases 1b and 1c. Bulk storage vessels remain consistent in relative frequency across both phases (31.3-32.4%), but the spatial division of bulk storage shows some discontinuities. In Phase 1b, bulk storage is most common in Room 1, Room 7, and the courtyard north, while in Phase 1c, this switches to Rooms 2, 4, and the courtyard north.

Cooking pots increase in Phase 1c (2.7-4.9%), with larger concentrations clustering in the south of the building. While in Phase 1b, cooking pots are mainly restricted to the courtyard (both north and south), along with a couple of sherds from Rooms 1 and 7, Phase 1c sees more cooking vessel diagnostics found in Room 2, Room 6 south, and Room 7. In the courtyard, cooking becomes more spatially restricted to the south side (12.8%) in Phase 1c.

2 Calderbank (2021b).

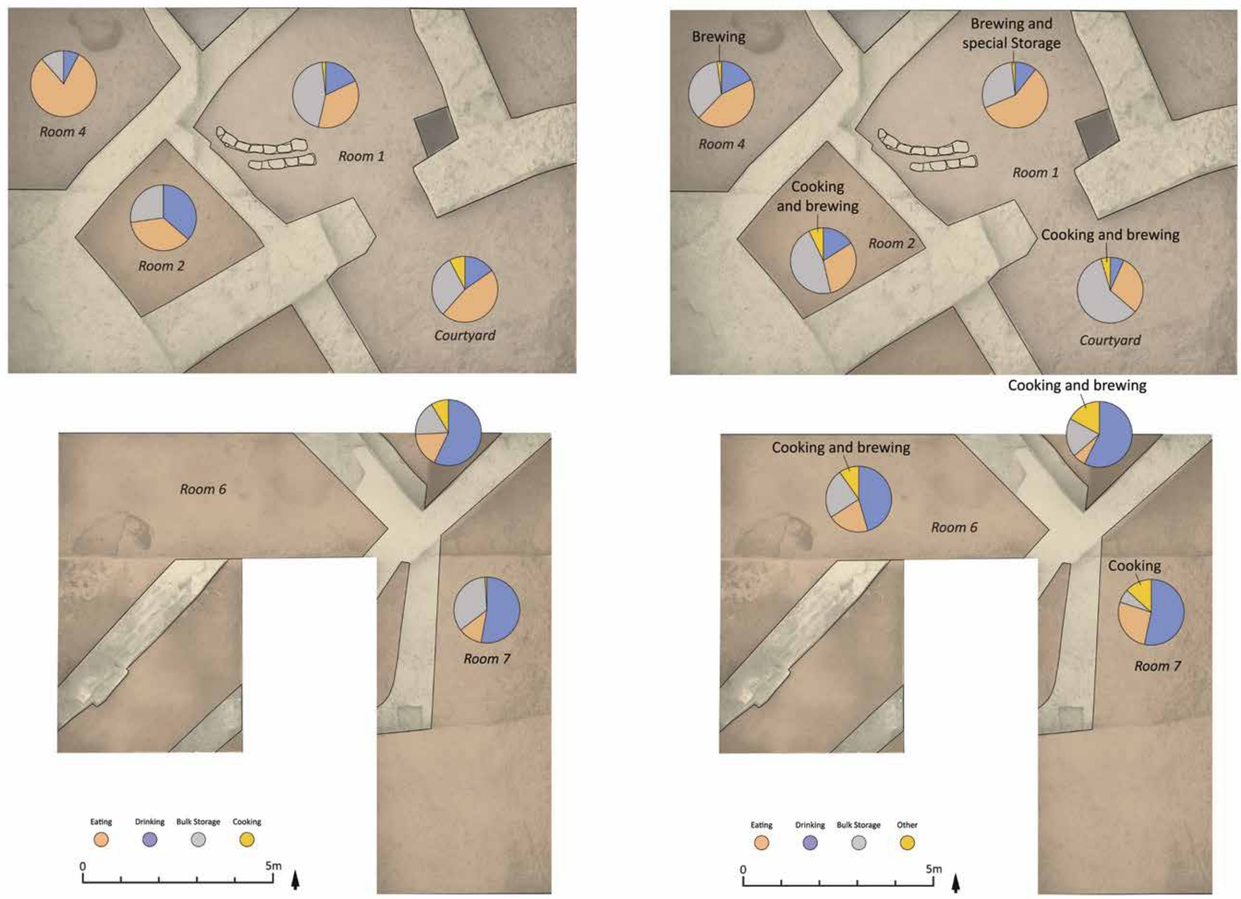


Figure 8.1 Distribution of vessel types in Area I during Phase 1b (left) and Phase 1c (right).

Eating vessels drop considerably in frequency in Phase 1c (36.7-24.8%), especially amongst smaller bowls (Family A: 31.6-19.8%). The spatial division of these vessels does, however, remain fairly consistent between phases. Eating vessels are most common in the south of the building, reflecting the pattern identified amongst cooking pots.

Drinking vessels, particularly cups, show precisely the opposite distribution to eating vessels. These vessels increase in frequency between Phases 1b and 1c (29.3-36.5%), but remain broadly restricted to the northern parts of the building, in Rooms 1, 2, 4, and the courtyard north. This includes the significant collection of complete/almost complete cups and goblets left behind in these rooms when the building was ceremonially abandoned.

Brewing vessels are introduced to the building only in Phase 1c (n=9; 1.4%), with one or two vessels/diagnostic sherds, the typical 'bunghole' bases (Type J.3), found in almost every room. There are two explanations for this chronological disparity: either the use-life of brewing vessels spanned from Phase 1b into Phase 1c (and so were not discarded in Phase 1b), or else, more likely, the function of the building switched at some point in Phase 1c to focus on brewing. A pattern of single brewing vessels per house has been identified at LB Tall Bazi[3] as well as in isolated rooms of the fortified building at Tell Khaiber,[4] but has not until now been identified across a large-scale and seemingly public building such as that in Area I in this period.

There are clear functional associations observable between specific vessel Families in Area I. In Phase 1c, cooking vessels and bowls co-occur in significant frequencies, further supporting the association of bowls with food consumption. Bulk storage vessels have an inverse correlation with bowls, and little coherent relationships with cooking vessels. Storage vessels do, however, show strong associations with drinking vessels (cups and goblets), co-occurring in high frequencies in Rooms 1, 2, 4, and courtyard north, and similarly low frequencies in other rooms. The Sealand texts of the CUSAS 9 archive, one of the most chronologically relevant

3 Zarnkow *et al.* (2011, 47-49).

4 Calderbank (2021b, 57-59).

for Kani Masi, demonstrate that storage vessels of the MB-LB (*kaptukkû, kupputtu, šandi/u,* and *pīḫu*) tend to be associated with two main consumables – ghee and beer – both of which seem to have fallen under institutional control.[5] The contextual associations of Area I storage vessels, which coincide with drinking vessels rather than cooking pots, may suggest that many of the jars and pithoi were used for beer production/storage.

The absence of other functional vessel categories provides further hints as to the nature of the activities taking place in the Area I building. Only one small special storage bottle was recovered amongst the spread of drinking vessels in Room 1 (Phase 1c). This bottle may have supported the drinking activities, perhaps holding beer flavourings; similar associations between small bottles and caches of drinking cups have been identified in Room 142 of Tell Khaiber's fortified building.[6] More notable perhaps is the complete absence in Area I of cylindrical measuring vessels, often interpreted as grain measures.[7] Since these vessels are fairly common in LB assemblages elsewhere across Mesopotamia, at Tell Khaiber, Tell Sabi Abyad, and Tell Sheikh Hamad, for instance, their absence suggests either that the Area I building was not a centre for goods redistribution, or else was not concerned with precise oversight of incoming/outgoing goods.

Food production and discard associated with the Area I building were found in Areas II and IV.

8.2.1.2 Area II

Area II lies c. 50 m west of the building in Area I. The earliest (Phase 1a) occupation in Area II is represented by a small section of a reddish-yellow mudbrick wall about two metres below the modern surface. A surface and red mudbrick collapse and subsequent fill deposit (Y82/L22, L21) yielded pottery and faunal remains that together may point towards a feasting event, possibly a closing ritual that we discuss in Chapter 9.3.1. Despite being made up of only a small number of diagnostic sherds, pottery from this early phase contained a diverse range of vessels associated with the storage, preparation, and consumption of food and drink (Figure 8.2). Two well preserved cooking pot profiles are especially notable (Figure 8.2.A and E). Alongside the range of vessel Families attested, another major feature of this early assemblage is its stylistic diversity (see Chapter 7.5.1), especially amongst bowl types (Types A.2, A.4-5, B.3) and jar rims (H.1-3), as well as diversity in vessel quality, with a fine-ware bowl found alongside a very roughly made bowl of the same type (Type A.2, Figure 7.2.10 and Figure 7.38.A).

Following the closure and dismantling of the Phase 1a structure, the area was levelled and overlain by mudbrick packing (Y82/L20), which is dated to between 1488 and 1292 cal. BCE. This suggests that this new phase of occupation in Area II, which includes a yellowish mudbrick wall, is broadly contemporary with Phases 1b-c in Area I (Figure 9.10). A tightly packed sequence of alternating layers of ashy deposits and resurfacing events were excavated that abut the wall in the north and slope upwards to the south. The thick ashy deposits, some of which contained hearth features, yielded fire-cracked rocks, ground stone tools, faunal and botanical remains, and a wide array of pottery vessels associated with the storage, preparation, and consumption of food (see Chapter 6.2.1.2 and Figure 6.7). While tight occupational lensing makes fine-grained vessel distributions as in Area I impossible, the diagnostic assemblage shows continuing multi-functionality for this area: vessels for storage, preparation, and consumption of food and drink all continue throughout the stratigraphic sequence. Mixed within this material are also a number of waster sherds, the remnants of failed firings probably from the kilns in Area III (see Chapter 6.2.2.1). The presence of some elegant cups (Figure 7.6.12 and 14) may speak to episodes of conspicuous consumption, albeit nowhere near the scale of the ceremony in Area I (Phase 1c) discussed in Chapter 9.3.2.

Area II produced the highest number of archaeobotanical remains at Kani Masi, which include the usual range of cereals (7% of total assemblage) and pulses (2%) (see also Appendix IV.6). The cereals are generally not well preserved, but some could be identified to wheats, including emmer and free-threshing wheat, hulled barley, and millet. Lentils and bitter vetch were also observed, as well as a fig seed. The Area II botanical assemblage also contains cereal chaff (1%) and large quantities of wild taxa (90%). Among the wild taxa, grasses predominate, followed by small legumes like *Astragalus* and *Trigonella*, as well as the herb *Malva* sp. They are all common wild plants; *Astragalus* and *Trigonella* form part of traditional animal fodder, and some species of *Malva* are also traditionally used as leafy greens in salads or cooked as a vegetable. Here, all wild taxa as well as the cereals and pulses are presumed to have formed part of animal grazing or fodder.

About half of the flotation samples contained fragments of animal dung, and three produced evidence for *Prosopis* cf. *farcta*, a wild plant commonly associated with animal dung when found in archaeobotanical assemblages.[8] It is most likely, therefore, that the majority of charred plant remains from Area II derive from animal dung, or dung cakes, used as fuel for cooking. This corresponds well

5 Boivin (2018, 126-182); Calderbank (2021a, 36-41).
6 Ibid., 69.
7 Mallowan (1946, 148-150).

8 Miller and Smart (1984); Charles (1998).

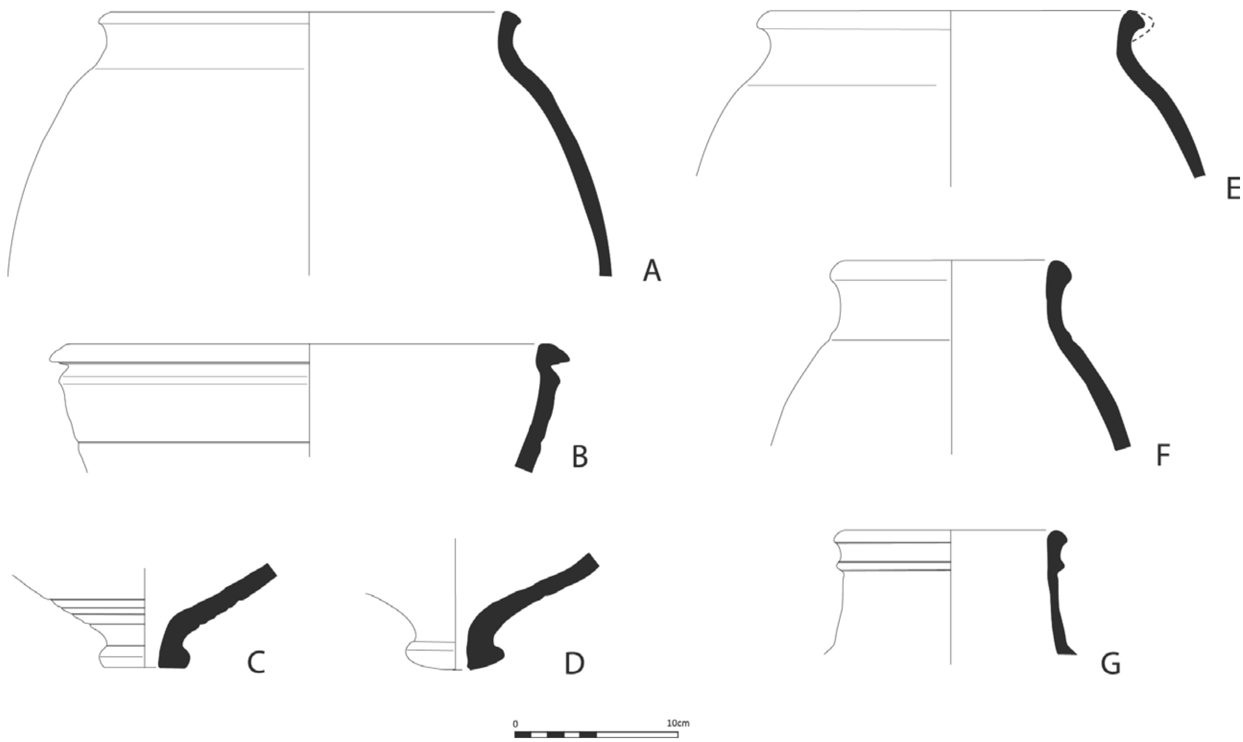


Figure 8.2 A selection of cooking pots (A and E), brewing vats (B-D), and storage jars (F-G), from Area II, Phases 1a-1c.

with the sample contexts, many of which are from within or around hearths (Y82/L7, L12). An average density of 3.4 plant items per litre of soil is also consistent with remains of fuel left in hearths, discarded deliberately, or scattered accidentally across occupation surfaces (Y82/L9, L13, L14, L17).

Area II produced the second largest faunal assemblage at the site. The later Phase 1 assemblage is dominated by caprines, followed by pig and cattle, as well as small quantities of equid and dog bones. Deer (including roe deer), gazelle, and bird are also attested, alongside rodents, which are to be expected in cooking and midden areas, but may also be later intrusions (Appendix VI, Table VI.14). A significant number of animal bones from Area II produced evidence for marrow and grease extraction, the largest number at the site. Marrow and grease extraction involves fracturing the bone in order to access the marrow, with these fragments subsequently boiled to extract grease (see also below). This cooking technique is corroborated by the presence of several cooking pots (Family K) in the Area II ceramic assemblage (Figure 8.2.A and E).

In concert, the evidence recovered from Area II points to the periodic use of this space for food preparation and as a midden for the disposal of dung fuel, food waste, and even pottery kiln waste. A series of absolute dates obtained from charcoal samples situates this sequence of alternating food production and refuse depositions mainly between the fifteenth to thirteenth centuries BCE, and thus roughly contemporary with Phases 1b-c in Area I, with some radiocarbon date ranges also including the twelfth century (see Chapter 6.2 and Appendix II.1). It is highly likely that both the outdoor food preparation activities and episodes of disposal are related to the Area I building, which hosted larger-scale commensal events.

The higher-lying deposits are more disturbed and therefore more difficult to interpret. Pottery and faunal remains decline in these loci compared to earlier occupation phases, but recovered assemblages overall are similar in composition, suggesting some continuity in use. A radiocarbon date from Y82/L3, which ranges between 1220-903 cal. BCE, points towards the continued use of this space into Phases 3 and 4, and possibly beyond.

8.2.1.3 Area IV

A further potential discard area was exposed in Area IV, which is located to the south of Area I. Following the removal of Phase 5 and Phase 6 installations, over a metre of consecutive LB activity horizons were excavated (DD89/L6-11), some of which included burnt brick fragments, large amounts of pottery and faunal remains, but no walls or floors. The ashy consistency of many of the sampled deposits in Area IV points to episodic discard of dung fuel. A charcoal sample from one of the earliest exposed deposits ranges between 1430-1291 cal. BCE, establishing a broad contemporaneity with Phase 1b-c in Area I and Area II.

The archaeobotanical assemblage from Area IV is more limited and includes barley and einkorn wheat as well as an undetermined pulse (Appendix IV.6). Among the wild taxa, grasses and leguminous plants were observed. The pottery from Area IV shows no solid evidence for food production, with no cooking pots attested. Small bowls and cups are also largely absent, while tall goblets (Family F, Figure 7.10.11) and storage jars (Family H) predominate (Figure 7.13.6). Caprines dominate the Area IV faunal assemblage, with pig, cattle, and equid remains represented less frequently and in similar proportions to Area II (Table VI.14). Common patterns in the botanical and faunal data of Area IV and Area II suggest that they served at least partially similar purposes, despite some differences in ceramic repertoires. Overall, the most plausible interpretation for Area IV is that it served as a disposal area for refuse from activities in Area I.

The Phase 1 faunal and ceramic assemblages from Areas I, II and IV differ from the other two excavation areas associated with the production of food, Areas III and VII, which appear to have served a different purpose and social group in Phase 2.

8.2.2 Phase 2

8.2.2.1 Area III

Area III, which lies 26 m to the northeast of Area II, has a complex biography and stratigraphy, which sees a Phase 1a habitation area that was constructed sometime in the sixteenth century BCE converted into a craft production area (Phase 2). The latter was dominated by two large consecutive ceramic kilns and a broadly contemporaneous working area framed by mudbrick walls on three sides, and a large round tannur. A radiocarbon date from a deposit in the middle of the midden build-up located between the kilns and the structure produced a range between 1391 and 1128 cal. BCE (V85/L164), suggesting some temporal overlap with Phase 1c-d in Area I (see Chapter 6.2.1.1.4).

The majority of pottery, faunal remains, and small finds recovered in Area III come from this midden area (V85/L174, L127, L164, L129), from its east- and northward extensions (V85/L116), and from fill deposits west of Walls 1 and 4 (V85/L115, L143, L179). Early during the north-eastern midden build-up, a juvenile burial (Burial AIII.2) was placed in this area and subsequently covered by more ashy refuse (see Chapter 9.2.5.1). The midden

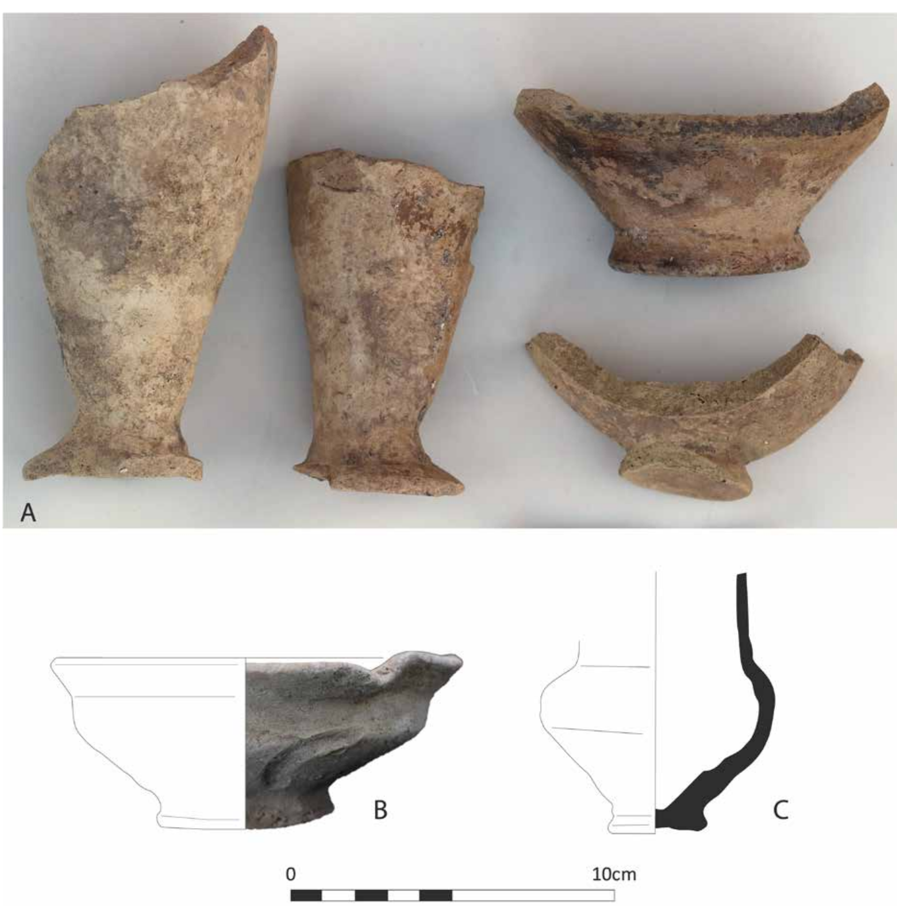


Figure 8.3 Pottery from Area III Phase 2 (V85/L164): A) typical bulk sherd collection, B) a malformed bowl, and C) a rough, lopsided cup.

Figure 8.4 Pig skull *in situ*, Area III.

deposits also contain the refuse from the firing chambers of the pottery kilns and some of their misfired pottery (see also Chapter 7.4.3).

The overall composition of the pottery assemblage and the extensive faunal remains from these deposits point to significant food production and consumption in Area III, most likely centred on the southern mudbrick structure and tannur.

The pottery from Area III shows significant differences to Areas I and II, in both style and function. Stylistically, the pottery is generally more roughly produced, with thicker walls, coarser fabrics, and frequent irregularities/deformities in shape (Figure 8.3). Finer, thin-walled vessels are generally absent. Vessels designed to hold individual portions, such as small bowls (Family A) and cups (Family C), are far less common than elsewhere and, when present, tend to be roughly made. The main exceptions to this are Type C.3 cups, vessels with sharp carinations on the lower body, not found anywhere else on site other than the Area III midden deposits (Figure 7.6.24-26); this was likely a short-lived style at Kani Masi. Tall rough goblets, jugs, and large bowls (Families B, E, and F) on the other hand, are more common across Area III; these vessels may not have been for individual consumption, but for passing amongst a group. The collection of pottery lids, with diameters of approximately 80 mm, found in V85/L164 (Figure 7.19.2-3) may well have been used to cover these goblets. Unlike Areas I and II, beer does not seem to have been produced in any meaningful volumes in Area III, with just one *namzītu* base (Type H.3) found in a refuse deposit (V85/L143).

The Area III botanical sample is small and contained a few indeterminate cereal grains as well as some lentils and other pulses, and a flax seed (Appendix IV.6). Grasses and small legumes dominate among the wild taxa. By contrast, the faunal assemblage recovered from Area III is one of the largest at the site (Table VI.14). All the usual domesticates are represented, including caprines, pig, and cattle, alongside small numbers of wild taxa in the form of gazelle and three species of deer. Area III differs from all other parts of the site, however, because pig remains, which make up a significant but usually subordinate category in other areas, dominate this assemblage (n=92; 34%).

With the majority of skeletal elements represented, pigs may have been slaughtered in this area. Several skulls across the site (n=6) show cleave marks consistent with an intention to access the brain, while few of the long bones provide evidence for grease and marrow extraction (n=11; 6%). This suggests that pigs were

Figure 8.5 Oven AVII.2 and storage jar in Area VII.

processed differently from caprines and cattle at Kani Masi. Meaty hindlegs may have either been heavily processed, or they were cured and consumed in a different locale, while forelimbs and other parts were consumed more immediately. Among the more unusual finds from this area is the deliberate burial of a large pig skull and mandible alongside some post-cranial bones on the northern edge of the area enclosed by Walls 4 and 6 (V85/L170, Figure 8.4). Cranial elements are generally common throughout Area III.

The pottery supports these observations. The extremely low frequency of cooking pots (Family K) and bowls (Family A), vessel types closely tied to the production and consumption of liquid and semi-liquid meals such as stews, suggests very different food production and consumption practices to Areas I and II.

The good preservation of faunal remains from Area III suggests relatively rapid burial of discarded remains similar to Area II. The wider finds context points to numerous but relatively small-scale episodes of disposal that built up the extensive middens of Area III, rather than one large-scale depositional event. In turn this may point to frequent but relatively small-scale food production, consumption, and discard. It is, thus, conceivable that the structure and tannur in the southern part of the site served as a form of canteen, feeding the craftspeople and workers, who produced pottery nearby and engaged in other craft activities across the north-western part of the site.

If this interpretation is correct, Kani Masi work-meals contained some animal protein, especially from pigs, which are generally associated with non-elite food consumption across Mesopotamia,[9] but also caprines and cattle. Pig products such as lard, for both consumption and as grease for tools and craft activities, as well as lard-derived soap, formed important commodities in ancient Mesopotamia.[10] A combination of craft activities and food processing is also indicated by the ground stone industry recovered from Area III, which includes whetstones, polishers, handstones, as well as a possible pestle and abrader from the same midden deposits (Appendix V.3). A rough ceramic grinding slab, the interior surface of which is embedded with large angular grits, was also recovered from V85/L127; similar examples have been found at Tell Sabi Abyad[11] and the kitchen at Tell Khaiber.[12]

8.2.2.2 Area VII

A similar combination of industrial activities and food production to Area III is attested in Area VII. Here, two pyrotechnological installations that we have interpreted as ovens, surround a pottery kiln.

The southern installation, Oven AVII.1, was constructed using mud-plaster building material and is circular in shape with an opening on the east side. In the southwest corner of the trench, we excavated a partial opening of a baked clay structure (Oven AVII.2, Figure 8.5). Oven AVII.2 was built slightly above the surrounding surfaces, and a mud-plaster platform slopes from the surrounding surfaces up against its eastern and southern sides, creating a platform just east of the oven's opening. On this platform sits a roughly square arrangement of baked bricks with a loose ashy deposit among the bricks. A large open-mouthed pithos with an attached ring base (Type I.1a, Figure 7.14.1) is set into the walking surface directly to the north of this installation. A complete footed goblet

9 Price (2020, 82).

10 For a summary, see Price (2020, 79-80).

11 Duistermaat (2008, Fig. IV.95.m).

12 Calderbank (2021a, 71, Fig. 5.15).

(Type F.1a, Figure 7.10.4) as well as several concentrations of bone, including human teeth (Appendix VIII.4.11), were found further to the northeast on the associated walking surface. A fragmentary grinding slab comes from a deposit c. 20 cm above but was most likely associated with the general function of the area. A sizeable assemblage of chipped stones from the area surrounding Kiln AVII.1, moreover, points to *ad hoc* tool manufacture that may be associated with craft activities, and perhaps also with food preparation (see Chapter 6.2.2.2.1).

Each of these features points towards a range of cooking activities. Whilst bread was perhaps being made in Oven AVII.2, a range of other foodstuffs may have been boiled, brazed, smoked, or fried on the arrangement of bricks directly outside its entrance. In general, this area was relatively clean of diagnostic pottery. A concentration of cooking and storage vessels were recovered from the western part of the trench, including several cooking pot sherds outside of Oven AVII.2, as well as sherds with evidence for secondary burning. A small number of bowls, cups, and goblets were found scattered across the trampled earth surface connecting the pyrotechnological installations. Overall, the pottery points to small-scale consumption activities rather than elaborate commensal practices such as those attested in Area I. The faunal material recovered from Area VII, which is among the smallest assemblages from Kani Masi (Table VI.14), includes caprine, cattle, pig, and equid remains, while flotation produced a small number of cereal grains and legumes. This points to consumption and discard of food remains taking place mostly outside of the excavated portion of Area VII.

8.3 Plants and animals

We now move from food-related activity areas to site and landscape scales of analysis in order to reconstruct, as far as the available evidence permits, the wider food webs that the inhabitants of LB Kani Masi formed part of, how domesticated plants and livestock as well as wild resources were managed and exploited, and how local food and subsistence practices tied into regional and supra-regional cultural networks.

8.3.1 Archaeobotanical evidence

The LB archaeobotanical evidence from Kani Masi, which derives almost exclusively from Phase 1 and Phase 2 contexts (LB I-II), provides clear evidence for a well-developed as well as diversified agricultural practice that was suited to local environmental conditions, and that buffered against the risks inherent in the practice of agriculture in the so-called 'zone of uncertainty' and in a region with sub-optimal soil conditions (see also Chapters 1.2 and 11.5).

Overall, the archaeobotanical assemblage from Kani Masi is relatively poorly preserved, with many samples having the character of dung fuel remains, where the seeds have travelled through an animal gut and appear chewed up and degraded. This is corroborated by the finds of dung remains within a number of flotation samples (see Section 8.2.1.2 above). The density of the samples, i.e. the number of identified plant items per litre of processed soil, is low, ranging from less than 1 to 19, and no definite and deliberate concentrations of plant remains, such as storage contexts, were found. With the majority of botanical remains derived from dung-fuel, there is thus no direct evidence for crops destined for human consumption. However, it seems likely that the crops and other plants palatable to humans observed in the assemblage were primarily grown or collected for food for humans. Food plants found in animal dung could be present for a number of reasons, including the use of crop cleaning by-products (chaff, seeds) or spoilt grains for fodder, as well as animals grazing on field stubble.

The primary food plants observed at Kani Masi include cereals such as hulled barley, glume wheats such as emmer and einkorn, free-threshing wheat such as bread wheat, and millet (Figure 8.6; for a detailed breakdown, see Appendix IV.6). Pulses such as lentils and types of bitter vetch or grass pea were also observed, as well as fig and flax. The majority of the assemblage consists of wild taxa.

All but one of the above crops are present in Southwest Asia from the earliest agricultural settlements onwards. Millet, though recorded in written sources from the second millennium BCE onwards,[13] is a rare occurrence in the archaeobotanical record from this region. Across Iraq, a number of seeds similar to millet have been noted from c. 3000 BCE,[14] where an imprint in ceramics has also been observed.[15] Finds of seventh century BCE millet from Nimrud have been noted by Helbæk,[16] and most recently, millet has been found in fourteenth and thirteenth century BCE levels at Gurga Chiya.[17] The upper limits of a series of radiocarbon dates from an adjacent locus (Y82/L9) suggest that the Kani Masi millet seed (Area II/Y82/L12) could date to as early as 1446 to 1421 cal. BCE. It is, thus, among the earliest secure archaeobotanical evidence of millet in Iraq so far.

All of the crops observed at Kani Masi could have been grown in the immediate region without the need for systematic irrigation, which would have been challenging to implement along the Sirwan due to violent spring floods prior to the construction of the Darbandikhan dam in the

13 CAD 1959.
14 Field (1932, 308).
15 Helbæk (1960, 112); Jacobsen (1982, 23).
16 Helbæk (1966, 615).
17 Wengrow *et al.* (2016).

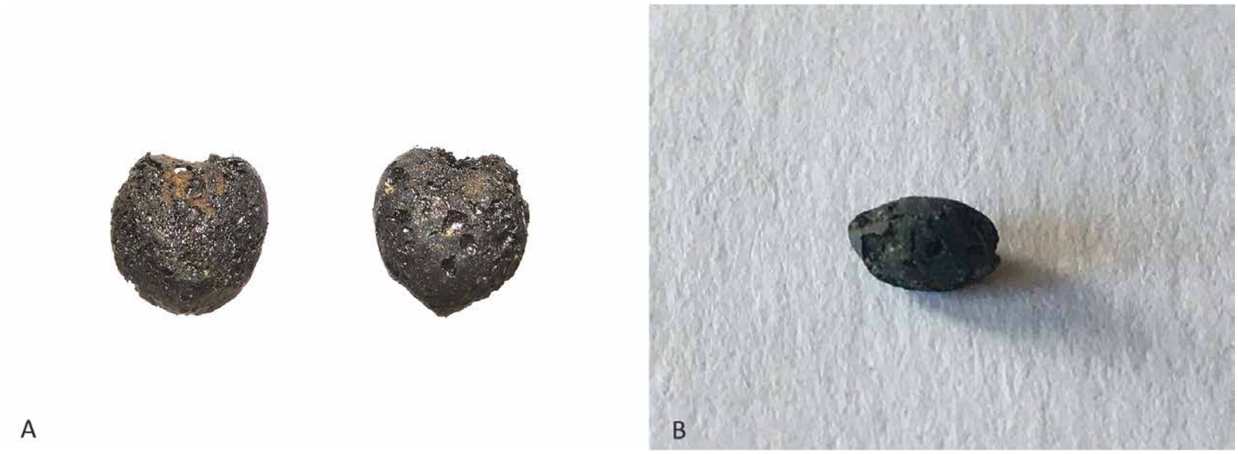


Figure 8.6 Charred A) millet and B) emmer grain from SRP046 (images not to scale).

last century (see Chapter 1.2). The majority of attested crops in the Kani Masi record are winter crops, i.e. crops sown in late autumn/early winter to take advantage of the seasonal rainfall during their growth periods and harvested in the spring. Millet, on the other hand – a hardy, fast-growing, drought-resistant plant – is a summer crop: sown in the spring and harvested in the autumn. This crop too would not necessarily require additional irrigation, with spring rains being attested well into April and May even in today's hotter and more arid climate.

Some supplementary irrigation or flood farming, such as that identified at third millennium BCE contexts at Gird-i Shamlu and Bakr Awa,[18] may well have been practiced by the inhabitants of Kani Masi. The presence of flax in Neolithic-to-Chalcolithic assemblages at Gurga Chiya and Tepe Marani have been interpreted as evidence for the use of marshy areas near rivers to cultivate this summer crop, and it is possible that flax at Kani Masi may have also been cultivated along the river. There are several advantages to having both winter and summer crops, including spreading out the intense labour days required for sowing and harvesting over several intervals during the year as well as spreading the risks of failure of one or more crops.

8.3.2 Zooarchaeological evidence

The faunal assemblage alongside the evidence for domesticated seeds in dung fuel suggest a tight integration of agricultural and pastoral practices by Kani Masi's inhabitants.

The zooarchaeological material from Kani Masi constitutes the largest analysed LB Babylonian assemblage published to date. In total, 280 faunal samples were analysed, containing 1268 individually identified specimens, the majority of which came from Area I (see Table VI.14). While material was frequently recovered from Areas II and III, no faunal samples were recorded in Areas VI and VIII. In total, 16 genera were classified, within which 10 taxa were positively identified to species level, with a mixture of wild and domesticated taxa represented, most of which were recovered from Areas I-III. Altogether 31.9 kg of material was analysed, with the distribution of the weight closely following the number of identified specimens in all areas (Figure 8.7, Table VI.9). The latter points to general consistency in the nature of the collected material across the site, with differential quantities reflecting differences in the frequency of faunal remain processing and consumption in the past.

8.3.2.1 Preservation and taphonomy

In contrast to the archaeobotanical remains, the zooarchaeological assemblage is well preserved, although the material is highly fragmented. Detailed taphonomic data are presented in Appendix VI.2.4, which shows that the bulk of the preservation can be categorised as 'good', followed by 'fair', with few samples classed as 'excellent' or 'poor'. The bones from Area I are the most poorly preserved at Kani Masi, especially when compared to those recovered from Areas II, III, V, and VII. These varying levels of preservation could well be linked to the different uses of the various areas. As discussed above, Area II especially, but also Area III, can be associated with larger-scale food preparation and the rapid deposition and extensive accumulation of food waste, processes which generally aid preservation.[19] By contrast, Area I is associated with different uses. Some food preparation does appear to have taken place within the central

18 Marsh *et al.* (2018).

19 O'Connor (1991, 234).

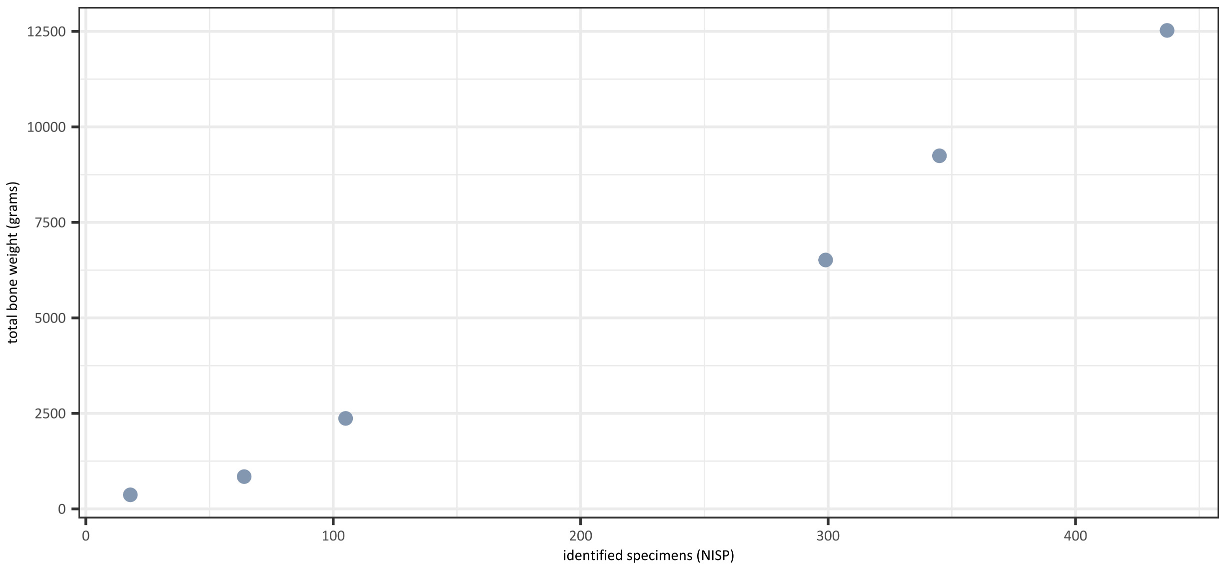


Figure 8.7 Comparison of total recovered bone weight and identified specimens (NISP) by excavation area. Data in Table VI.9.

building, but the focus appears to have been primarily on consumption without rapid deposition, leading to a more gradual build-up of organic material, which is not as conducive to good preservation. The continued building, abandonment, and re-building of the Area I structure may also have further disturbed the assemblage, thus altering overall preservation.

This is also corroborated by evidence for bone weathering. Few samples show any reliable evidence for weathering. Of the few that do, the greatest evidence comes from Area I, indicating that some specimens were left exposed to the elements, rather than being subject to rapid deposition. Very little gnawing is recorded at Kani Masi. Gnawing caused by carnivores is the most common, and it appears most frequently in Areas II and III. This would suggest that the bones which had been deposited in those areas, although they appear to have accumulated quickly in piles, to some extent must have been exposed, thus allowing carnivores, most likely dogs, to opportunistically gnaw on the bones. Carnivore gnawing also occurs in Area I, mainly associated with Phase 3, when scavengers may have periodically used the abandoned building for shelter. Evidence for rodent gnawing, while present, is uncommon.

8.3.2.2 Animal populations

A range of animals are recorded in the Kani Masi zooarchaeological material, within which domestic taxa dominate with smaller proportions of wild species. Caprines (goats and sheep) are the most common (n=595; 46.6%; all NISP and %NISP values from Table VI.14). This dominance is consistently seen across all larger, species-rich area assemblages, varying between 41.6-63.2 %NISP. This is followed by pig (n=205; 16.1%), which also appears in all areas with substantial faunal remains. There is, however, a much higher-than-average frequency of pig in Area III (n=93; 31.2%) compared with other areas. Cattle is present throughout the site in even proportions (n=133; 10.4%). Eqids are not numerous at Kani Masi (n=77, 6.0%), but, with the exception of Area V, appear throughout the site. Dogs appear in all areas with substantial faunal assemblages, but are not especially numerous (n=17, 1.3%). Lastly, one (0.1%) instance of camel was discovered in Area I associated with a Phase 6 context.

Wild animals only make up a small fraction of the faunal assemblage (n=46; 3.6%). Gazelle are by far the most common (n=33; 2.6%) and appear throughout all areas with substantial faunal remains. Deer are also present across the site (n=12; 0.9%); three species were identified, and of these *Capreolus capreolus* was the most common (n=7; 0.6%). Only one bone of a hare was identified in Area I.

Very few micromammals were identified (n=10; 0.8%). Of these, most were rat-sized. Non-mammal species are also limited. Of these taxa, fish was the most common. These specimens, however, mostly come from one sample in Area I and may only represent one individual fish. Birds, amphibians, and crabs are also present, but rare.

As there were differing quantities of faunal material excavated from across the trenches, there is an uneven distribution of identified specimens in each area of the site. Grayson has shown that the size of the retrieved assemblage is tightly correlated with the number of species, or taxa,

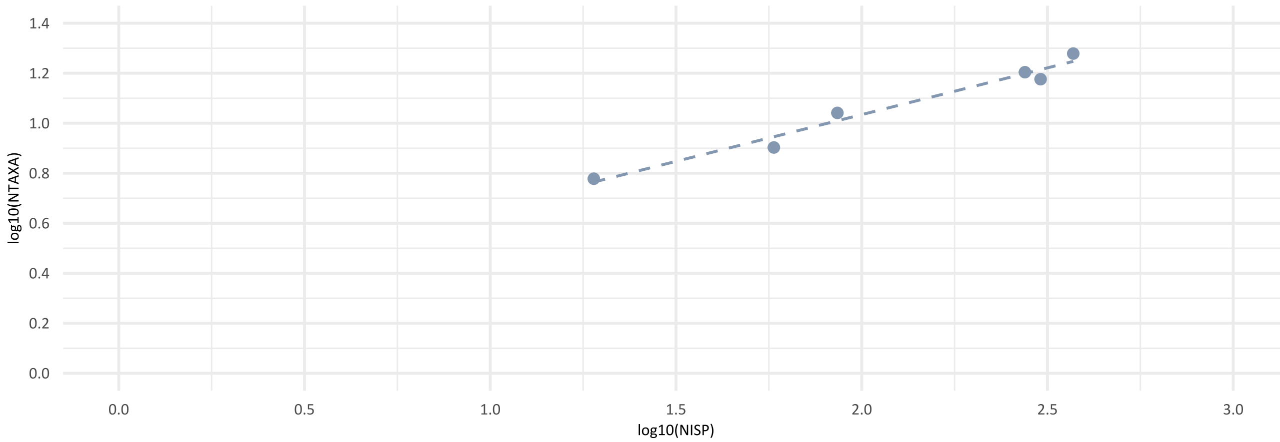


Figure 8.8 Graph showing the logarithm of the number of identified specimens (log_{10}NISP) against the logarithm of the number of identified taxa (log_{10}Ntaxa) for the area assemblages. Data in Table VI.14.

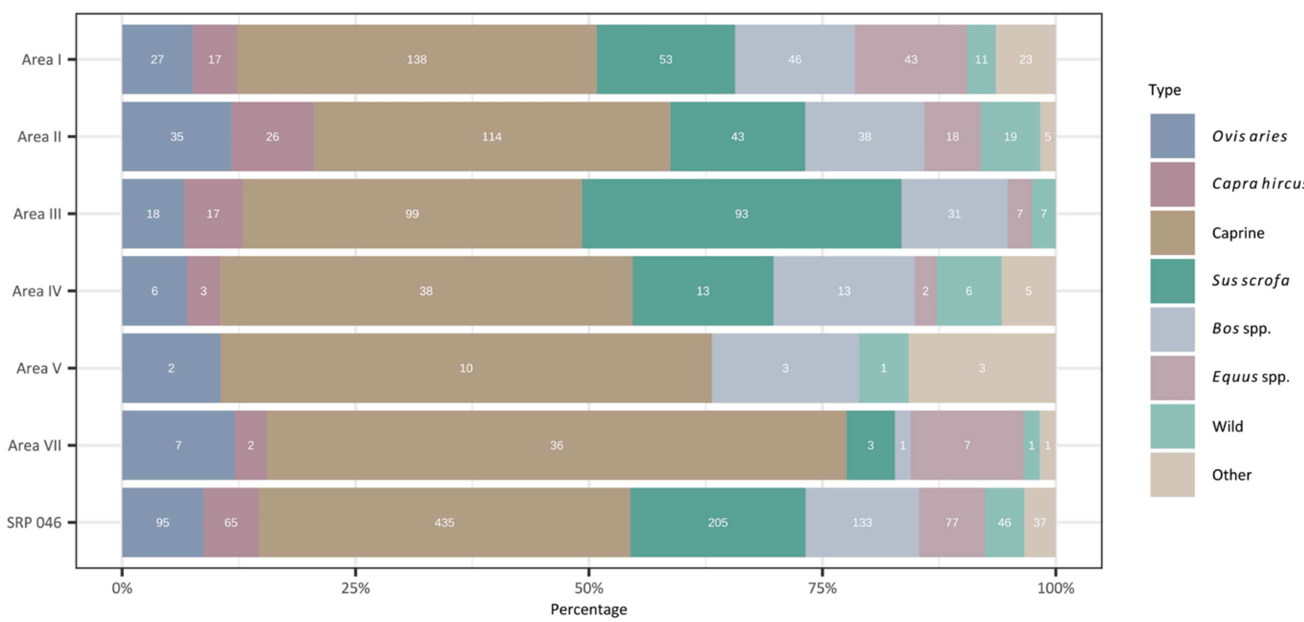


Figure 8.9 Relative abundance of the most frequently identified taxa (%NISP) in each area. 'SRP046' represents the site total. Data in Table VI.14.

produced from that assemblage.[20] This relationship can be demonstrated across the different areas of excavation at Kani Masi through plotting the logarithm of the number of identified specimens (log_{10}NISP) against the logarithm of the number of identified taxa (log_{10}Ntaxa) (Figure 8.8). This demonstrates that the variation in the diversity of animals identified between the excavation areas can be explained by the variation in assemblage size.

20 Grayson (1984).

8.3.2.2.1 Caprines

Typical of the region, and as already noted, caprines – sheep and goat – are the most common animals in the Kani Masi zooarchaeological assemblage (Figure 8.9). Within this group, sheep are relatively more common than goats. This is typical of the wider archaeological and textual evidence, although sheep are not as strongly represented as at some sites (this is discussed further in Section 8.4 below). Metrical evaluation of body size indicates the animals are consistent with domestic populations.

Within the assemblage overall, most parts of the skeleton are present, indicating that whole animals

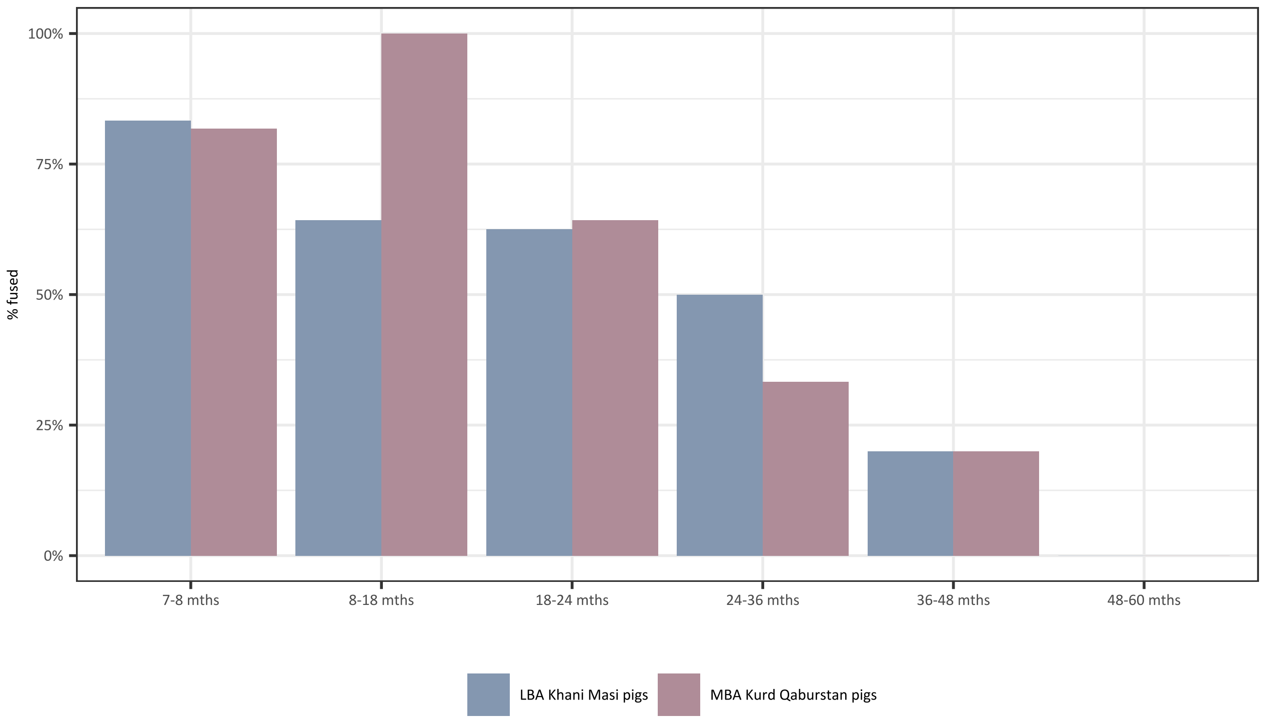


Figure 8.10 Pig demographic profile – epiphyseal fusion data at Kani Masi, compared to Middle Bronze Age Kurd Qaburstan (Schwartz *et al.* 2022). Age categories follow Zeder *et al.* (2015) revised fusion stages. Data in Table VI.35.

were slaughtered and butchered on site. The skeletal element representation looks to be shaped by taphonomic attrition,[21] with larger and more robust elements well represented compared to smaller, less dense bones.

Comparing the demographic profile of the Kani Masi caprines to Payne's mortality profiles[22] suggests that meat was likely an important focus of the animal husbandry strategy (Figure VI.3), with milk and wool being more minor products of both sheep and goat. The latter is particularity interesting, as wool/fibres are often described as the most desirable product of sheep and goats. A single perinatal metacarpal from Area III (V85/L127, Figure VI.4) indicates that breeding females were present at the site in the very late winter/spring for the lambing/kidding season.

8.3.2.2.2 Pigs

After caprines, the next most common animal represented at Kani Masi is pigs. Pigs are well-represented across the site (Figure 8.9), with the highest contribution within Area III where a high proportion of cranial elements is recorded.

Across the assemblage as a whole, most parts of the skeleton are present, indicating that whole animals were slaughtered and processed on site. Within the skeletal element representation (Figure VI.6), there is a clear bias towards cranial parts and forelimbs being better represented. Part of this representation pattern may be linked to survival of the more robust and dense elements, but it may also be associated with cultural choices. Several of the skulls (n=6) have cleave marks consistent with an intention to access the brain. Similar butchering practices were identified at LB Nippur,[23] suggesting this may have been a common practice. Very few of the long bones provide evidence for grease and marrow extraction (n=11; 5.8%), which could suggest that the hindlimbs were more heavily processed, effectively removing them from the assemblage. Alternatively, the meaty hindlimbs may have been processed, consumed, and deposited in a different way, rather than being boiled. Perhaps the forelimbs were consumed soon after slaughter while the meatier hindlimbs were cured and consumed later, or even moved off site. Similar body part distributions have been observed at the broadly contemporary site of Tell Arbid in Syria.[24]

The demographic profile of the Kani Masi pigs is similar to that of the population at Middle Bronze Age Kurd Qaburstan,[25] indicating a focus on younger animals for meat and fat (Figure 8.10). Although meat is typically the primary motivation for pig rearing, it is common to

21 Lyman (1994).
22 Payne (1973).
23 Boessneck (1978).
24 Piątkowska-Małecka and Smogorzewska (2010).
25 Schwartz *et al.* (2022).

cull piglets before they reach their maximum size to allow the sow to farrow more regularly.[26]

Metrical analysis of the skeletal remains indicates that the pigs at Kani Masi were relatively small. This is in agreement with comparable regional sites, such as Nippur and Tell ed-Der,[27] where small-sized domestic pigs were also common at this time. Further work on the morphology of pigs in this region could consider the phenotypic adaptation of this domestic animal to local conditions, which may not have been optimal for free-range pigs,[28] impacting the local phenotype or necessitating more intense human management (see discussion in Section 8.4.1 below).

8.3.2.2.3 Cattle

Less frequent than caprine and pig bones, cattle bones are a common part of the evidence for food waste across the site, appearing in all species-rich areas (Figure 8.9). Although it is a relatively small assemblage overall, most parts of the skeleton are represented indicating that whole animals were brought to the site for slaughter and butchery, rather than meat moving as joints. A range of ages are represented in the limited demographic data (Table VI.39) suggesting that multiple products were made use of, including meat and milk, as might be expected. A relatively high proportion of animals being culled by c. 3-4 years, at the point at which cattle reach their maximum weight, suggests that meat production may have been a key focus. As well as providing meat, there is also evidence for grease/marrow extraction from the fracturing of the limb bones. No traction-related pathologies or very old animals were observed in the assemblage, although the assemblage is small and there are few teeth present with which to identify the oldest animals.

8.3.2.2.4 Equids

Within the material identified as equid, both horse and donkey are positively identified, and a likely equid hybrid is also present (Appendix VI.5.4.4). It is likely that mules, hybrids between a horse and donkey, were bred from an early point when the historically expanding biogeographies of domestic donkeys and horses overlapped in Southwest Asia.[29] Mules were prized beasts of burden, exhibiting stamina, speed, and strength.[30]

The bones of equids make up a relatively small proportion of the assemblage, reflecting the fact that they were not a common food animal at Kani Masi. They may, however, have played a role in food supply or agricultural resource management. The complete horse mandible excavated from Area II (Y82/L22), from a c. 13-15-year-old mare, exhibits heavy bit wear on the anterior border of the lower second premolars (Figure VI.13). The degree of wear is suggestive of sustained and heavily applied rein tension and the likely use of an abrasive, metal mouthpiece.[31] The morphology of the bit wear does not allow distinction between riding or driving of this horse, but it does indicate the potential role of equids in transporting people and produce, and managing trade, livestock, or pastureland.[32]

8.3.2.2.5 Other taxa

Other taxa make only minor contributions to the zooarchaeological assemblage. A range of wild mammals are present, some of which likely contributed to human diet. Gazelles are by far the most common wild taxon (Appendix VI.5.4.6). Within the gazelle assemblage, a limited range of elements are present, and it is therefore unlikely the whole carcass ever appeared on site. There are two probable ways in which the specimens entered Kani Masi. Some animals may have been hunted in the surrounding area, with the carcasses broken down at the kill site and only the meat-bearing elements brought back. The horn cores were likely brought back too. Hides are also often transported with the feet attached,[33] which could explain the presence of phalanges and the high frequency of metapodials.

Three species of deer are also present in the assemblage, all in very small numbers (Appendix VI.5.4.7). Of these, roe deer (*Capreolus capreolus*) is the most common. *Dama* spp., either *Dama mesopotamica* (Mesopotamian fallow deer) or *Dama dama* (fallow deer), is also present. The former occupy a range of woodlands and are also known to inhabit savanna and shrubland.[34] Hatt also notes that they are known to occur in mountainous regions as well.[35] The latter also has a wide range, inhabiting forest, shrubland, grassland, as well as worked agricultural land.[36] Both species of *Dama* spp. are therefore likely to occur in the wider surroundings of Kani Masi. One specimen was identified as *Cervus elaphus* (red deer). They inhabit open deciduous woodland, upland moors and open mountainous areas, sometimes even above the treeline.[37] The survival of individual cervid body parts by MNE are presented in Figure VI.16. There is a limited range of skeletal elements present, which suggests that deer, in a similar way to gazelle, were butchered and brought to site

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26 Price (2016, 64).
27 Boessneck (1978); Bökönyi (1978).
28 Grigson (2007).
29 Bendrey and Oakes (2023).
30 Mitchell (2018).
31 Compare to other archaeological examples in Bendrey (2007) and Bendrey *et al.* (2013).
32 Mitchell (2018); Bendrey and Oakes (2023).
33 Reitz and Wing (2008, 126).
34 Werner *et al.* (2015).
35 Hatt (1959, 63).
36 Masseti *et al.* (2008).
37 Lovari *et al.* (2018).

in parts. The occurrence of phalanges could be indicative of hides with attached feet entering the site, either as the result of hunting or of trade, as mentioned earlier.

Domestic dogs are relatively rare in the assemblage suggesting that they were neither eaten regularly nor culled *en masse* at the site (but see Chapter 9.3.2). One specimen of *Camelus dromedarius* (dromedary), represented by the left acetabular articulation of the pelvis, was found in Area I (Z88/L2). This locus is associated with the latest occupation (Phase 6) of the site, post-dating the main LB-IA occupation phases.

Few non-mammals were found on site. Most fish specimens appear in Area I, but are likely from the same fish (Appendix VI.5.4.9). Bird appears most frequently in Area IV and in loci associated with Phase 6 occupation. They also appear in Areas I-II. The low frequency of birds is interesting, since, according to textual sources, bird is a staple of the Babylonian diet. For instance, 10 of the 35 Yale Culinary Tablet recipes are bird dishes, including pigeon broth with several ways in which to prepare bird's gizzards and entrails.[38] Bird appears rarely at archaeological sites, however. Considering the proximity to the river, waterbirds may well have been of use to the people of Kani Masi.

As will be discussed in more detail below, the animal remains from Kani Masi represent a diversity of activities and relationships, a key one of which is the food consumed by the inhabitants. Domestic animals were the mainstay of this diet, and the overall composition of domestic taxa within the LB Kani Masi assemblage aligns broadly with its regional contemporaries. Caprines are always the dominant group, with cattle and pigs playing a considerable, but variable role in the economy. The number of wild animals, while still small in the overall assemblage, stands out when compared with other Bronze Age sites, most of which are located in the lowland alluvial plains.

8.3.3 Stable isotope analyses

In addition to the archaeobotanical and zooarchaeological assessments presented above, we also undertook a series of pilot stable isotope analyses to investigate further dimensions of human-animal-environment relationships at LB Kani Masi. This includes both stable isotopic analyses of archaeological bone collagen and tooth enamel, and focuses on stable carbon and nitrogen isotopes ($\delta^{13}C$ and $\delta^{15}N$) in bone collagen and stable carbon, oxygen, and strontium isotopes ($\delta^{13}C$, $\delta^{18}O$, and $^{87}Sr/^{86}Sr$) in tooth enamel. See Chapter 3.2.8.2 for an introduction to, and the context of this work, and Appendix VII for the full data presentation.

38 Reynolds (2007, 189).

8.3.3.1 Animal diet, seasonality, and movements

In terms of bone collagen analyses, a total of 28 animal bone specimens were sampled and measured for carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) values. The main focus of this analysis was to investigate diet and movement of the sheep and goat, for which 11 sheep bones and eight goat bones were sampled. We were also interested in the management and diet of the pigs at Kani Masi, in particular as the site is located on the dry-farming limit, a potentially challenging context for pig husbandry.[39] Nine pig bones were also sampled.

The integrity and preservation of collagen recovered was assessed and those samples with carbon/nitrogen (C/N) ratios of 2.9-3.6[40] are further considered below. Collagen was sufficiently well-preserved to return usable stable isotope data from 12 specimens (where duplicates on samples were run, the average of each duplicate pair of samples is used to represent that sample) (Figure 8.11). Sample sizes are small, so interpretations must be cautious. Average $\delta^{13}C$ and $\delta^{15}N$ values for the sampled animals are -19.5 ± 0.6 ‰ (n=12) and 6.2 ± 1.6 ‰ (n=12) respectively. Variation in $\delta^{13}C$ values is from -20.5 ‰ to -19.5 ‰ and in $\delta^{15}N$ values from 3.6 ‰ to 8.7 ‰. A comparison of the average isotopic values of animal taxa indicates similarity between sheep and goat diets, compared to a small difference in the average diet of the pigs [$\delta^{13}C$ values: sheep = -19.4 ± 0.5 ‰ (n=5); goat = -19.5 ± 0.2 ‰ (n=3); pig = -20.1 ± 0.4 ‰ (n=3); $\delta^{15}N$ values: sheep = 5.4 ± 0.1 ‰ (n=5); goat = 5.7 ± 2.0 ‰ (n=3); pig = 7.2 ± 0.8 ‰ (n=3)].

Although a small sample, the three goats sampled appear to have been managed in a way that restricted carbon isotope variation (a range of 0.4 ‰; from -19.7 to -19.3 ‰) compared to the five sheep sampled (a range of 1.4 ‰; from -20.1 to -18.7 ‰). Further, the sheep sampled appear to have been managed in a way that restricted nitrogen isotope variation (a range of 2.2 ‰; from 4.4 to 6.6 ‰) compared to the goats (a range of 3.9 ‰; from 3.6 to 7.5 ‰). With a greater sample size than analysed here, it would be interesting to explore the degree to which the differences indicated between the sheep and goats are representative of separate management practices for the two taxa more broadly. Further work will be required to clarify this.

As discussed in more detail in Chapter 3.2.8.2, the $\delta^{13}C$ values of plants vary due to photosynthetic pathways and environmental conditions, with modal $\delta^{13}C$ values for modern C_3 and C_4 plants of -26.5 and -12.5‰ respectively.[41] Based on isotopic analysis of both modern and ancient plant remains from Çatalhöyük, Pearson *et al.* established

39 Grigson (2007).

40 DeNiro (1985); Ambrose (1990).

41 Vogel *et al.* (1978).

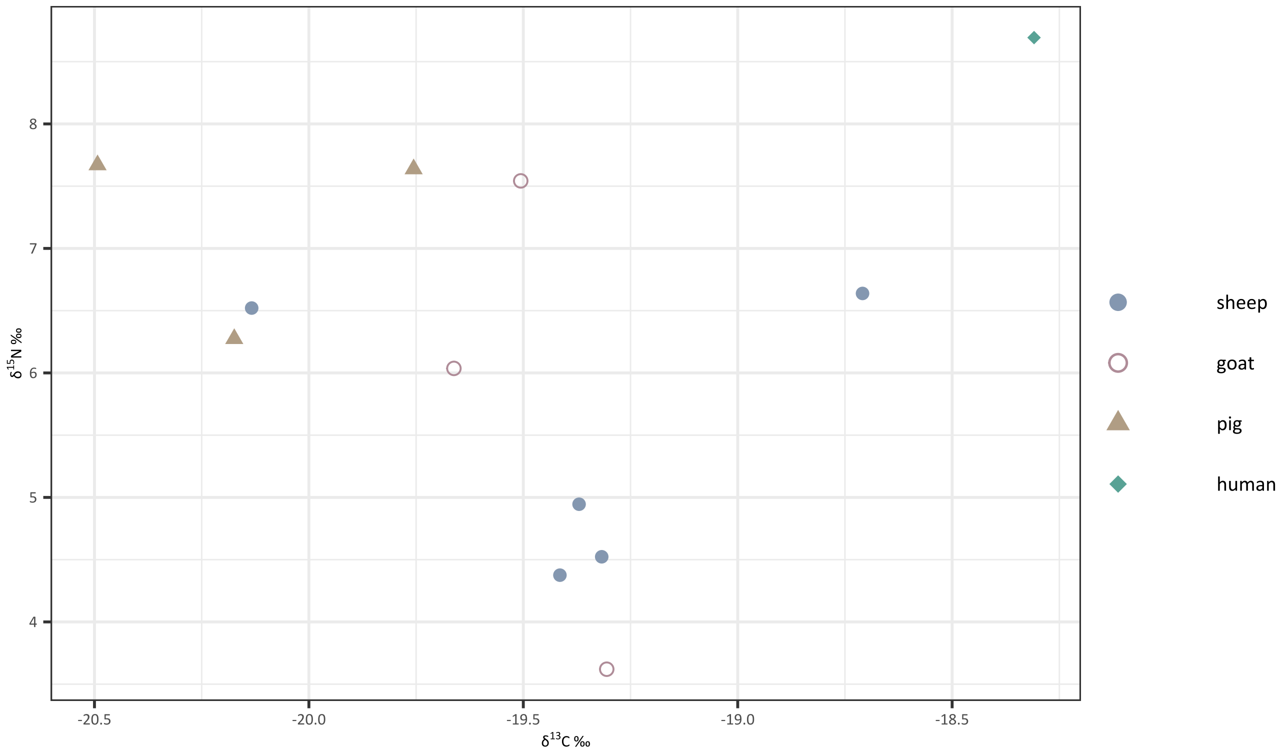

Figure 8.11 Scatterplot of bone collagen δ^{13}C and δ^{15}N values from SRP046.

a mean value of -23‰ for C_3 plants and -12‰ for C_4 plants.[42] As another example, for the Qazvin plain, Iran, Bocherens *et al.* summarise data on modern plants with ranges of -28.6 to -26.2‰ for C_3 plants and -15.7 to -11.5‰ for C_4 plants.[43] Correcting the Kani Masi values for 5‰ enrichment between the diet and bone collagen of the animal[44] indicates that the values measured in the Kani Masi animals represent a diet of predominantly C_3 plants, and that C_4 plants contributed little to their diet, as we also saw at Shakhi Kora in tooth enamel. This is perhaps surprising, considering that there would be expected to be some C_4 grasses present in the region.[45] This is moreover evidenced by the presence of millet in the hearth and midden deposits of Area II, with a degraded surface that suggests it may have been digested by an animal and subsequently used for dung fuel (see Section 8.2.1.2 above).

The collagen results can be compared to the carbon and oxygen isotopic values from the sequential enamel samples. Figure 8.12 illustrates two sequentially sampled lower third molars (M_3) from LB Kani Masi (compared to two from Late Chalcolithic (LC) Shakhi Kora). From Kani Masi, the sheep M_3 (sample 116) and sheep M_3 (sample 56) were recovered from Area II (Y82/L17) and Area III (V85/L116) (see Appendix VII.3). As described above, oxygen isotope (δ^{18}O) values can be used to explore seasonal fluctuations in the teeth, with both specimens exhibiting maxima at the same location, in line with the Shakhi Kora goat 258.2, suggesting consistency in birth season at Kani Masi (at least within the two animals sampled). Differences in the mean and range of δ^{18}O values in the four teeth sampled may represent ingestion of different water/food sources, for example with sheep 116 being clearly offset compared to the other three animals. Given that in this region, surface waters, such as from rivers or lakes, are likely to display greater isotopic seasonal variation than groundwater sources, such as wells,[46] the lower values in sheep 116 coupled with its shorter range in values in Table 8.2 may suggest groundwaters contributed to the drinking water or plant growing conditions of the dietary intake of this animal. Further work is needed to clarify this, but there are today numerous artesian springs in the surroundings of the site and a similar situation is likely for the second millennium BCE (see also Chapter 5.2).

42 Pearson *et al.* (2007).
43 Bocherens *et al.* (2000a).
44 Ambrose and Norr (1993).
45 Bocherens *et al.* (2000b, Fig. 1).

46 See discussion and references in Greenfield *et al.* (2022).

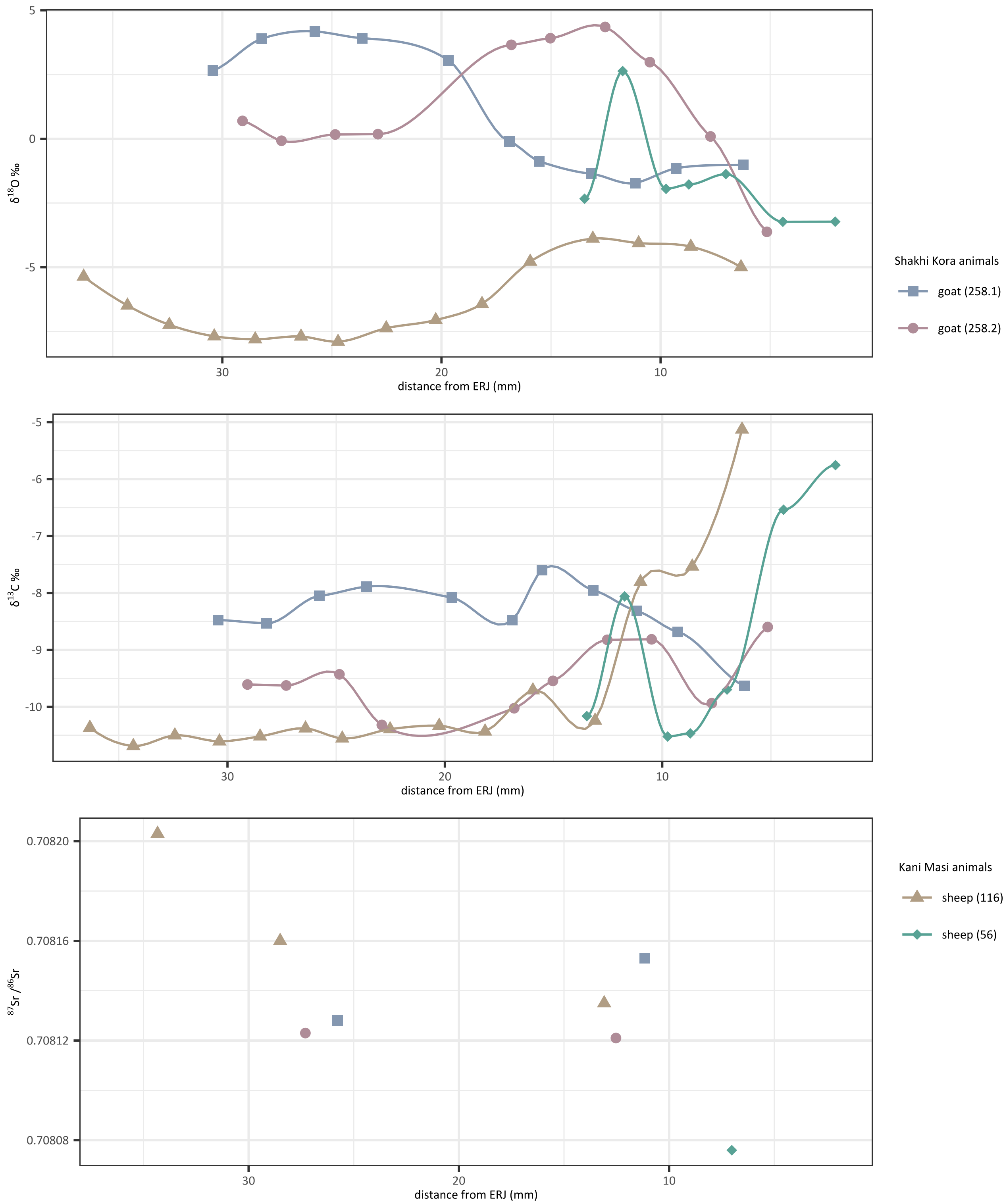

Figure 8.12 Sheep and goat sequential enamel oxygen (top), carbon (middle), and strontium (bottom) isotope results (see Appendix VII.3 for specimen data and values).

Specimen	Goat M_3 258.1	Goat M_3 258.2	Sheep M_3 56	Sheep M_3 116
mean	1.0	1.2	-1.6	-6.2
SD	2.46	2.47	2.00	1.50
range	5.9	8.0	5.9	4.0

Table 8.2 Mean and range of $\delta^{18}O$ values in the sequentially sampled sheep and goat teeth (data in Table VII.4).

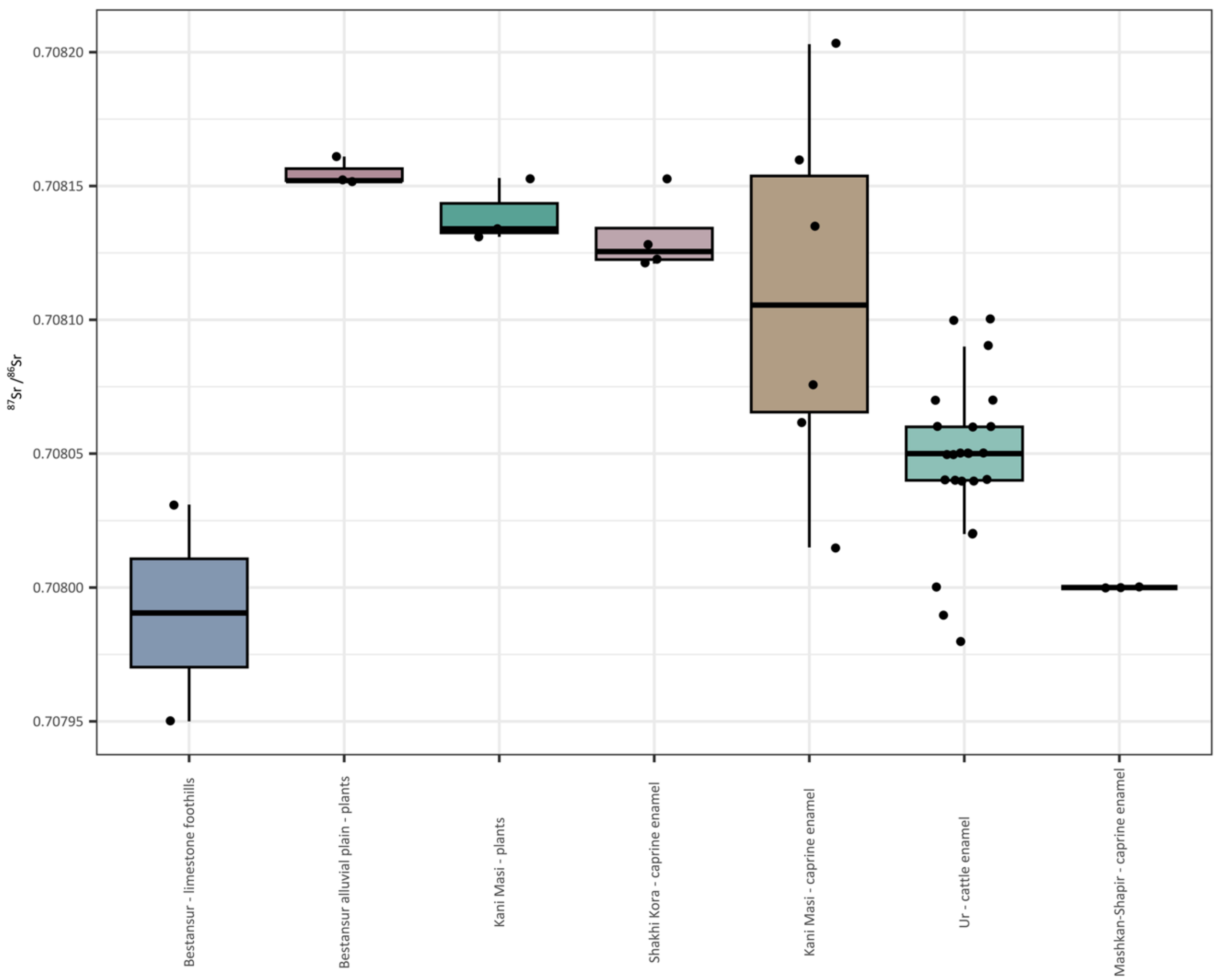

Figure 8.13 Strontium isotope ($^{87}Sr/^{86}Sr$) results from Shakhi Kora and Kani Masi caprine tooth enamel (Appendix VII.3) compared to published regional values of modern plants (Elliott *et al.* 2015), cattle tooth enamel from Ur (Greenfield *et al*. 2022), and caprine tooth enamel from Maskhan-Shapir (Kenoyer *et al.* 2013).

For the two LB Kani Masi specimens, tooth enamel $\delta^{13}C$ values range from -10.7 to -5.1 ‰ (Appendix VII.3). The Kani Masi sheep M_3 (116) and sheep M_3 (56) produced ranges of 5.6 ‰ and 4.8 ‰ respectively. In addition to this, given the expected off-set of 14.1 ± 0.5 ‰ between tooth enamel and dietary intake,[47] we would expect an estimated $\delta^{13}C$ dietary range between -24.8 and -19.2 ‰. This suggests that a very high proportion of the caprine diet was made up of C_3 plants. Together, the higher intra-

47 Cerling and Harris (1999).

tooth ranges and higher maximum $\delta^{13}C$ values indicate a higher proportion of C_4 plants in the diet than seen at Shakhi Kora. The identified increases occur at around the same season in both teeth, towards the base of the M_3 crown – equating to the summer/autumn of the second year of life (Figure 8.12). This increase may be linked to the site being situated in a dry-steppic vegetational zone,[48] characterised by hot and dry summers, the ideal environment for C_4 plants.

Based upon the sequential tooth enamel $\delta^{18}O$ and $\delta^{13}C$ values, it can be suggested that the dung fuel, which was found in flotation samples especially in Area II (see Section 8.2.1.2 above) and that contained millet grains, was produced in a restricted season – in the warmer months of the summer or earlier autumn – when C_4 grasses were accessible to the caprine herds.

Together, this paints a picture in which the caprine bone collagen data, reflecting multi-year averaging of diet, represents a predominantly C_3 diet, with some consumption of C_4 plants in the hot season captured in the sequential enamel data and the dung deposits from Area II. This can tentatively begin to populate our understanding of seasonal-spatial scheduling of animal husbandry practices in the Kani Masi landscape. Animal and plant husbandry are often intimately connected, but also in tension – animals can be used to fertilise fallow fields, but can also damage and consume developing crops.[49]

The strontium isotope data also suggests the movement of animals around the wider landscape. The lower M_3 of sheep 56 produced a relatively short sequence as it is from an older tooth, however the M_3 of sheep 116 produced a longer sequence and in this one there is no similar peak of $\delta^{13}C$ values in the preceding autumn, perhaps suggesting a different husbandry regime in that season (Figure 8.12, middle panel). Interestingly, the first Sr value from this individual is also clearly non-local compared to the two later values that are consistent with local values (Figure 8.12, bottom panel; compare to Figure 8.13), perhaps indicating a movement to the site from elsewhere during the period of formation of the tooth. These analyses are derived solely from two sheep teeth, and considering the possible differences in management regimes indicated in the goat and sheep collagen results, further work is needed on goat samples to explore seasonal management practices for them.

Figure 8.13 compares the strontium isotope values from the Kani Masi sheep teeth with the limited published bioavailable strontium values from modern plant and archaeological tooth enamel samples in a broad transect of eastern and southern Iraq (this figure includes two samples from another tooth – a sheep M_3 from Kani Masi, Z90/L4). Although it is difficult to define precise local Sr ranges and regional variability without more detailed mapping, as mentioned previously, the Kani Masi caprines indicate a wider sphere of connectivity and movement than that seen in the Shakhi Kora (SRP191) data – some samples show values consistent with locally pastured animals, while other samples show values far outside this range (from around 0.7080 to 0.7082). It is not possible to define the locations with confidence as multiple locations in Iraq have the same geologies and thus the same potential to generate the identified values,[50] but it is perhaps notable that the lower Tigris-Euphrates river system generates similar values as some of the samples identified from Kani Masi (Figure 8.13).

Lifetime movements of animals may encompass a range of practices, such as seasonal herding, gift giving, or trade.[51] It is difficult to assign specific interpretations to the movements identified, but they do indicate that LB Kani Masi was connected into a wider regional sphere of interactions visible in lifetime animal movements than has so far been identified at LC Shakhi Kora.

Pigs can be managed in a range of ways with varying degrees of human interference.[52] Low intensity management practices, such as free-ranging or urban scavenging models mean the animals consume a wide array of food. This contrasts with more intensive management practices where the animals' diet is controlled by the farmer. Pigs are omnivorous, meaning they can consume a more varied diet than caprines, including animal matter which would be expected to result in higher $\delta^{15}N$ values. Our dataset is small and interpretations should be made cautiously. Although the pig $\delta^{15}N$ values are comparable with the upper part of the sheep/goat (herbivore) range (Figure 8.12), the Kani Masi pig average $\delta^{15}N$ value (7.2 ± 0.8 ‰) is higher than that seen in the sheep and goats (5.5 ± 1.4 ‰). For comparison, in a larger dataset from Chalcolithic Marj Rabba, Price *et al.* interpret 1.2 ‰ enrichment in pig $\delta^{15}N$ values compared to herbivores as indicating pigs accessed either ^{15}N-enriched plant foods or a higher proportion of animal protein.[53] In contrast, closer similarity between pig and caprine $\delta^{15}N$ values at Chalcolithic Çamlıbel Tarlası, north-central Anatolia, have been interpreted as the pigs there being free-roaming and foraging.[54] Free-roaming pig populations consume a broad range of food including animal protein, although they are predominantly herbivorous.[55]

48 Ghazanfar and McDaniel (2016, 13).
49 Elliott *et al.* (2015); Bendrey *et al.* (2016).

50 Greenfield *et al.* (2022).
51 Bendrey *et al.* (2017); Grossman and Paulette (2020).
52 Price (2016, 74).
53 Price *et al.* (2020).
54 Pickard *et al.* (2017).
55 Studnitz *et al.* (2007).

At LB Kani Masi, the average pig $\delta^{13}C$ values (-20.1 ± 0.4 ‰) are slightly more negative than the caprine values. The Kani Masi pig $\delta^{13}C$ values are comparable with archaeological pig values from Bakr Awa in the Shahrizor plain.[56] They are also consistent with what would be expected of C_3 plants local to Kani Masi that have $\delta^{13}C$ values comparable to published modern C_3 plants from the Qazvin plain, Iran,[57] allowing for the fossil fuel effect and enrichment between the diet and bone collagen of the animal as outlined above.[58] Depleted $\delta^{13}C$ values are also sometimes associated in animal bone collagen, with the depletion of plant $\delta^{13}C$ values in wooded environments known as the 'canopy effect'.[59] However, the degree of local woodland is currently unknown. Although it is unlikely to have been significant, it could have been more established around the Sirwan (see also Chapter 1.2). The average pig $\delta^{13}C$ values are consistent with a dietary focus on C_3 plants. Whether C_4 plants were a dietary avoidance of free-roaming pigs or human choice of fodder selection for more intensively managed animals, is difficult to judge from the data at hand.

The environmental context of Kani Masi adds another important dimension to the consideration of pig management at this site. Pigs are generally not suited to the hot and dry environmental conditions prevailing in the lower Sirwan region. In fact, without continuous access to water and shade, they perish quickly in temperatures exceeding 35°C. Indeed, Grigson demonstrated a direct correlation between annual precipitation and pig husbandry, showing that the occurrence of pigs is greatly reduced on archaeological sites outside of the dry-farming zone (c. 300 mm isohyet) for the fifth, fourth, and third millennia BCE.[60] River systems can offer suitable environments for pigs in Iraq,[61] and the Sirwan could offer a source of water and also potentially shade from associated vegetation. However, considering the significance of pigs in the zooarchaeological assemblage, it is also a possibility that Kani Masi's position on the dry-farming limit might have meant pigs would have been kept more intensively within a human niche, where water, food, and shade was either provided to them, or readily available. In this scenario, animals would have been raised in close confinement such as a backyard or pigsty and fed with a range of foods, perhaps including household food waste or agricultural by-products. There is evidence in late third millennium BCE texts for grain-fed pigs, in part with spent brewing grain,[62] although without local cereal $\delta^{13}C$ values it is not currently possible to assess this.

These results lead to two potential interpretations: 1) the pigs were managed as free-roaming animals; 2) they were managed more intensively in confined spaces. Compared to the Kani Masi caprines, the higher average pig $\delta^{15}N$ values at Kani Masi may be associated with sty-fed animals consuming household leftovers (including animal protein) or free-roaming pigs feeding on household waste in midden areas or other accessible animal matter (e.g. insects or carrion).[63] The average pig $\delta^{13}C$ values are consistent with a dietary focus on C_3 plants. If the pigs were eating human food waste, which could be expected with sty-fed animals and to some degree in urban scavengers,[64] the animals might be expected to plot closer to the human sample (Figure 8.14). Although the human value represents a subadult individual, with an age-at-death estimated to approximately 4-5 ± 1 years, subadults are often lower than adults from the same population even after total breastfeeding has ceased.[65]

8.3.3.2 Human diet and mobility

We sampled three individuals for carbon and nitrogen isotope analysis with only one individual yielding collagen sufficiently well preserved to meet the criteria described above with carbon isotope value averages of -18.3‰ and nitrogen isotope values of 8.4‰. This individual, Burial AI.1 (Z88/L16), a subadult with an age-at-death estimated to approximately 4-5 ± 1 years (for more information on burials and human remains, see Chapter 9.2 and Appendix VIII.4), is difficult to interpret as evidence of human diet at the site since at this life stage bone turnover is much faster than in adults, and as such represents a much shorter period of time. Without younger individuals we cannot establish whether a breastfeeding signal is still present, and without older individuals we cannot say whether this individual had a diet typical of the population. As mentioned above, subadult individuals often exhibit different carbon and nitrogen isotope values to adults. These include physiological effects and the possibility that some communities fed their children different meals (for instance with a narrower range of foods, or incorporating different foodstuffs) compared to adults.[66] We can say that the plant base of the subadult diet was likely C_3-focused, but how important sheep, goat, and pigs were to the diet is difficult to estimate accurately at this time. Comparison with other sites is difficult as there is very little comparative data from Southwest Asia for this period. Tepe Hissar III offers the closest comparable data.[67] The adults at Tepe Hissar III have carbon isotope value averages of -19.4‰

56 Fetner (2016).
57 Bocherens *et al.* (2000b, Table 1).
58 Freyer and Belacy (1983); Ambrose and Norr (1993).
59 Bonafini *et al.* (2013).
60 Grigson (2007).
61 Bendrey *et al.* (2020).
62 Lion and Michel (2006); Owen (2006) cf. Price *et al.* (2020).
63 See also Studnitz *et al.* (2007); Price *et al.* (2020).
64 Price (2016, 74).
65 Pearson (2018).
66 Ibid.
67 Afshar *et al.* (2019).

Burial	Sample	Tooth region	Age estimate	$\delta^{13}C_{carbonate}$ (vPDB) ‰	$\delta^{18}O_{carbonate}$ (vSMOW) ‰	$\delta^{18}O_{phosphate}$ (vSMOW) ‰	Sr
AIII.1	JP1a	coronal	3-4 years	-8.87	27.8	19.0	0.70809
	JP1b	middle	4-5 years	-8.42	27.2	18.4	0.70810
	JP1c	cervical	5-6 years	-7.39	28.2	19.4	0.70808
AI.4	JP2a	coronal	3-4 years	-10.60	26.2	17.4	0.70811
	JP2b	middle	4-5 years	-9.97	28.1	19.3	0.70811
	JP2c	cervical	5-6 years	-7.41	29.0	20.2	0.70817

Table 8.3 Strontium, oxygen, and carbon isotope analysis of tooth enamel from permanent M2 teeth of two subadults and approximate age stages these represent. Age estimates for enamel follows Massler and Schour (1946). Samples were measured on the vPDB scale and converted to the vSMOW scale using Coplen (1988) and then to phosphate values using the formula reported in Chenery *et al.* (2012).

and nitrogen isotope values of 12.2‰, which are quite different to the LB Kani Masi subadult, although this is difficult to explain as there are no Tepe Hissar III animals or subadults to compare with in order to rule out possible differences either due to management practices, local environment, or different diet/physiological impact on the subadult. Future work is needed to measure more animals and humans from this area and period.

For strontium, oxygen, and carbon isotope analysis from human dental enamel samples were taken from adult M2 teeth of two additional individuals, a subadult with an age-at-death estimate of 5 ± 1 years (Burial AIII.1), and a likely slightly older subadult with an age-at-death estimate of 5-8 ± 2 years (Burial AI.4). Both molars were subsampled to provide values for the coronal, middle, and cervical region on each tooth (Table 8.3).

The samples represent different lifestages of the subadults from which they were taken. We chose M2 so as to avoid input from breastfeeding, as these would represent the values of their caregiver instead. Figure 8.14 shows the two subadults' average strontium isotope values plotted against the earlier Figure 8.13.

For the strontium isotope values, there is clear overlap between the subadult values and the Kani Masi caprines to a greater extent than the plants, although these data could also be consistent with visiting the limestone and alluvial zones since the Kani Masi individuals seem to fall between the values for limestone and alluvial zones in the Shahrizor plain near Bestansur. It should be noted that this likely provides a proxy for adult behaviour since it is unlikely young children were travelling alone, although some engagement with activities associated with this mobility is possible.

For the oxygen isotope values, it is unlikely these values represent seasonal mobility or movement because permanent M2 teeth are relatively slow-forming compared to deciduous teeth and even our subsampling likely represents a full year each.[68] The equations presented in Table 8.4 were used to calculate the expected values for humans occupying the region.

Comparing the expected and measured phosphate oxygen isotope values for the two subadults, the Kani Masi values range from 17.4‰ to 20.2‰ falling within the range for waters measured from the Hawasan and Sirwan rivers except for the cervical measurement of the slightly older child from Burial AI.4. This value does fall within the range of southern and eastern Iraq.[69] While this may signal limited mobility in childhood, we also do not have a full range of measurements for our study area.

For the carbon isotope values, since the values likely represent around 12 months of the diet, it provides evidence of differences in food from year to year through a part of their childhood. The diet-to-tissue offset in enamel in humans used here is 11.5 ± 0.5 ‰,[70] equating to a dietary range of -22.1 to -18.9 ‰ depending on the period of enamel formation. This suggests limited C_4 plant consumption. The variation in values over time might point to consumption directly or indirectly (i.e. through animals) of C_4 plants in some years, or eating (or animals eating) plants with different types of C_3 plants with varied values for parts of their life, but not consistently. In both cases however the C_4 plant component gradually increases through the childhood of both individuals. Without adults it is difficult to say accurately if this represents a childhood dietary transition to an increasingly adult diet, or a change in crop, or other types of plant or indeed animal, exploitation at the site.

Burial AIII.1 shortly postdates the construction of the earliest structure in Area III, which is dated to 1505-1418 cal. BCE, and a charcoal sample from the soil surrounding Burial AI.4 produced a date range of 1433-1288 cal. BCE (for

68 Massler and Schour (1946).
69 See discussion in Greenfield *et al.* (2022).
70 Passey *et al.* (2005); Malone *et al.* (2021).

Reference	Equation	Hawasan (22/08/18) -4.72‰	Sirwan (07/05/19) -5.85‰	Ur range (Greenfield *et al.* 2022) -6 to -1‰
Luz *et al.* (1984)	y= 0.752x + 22.00	18.5	17.6	17.5-21.2
Longinelli *et al.* (1984)	y= 0.633x + 22.29	19.3	18.6	18.5-21.7
Levinson *et al.* (1987)	y= 0.470x + 19.23	17.0	16.5	16.4-18.8
Daux *et al.* (2008)	y= 0.501x + 20.71	18.3	17.8	17.7-20.2
Pollard *et al.* (2011) - Superset	y= 0.531x + 20.52	18.0	17.4	17.3-20.0

Table 8.4 Expected phosphate oxygen isotope values for Kani Masi humans calculated from local meteoric waters collected in the 2018 and 2019 field seasons (each location represents an average of four replicates) together with values discussed in Greenfield *et al.* (2022) from Ur using different formulae published in Pollard *et al.* (2011).

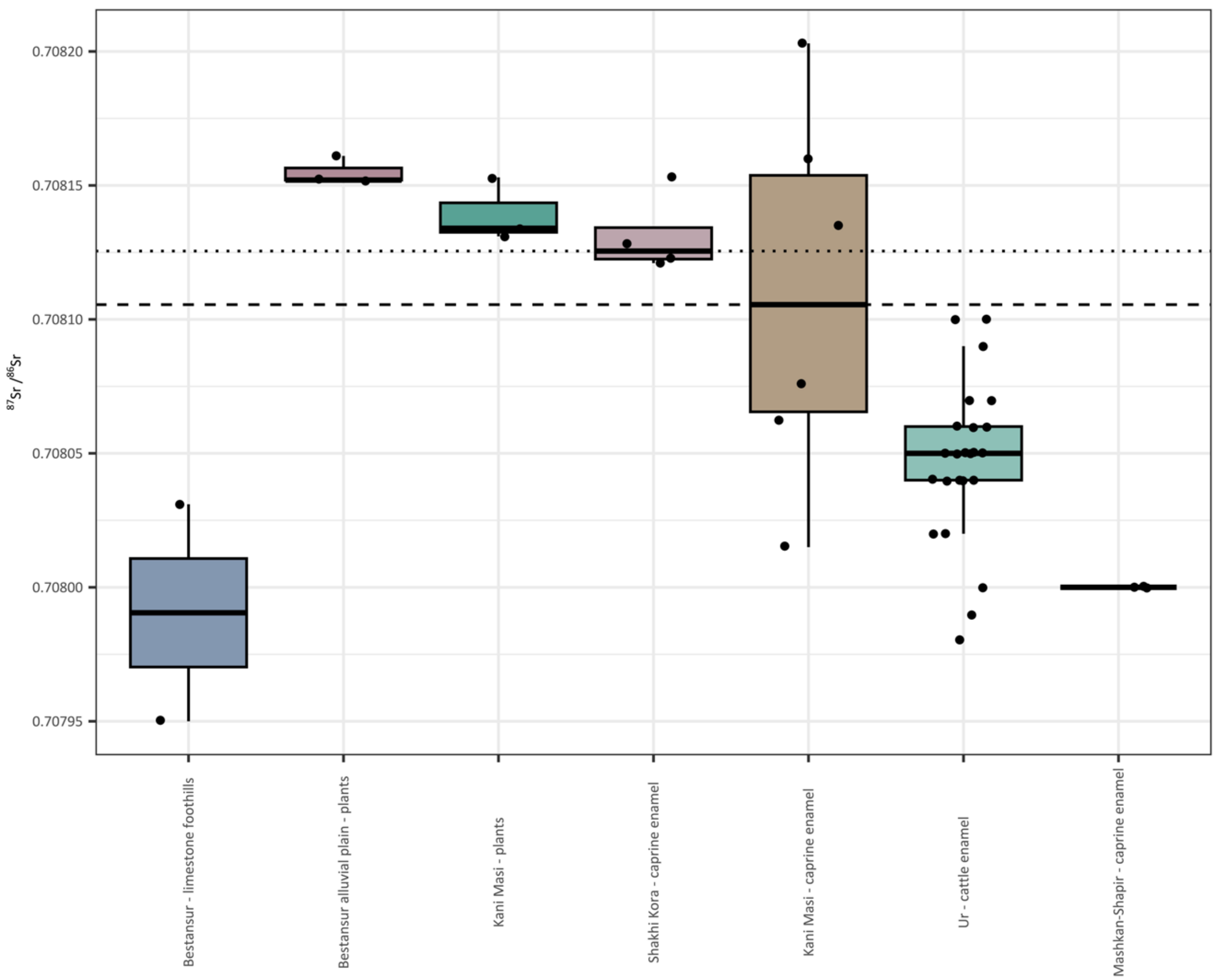

Figure 8.14 Burial AIII.1 plotted as the dotted line and Burial AI.4 plotted as the dashed line.

details, see Chapter 6.2.1). Given the likely chronological difference between the two burials, the gradual increase in the consumption of C_4 plants indicated over the course of both individuals' childhoods would thus seem more likely the result of a transition to an adult diet rather than a shift in the local subsistence economy.

8.4. Subsistence, food practices, and human-animal relations

It is clear from the data presented above that the inhabitants of Kani Masi practiced a tightly integrated agropastoral economy. This included a range of different husbandry practices, each of which presents a distinctive way of engaging with animals on the one hand, and with the landscapes surrounding the site, including agricultural spaces and their products, on the other. Ceramic and faunal material, supplemented by botanical data, ground stone industries, and the results of organic residue analyses, which we discuss below, moreover, provide us with insights into local food habits and their potential social dimensions. Each of the practices outlined below presents an articulation of distinctive cultural traditions that involved specific practical and metaphysical knowledge and skills. Together with records of local practice in other spheres of life at the site, they allow us to broadly sketch out the identities of Kani Masi's inhabitants as they would have emerged from participation in local and larger-scale communities of practice.

8.4.1 Husbandry practices

The overall composition of animals within the Kani Masi assemblage aligns broadly with its regional contemporaries. Caprines are always the dominant group, with cattle and pigs playing a considerable, but variable role in the economy. Strong similarities are also present in the sizes of the animals. Most elements for both sheep and goat plot closely to other second and third millennium BCE sites, all of which indicate that the caprines are smaller than their wild counterparts. At closer inspection, however, some unique characteristics also emerge.

Most apparent is the ratio of sheep and goat at the site (c. 19:13), which presents a significant departure from most studied sites of this period (Table 8.5). According to Bronze Age texts, sheep always took preference, as they were favoured for their wool in addition to milk and meat.[71] Postgate's analysis of Old Babylonian flock compositions, as recorded in herding contracts, showed that sheep and goats were often herded together, but the former was always in the majority, often by a vast margin.[72] These flock compositions appear to be reflected in zooarchaeological assemblages contemporary to LB Kani Masi at Nippur and at the ritual site of Tell Sakhariya, where sheep greatly outnumber goat. There is also an overwhelming preference (c. 99%) for the use of sheep in contexts of ritual sacrifice demonstrated in the archaeologically unprovenanced Sealand period archive of the Schøyen collection, which dates to the mid-sixteenth century BCE.[73] These ritual sacrifices were all associated in some way with what has been characterised as a palatial complex.[74]

The slightly higher representation of goat at LB Kani Masi could be related to a number of factors. Goats are well adapted to harsh environments and often are relatively well represented in relation to sheep in contexts of greater aridity.[75] In such environments, they are well adapted to utilising what is often considered as marginal vegetative resources compared to other livestock.[76] Goats can also provide relatively good yields of milk for small, village-scale systems.[77] As a regional comparison, there is a slightly higher preference for goats than sheep at second millennium BCE Kurd Qaburstan.[78] Schwartz *et al.* suggest that the Erbil plain at this time was experiencing relatively wet conditions, and so this is not a result of aridity; rather they see it as a cultural preference, perhaps for goat-hair production.

The mortality profile of caprines at Kani Masi, however, suggests that meat production was the primary goal of livestock management, with dairy and wool production seemingly playing a very minor role in the local caprine economy. The latter appears to be confirmed by the scarcity of textile tools, such as spindle whorls and loom weights across exposed contexts, while the presence of a flax seed from Area III could point to plant-based fibre or linseed oil production.

Both collagen and sequential tooth enamel stable isotope values from Kani Masi caprines suggest that they grazed, or were foddered on, a predominantly C_3 plant diet, with C_4 plants making up a surprisingly minor component of animal diets given the likely ubiquity of such plants in the surrounding landscape. This is especially the case during the summer months when much of the sampled dung fuel from Area II would have been produced.[79] Strontium and oxygen isotope results suggest mainly local mobility for caprine herds, with some sheep showing signs of more distant origins, possibly in south-eastern Iraq. As is evident from other material indicators at the site, not least the ceramic record (see Chapter 7.6) and several sealings (see Chapter 10), Kani Masi's LB inhabitants entertained close relationships with lowland Mesopotamia. It is not surprising to find that some trade, exchange, or gifting of livestock occurred over medium-to-long distances.

There is nothing in the faunal and isotopic data that unambiguously points to a mobile pastoral element in

71 Sallaberger (2014).
72 Postgate (1975).
73 Dalley (2009).
74 Ibid., 264; Twiss (2017).
75 Silanikove (2000).
76 Daskiran *et al.* (2018).
77 Dubeuf (2005).
78 Schwartz *et al.* (2017).
79 Portillo and Matthews (2020).

Period	Site	Sheep (NISP)	Goat (NISP)	Ratio of sheep to goats
Second millennium	Kani Masi (SRP 046)	76	60	19:13
	Nippur	65	11	6:1
	Tell Sakhariya	80	2	40:1
	Kurd Qaburstan	6	18	1:3
Third millennium	Kani Masi (SRP 094)	5	1	5:1
	Razuk (round building)	154	36	3:1
	Lagash	43	25	9:5
	Sakheri Segir	4	1	4:1
	Tell Arbid	28	50	3:5
Fourth millennium	Shakhi Kora (SRP 191)	9	13	3:4
	Farukhabad	51	72	5:7
Neolithic	Jarmo	277	553	1:2
	Bestansur	55	24	11:5
	Çatalhöyük	1180	736	5:3
Tenth millennium	Karim Shahir	28	3	9:1

Table 8.5 The number and ratio of individual sheep and goat specimens identified in temporally and geographically relevant sites (Boessneck 1978; Wright 1981; Mudar 1982; Stampfli 1983; Gibson 1990b; Russell and Martin 2005; Piątkowska-Małecka and Smogorzewska 2010; Twiss 2017; Schwartz *et al.* 2017; Bendrey *et al.* 2020).

Kani Masi's society of the sort often assumed for Kassite groups on the basis of textual data.[80] What our data shows is that Kani Masi caprine flocks and their human guardians may have roamed over a larger region than their LC counterparts at Shakhi Kora (SRP191) (see Chapter 3.2.8.2), or they may have been bred elsewhere and transported to Kani Masi at a later point. This region, however, was still largely confined to the Sirwan valley and its tributaries. As regards the presence of caprines on site, a perinatal metapodial from Area III suggests that nannies and ewes were present at the site during lambing season, which would fall around February-March.

The management of cattle often contrasts with that of sheep and goats. Their water and pasture preference require that they are kept within prime areas for agricultural production.[81] Cattle were one of the most important animals in the Bronze Age. As a source of milk, meat, and traction, cattle have been characterised as "the engines of Bronze Age agricultural systems".[82] Richardson notes that the phrase: "The household is well, and the cattle are well" is a common theme in Old Babylonian letters.[83]

Cattle's high status within the Babylonian cultural sphere appears to be reflected in their use as a food source. In Sealand texts,[84] there is a clear contrast between the use of cattle and that of caprines. While cattle constitute approximately 20% of the animals mentioned in the entire archive, in those texts that describe deliveries to the palace kitchens, cattle constitute 90% of the animals mentioned and caprines just 10%.[85] It is unclear whether this disparity in animal taxa presents geographical and cultural variation, or whether the difference is social, with the palatial context of the Schøyen tablets skewing the types of foods being processed in its associated kitchens.

The LB Kani Masi data shows a strong correlation between increasing age and mortality (Table VI.39), with 42% of animals living past the 3-4 years age group. The lack of older cattle and work-related pathologies does not seem indicative of large-scale labour exploitation; rather the animals were likely kept for their meat and milk.

A third husbandry tradition concerns the site's sizeable pig population. The general environment of Kani Masi, as we have discussed above, is not well suited for pig husbandry. As a result, the pigs at Kani Masi may have had to be heavily managed, either as a sty-fed urban population, or herded in the site's vicinity. Stable isotope values obtained from Kani Masi pig remains suggest a diet partially comparable to caprines, while nitrogen values are higher on average. The latter means that pigs either accessed plants with higher nitrogen content or animal

80 For a summary of the relevant textual sources, see e.g. van Koppen (2017).
81 Kozuh (2021, 139).
82 Arbuckle (2015, 290).
83 Richardson (2021, 44).
84 Dalley (2009).
85 Twiss (2017, 264, Fig. 5).

protein – most likely from human food refuse – while otherwise subsisting on a predominantly C_3 plant diet.

Pigs do not take well to longer-distance mobility or transhumance, especially not in the prevailing climatic conditions in the region. Pig husbandry, therefore, is a hallmark of sedentary communities. Given the marked frequency of pigs in the Kani Masi assemblage, we may conclude that pig rearing and pork consumption were culturally important, and deeply embedded practices.

The range of represented body parts for all main domesticated species suggests that livestock was culled on-site, with wild species such as gazelle and deer culled elsewhere and only part of the animals brought to the site. Compared to most other excavated LB centres, the inhabitants of Kani Masi had access to nearby mountain regions and a diverse range of wild species from these habitats.[86] Gazelle, for instance, make up nearly 3% of the animal population at Kani Masi, compared to only 1% at Nippur,[87] less than 1% at Tell Sakhariya,[88] and a negligible amount from the LB contexts at Kurd Qabustan.[89] Kani Masi also produced a wider variety of wild animals than any of the other sites, including several species of deer.

8.4.2 Culinary practices

The combined and contextual analysis of ceramic vessels, ground stone industries, faunal, and botanical data from Kani Masi also allow us to characterise the culinary preferences and practices of Kani Masi's LB inhabitants, and to pinpoint notable idiosyncrasies that may point towards local cultural or social differences.

8.4.2.1 Cereal-based foods

As discussed above, the primary food plants present at Kani Masi are cereals such as hulled barley, emmer, einkorn, and free-threshing wheats, as well as millet, which were consumed alongside lentils and bitter vetch or grass pea, and fruit such as fig. In line with food traditions in wider Mesopotamia, cereal-based foods, thus, can be expected to have contributed a significant proportion of the Kani Masi diet. Direct evidence is available at the site for beer brewing activities, while more indirect indicators point to bread-making as a central culinary practice.

Interesting to note is the absence of large-scale cereal storage facilities in any of the excavated areas and very limited finds of larger jars, such as open-mouthed pithoi with large ring bases (Family I), that could have served medium-term storage needs. Such vessels are found dispersed throughout different phases and areas, but become more common from Phase 1d onwards. Perhaps this is indicative of these vessels being less disposable and having lived longer use-lives than tablewares. Also nearly absent are cylindrical beakers (Family G), often referred to as 'grain measures', suggesting that accurate measurements that may be of interest to tax collectors, for instance, and that are attested in greater numbers at broadly contemporary sites in the Hamrin, southern Mesopotamia, and the Syrian Jezirah, were not especially important to the community at Kani Masi.

8.4.2.1.1 Brewing

Beer is frequently mentioned in both administrative and ritual cuneiform texts and its consumption is portrayed on a range of media such as seals and ceramic plaques. The beverage suffused all aspects of life in Mesopotamia and surrounding regions both as a nutritious dietary staple[90] and an essential component of cult festivals and feasting events.[91] Beer is well attested in a range of cuneiform genres from the fourth millennium BCE onwards. Mid-third millennium BCE administrative records from the Mesopotamian city of al-Hiba-Lagash mention a variety of beers including golden beer, sweet dark beer and red beer, alongside differences in beer quality.[92] Beer also appears in many texts relating to religion and medicine.[93] A hymn dedicated to Ninkasi (c. 1800 BCE), the Babylonian goddess of beer and brewing,[94] includes rare instructions for beer brewing involving the use of BAPPIR or 'beer-bread'. Lexical and administrative texts also frequently mention beer, while archaeological identifications of beer brewing are limited. They include an ED III building at Lagash, which produced an assemblage consisting of vats with perforated bases, hearths and ovens. Also found was an administrative text listing quantities of beer, as well as mentioning the terms BAPPIR and brewery (É-LUNGA).[95] An early-fifteenth century BCE building at Tell Hadidi on the Syrian Euphrates was furnished with storage vessels, cups and jars alongside carbonised grains, grinding stones, a strainer and vessels with perforated bases.[96] The latter vessels, which are brewing vats, are referred to as DUGNÍG.DÚR.BÙR or *namzītu* in cuneiform sources.[97]

Evidence for beer brewing in the form of *namzītu* vats can be found throughout the Kani Masi sequence and in several of the excavation areas, but especially in Area I, Phase 1c (see Section 8.2.1.1 above). This suggests rather substantial brewing activities taking place in the context of the large building of Area I, whose architecture,

86 Hatt (1959).
87 Boessneck (1978).
88 Twiss (2017).
89 Schwartz *et al.* (2017).

90 O'Connor (2015).
91 Sallaberger (2015); Otto (2012).
92 Michel (2012).
93 Scurlock (2014).
94 Jennings *et al.* (2005).
95 Hansen (1980-1983).
96 Dornemann (1977; 1981).
97 Gates (1988).

associated finds, and elaborate closing ceremony (see Chapter 9.3.2) indicates a public building. As discussed above, this differs from broadly contemporary sites, where brewing took place in private households or in discrete rooms of larger structures.

The extensive production and consumption of beer in Area I is corroborated by the results of organic residue analysis (ORA). ORA was performed on a collection of drinking vessels from the sealed Phase 1c deposit in Room 1 and from ritual offerings and a brewing vat deposited amidst the ruins of Room 1 (Phase 3) (for a detailed discussion of these contexts, see Chapter 9.3.2 and 9.4.1). Analytical results show a co-occurrence of ten chemical compounds that together point to the presence of beer in these vessels.[98]

8.4.2.1.2 Breads and baked foods

Bread was the other quintessential Mesopotamian food, whose symbolism was as significant as that of beer. In the Epic of Gilgamesh, for instance, the ingestion of beer and bread marks the transition of Enkidu from a wild creature of the steppe and forest to a fully realised, socialised – and therefore, in the eyes of Mesopotamian urban dwellers, civilised human being.[99] While there is no direct evidence as yet for the baking of bread and other flour-based foods at Kani Masi, it is safe to assume that such meals would have been produced and consumed in likely large quantities.

Indirect evidence for this includes charred cereal remains commonly used for bread-making (see Section 8.3.1 above), the presence of grinding slabs and handstones made from local limestones and conglomerates suitable for flour production (Appendix V.3), and a scatter of tannur ovens suitable for making flatbreads across the main excavation areas (see Chapter 6).[100] Mesopotamian texts attest to a wide variety of breads, including leavened breads, which were baked in domed ovens. No domed ovens, however, were uncovered at Kani Masi, suggesting a likely preference for unleavened breads, or, alternatively, leavened bread production elsewhere on the site, perhaps in the northwest, where numerous dipolar anomalies indicate the presence of further pyrotechnological installations.

8.4.2.2 Meat-based foods

Bottéro *et al.* challenge the tendency of Assyriologists to envision the lower echelons of Babylonian society as “doomed to daily and everlasting porridges”.[101] This impression is drawn largely from the frequency of administrative texts which track the distribution of cereals to labourers of the state. But this fairly monotonous diet only seems to have been the fate of the extremely poor.[102] Most of the population would have supplemented these basic staples with a range of other foodstuffs not necessarily mentioned in the texts. Thus, Bottéro *et al.*, while suggesting the presence of a Mesopotamian *haute cuisine* that was restricted to the upper classes and produced by professional cooks, also believe that the average Babylonian would also have had access to varied foodstuffs.[103] This is certainly borne out by the faunal and ceramic evidence from Kani Masi. The limited number of measuring vessels at Kani Masi, which speak to a limited concern with grain redistribution, and the close contextual association of cooking pots with faunal assemblages subjected to grease and marrow extraction, do not point to a population fed on porridge alone, but rather a diet relatively replete with animal protein, although cereal-based products such as oats or semolina alongside flatbreads would no doubt have formed part of regular meals.

8.4.2.2.1 Stews and broths

The mortality curve of both caprines and pigs show that the animals were primarily butchered at a young age, at a point when the meat is at its most tender. Cattle too were mainly kept for their meat and milk. The Yale Culinary Tablets include a variety of ways in which one might prepare animal products, and 33 of the 35 recipes include a form of animal protein.[104] The most common recipes are broth-based, which include, amongst others, lamb broth, kid broth, ram broth, as well as venison broth, and gazelle broth, each of which show solid evidence for being processed for food at Kani Masi.

These stews would have been prepared by cooking water with added animal fat in a ceramic cooking vessel, as exemplified in recipe 11, which states:

> *Dodder (?) broth.* (Fresh) meat is not used, but rather “salted.” Prepare water; add fat, some crushed dodder (?), onion, *samidu*, coriander (?), cumin (?), leek, and garlic. When the pot has barely sat on the stove, carve and serve.[105]

Reynolds argues that the prevalence of meat “indicates that these recipes concerned the elite rather than ordinary people”,[106] further stating that they are not indicative of everyday meals, but of meals prepared for religious

98 Perruchini *et al.* (2018).
99 George (2003).
100 Ellison (1978); Rova (2014c).
101 Bottéro *et al.* (2001, 67).
102 Ellison (1984, 63).
103 Bottéro *et al.* (2001, 68).
104 Bottéro (1995).
105 Ibid., 9.
106 Reynolds (2007, 174).

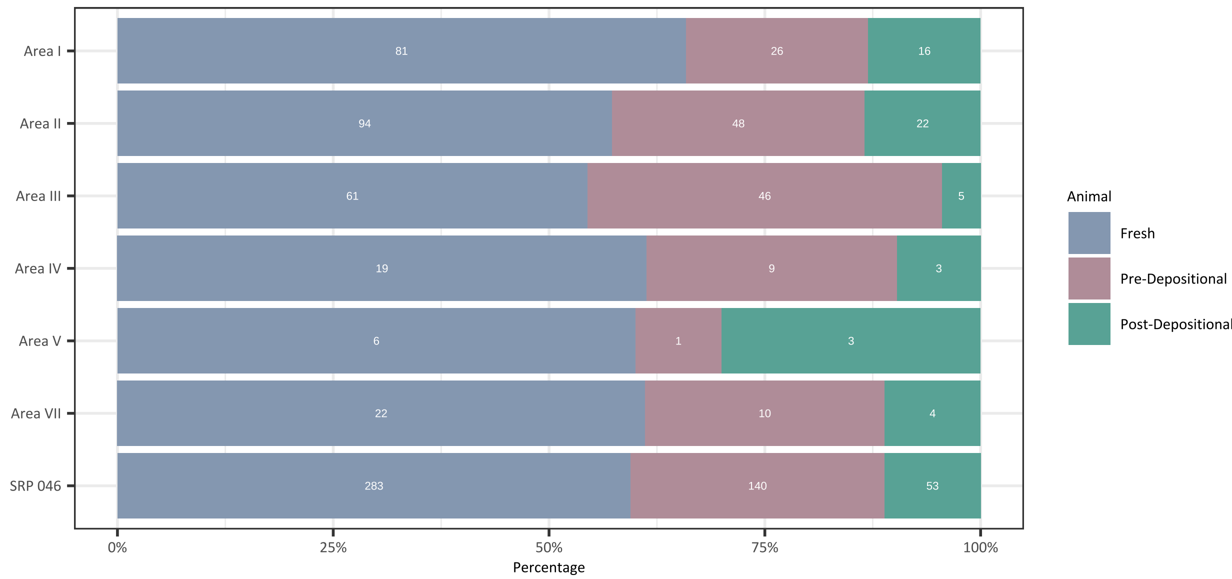

Figure 8.15 The relative proportions of types of breaks of individual specimens. Note that one specimen can display several types of breaks. Teeth and modern breaks are not included in this figure. 'SRP046' represents the overall site total.

ceremonies. This would map rather well onto the observed differences in food preparation between Areas I and II and Area III (see Section 8.2 above). The faunal material from Kani Masi, moreover, can be connected in many ways with various animal ingredients and cooking processes outlined in the Culinary Tablets.

A common way to obtain animal fat is through grease and marrow extraction, and this process is recognisable archaeologically. Taphonomic data from the zooarchaeological assemblage can provide a range of useful insights into food preparation and consumption, notably in terms of carcass processing (butchery and bone breaking) and cooking. The different types of bone breakage are evenly distributed across the site (Figure 8.15). Fresh breaks are by far the most common in all areas (n=285, 59%), they are often related to the initial breaking down of a carcass. Pre-depositional breaks are also very common (n=130, 29%); these may have been caused by further breakdown of bones for use in non-food activities, in toolmaking for instance. This type of breakage appears at a higher-than-average frequency in Area III (n=46). Alongside food production, this area is related to industrial activities (see Chapter 6.2.2). A bone needle, for instance, was discovered alongside other manufactured goods in Area VII, in close proximity to a large Kiln AVII.1. Post-depositional breaks are the least common (n=53, 11%); these are likely caused by trampling, soil pressure, or other taphonomic processes.

Marks left by butchery processes can be difficult to positively identify, especially among heavily fragmented assemblages. The high fragmentation within the Kani Masi assemblage therefore means it is no surprise that most specimens show no sign of butchery. Of the ones that do, marrow and grease extraction is by far the most frequent (n=248, 77%, Figure 8.16). This involves fracturing the bone in order to access the marrow, with these fragments subsequently boiled to extract grease. This process leaves more clearly identifiable characteristics. Area II produced the largest frequency of specimens used for marrow and grease extraction (n=95, 38.1%), further solidifying this area as a food production and refuse zone (see above).

Figure 8.17 shows the relative proportion of various butchery techniques evident on different taxa. For both sheep and goat, which consistently comprise c. 40-50% of the faunal assemblage across all excavation areas, grease and marrow extraction is by far the most common butchery technique, suggesting their bones were commonly broken down and used for broths. Cattle occurs at Kani Masi consistently at c. 10% across different excavation areas and show similar patterns of butchery. Equids, gazelles, and deer too show relatively frequent signs of marrow and grease extraction and, thus, appear to have been consumed in similar dishes, while also showing signs of skinning and hide-production.

Large holemouth vessels (Family K) with coarse-grained fabrics, typical for the cooking of stews, were found distributed across most areas of the site, in particular Areas I and II (see also Chapter 7.3.1.11). They are, however, noticeably absent in the Area III assemblage, where pigs dominate the faunal assemblage.

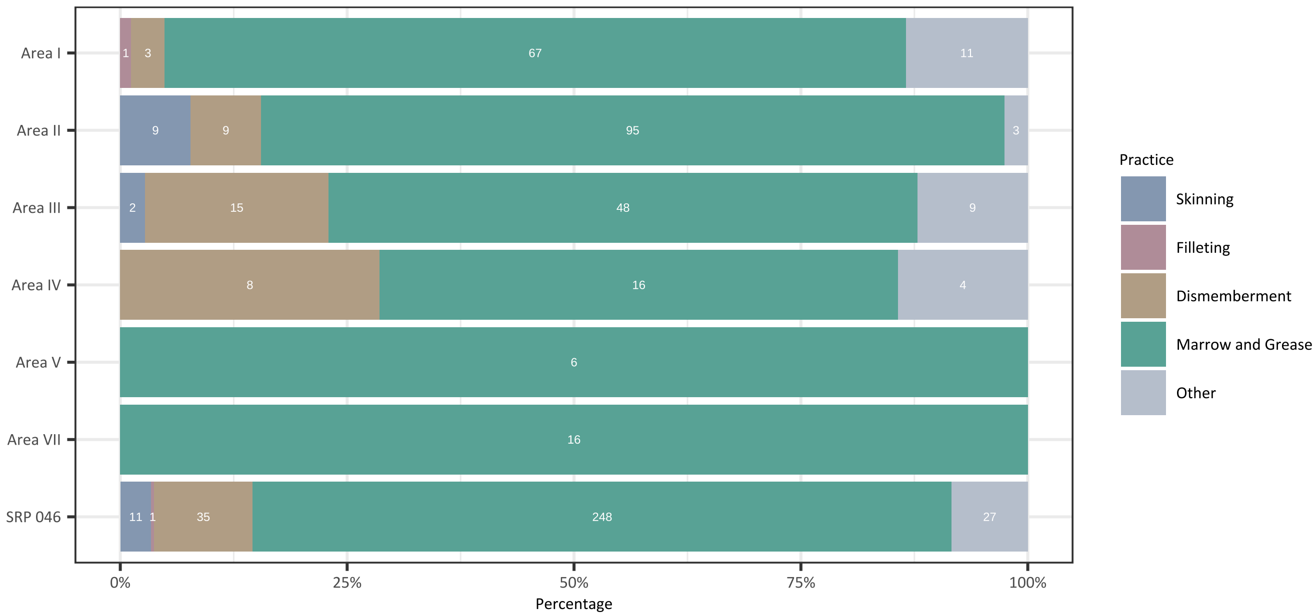

Figure 8.16 The relative proportion of types of butchery techniques on individual specimens. Note that one specimen can display several types of butchery techniques. 'SRP046' represents the overall site total.

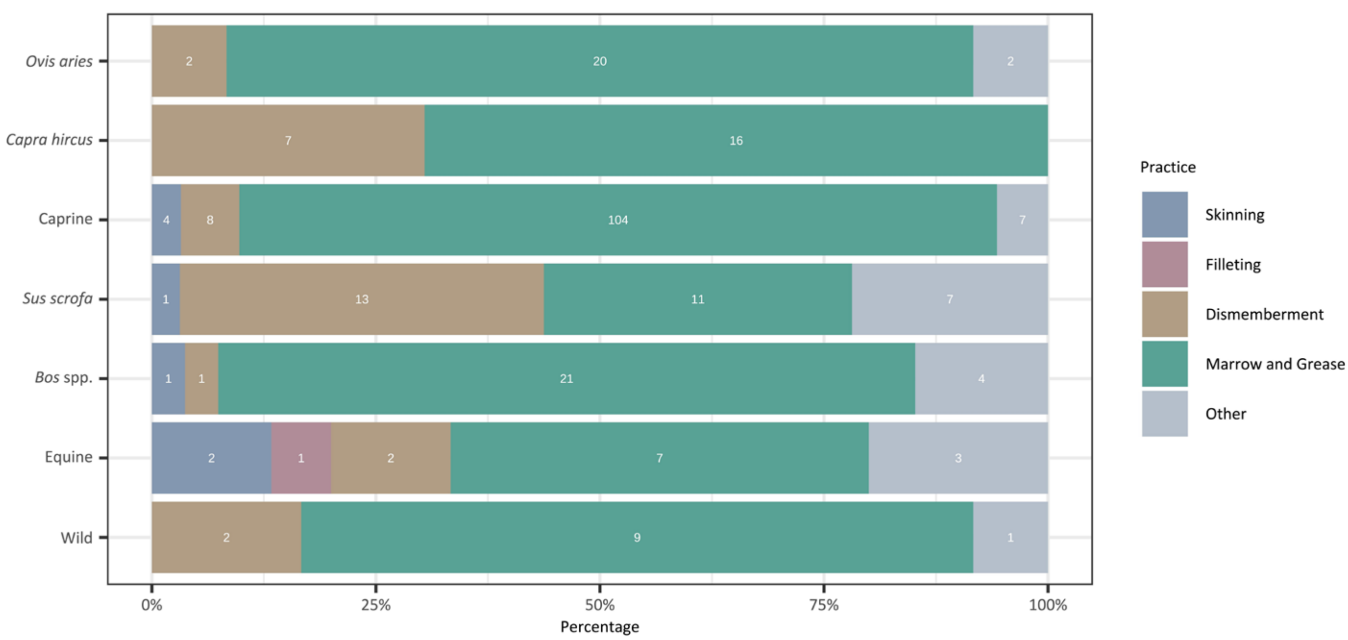

Figure 8.17 Relative proportions of butchering practices for each major taxon at Kani Masi (SRP046).

8.4.2.2.2 Other meat-based meals

Pig bones appear to have been used less frequently for marrow and grease extraction. Pigs also do not appear as ingredients in any of the Yale Culinary Tablet recipes. This is perhaps related to their comparatively low social value. Price also notes that they are discussed less and less frequently in texts towards the end of the Bronze Age.[107] Their common presence at Kani Masi suggests that, while pigs were consumed in significant quantities, they

107 Price (2020, 70, Fig. 5.1).

were rarely used for marrow extraction. The absence of hindlegs from the Area III assemblage, for instance, might point to the curing of meat and consumption elsewhere, while roasting might be the preferred cooking method for other dismembered parts; a form of cooking that Oven AVII.2 appears to have been able to perform, as would the open hearths scattered across the site, including in Area I. Birds, fish, and crab, which would have been available in the site's vicinity, as well as equids, gazelle and deer, could have been included in both broths and stews, as well as roasted.

In the Kani Masi assemblage, carbonised material is rare. In Area I, several of the samples with burnt material derive from depositions with likely ritual character (Z88/L29, L33 and L34). In Area II, which was used as a food production and midden area, samples with low levels of burnt remains are present throughout, while Area III, which contains several pyrotechnological installations, has a relatively low frequency of burnt bone. This suggests that whatever was being burnt in Area III, animal carcasses were not involved. In addition, few samples across the site contain calcined bone. In Area I, most calcined samples come from an ostensible ritual deposition (Y88/L20). In Area II, calcined material is also associated with a pottery-rich ashy deposit (Y82/L9) and the potential closing ritual of the Phase 1a occupation (Y82/L20 and L22).

8.4.2.3 Dairy-based foods

Meat production often focuses on culling animals as or before they reach their maximum size.[108] This was the preference for all domestic species at Kani Masi. Age data for the domestic livestock, though limited, also indicate they were kept for a range of other products. Animals retained into older age classes would have been exploited for secondary products such as milk. This is indicated indirectly in both the sheep/goat and cattle data suggesting dairy was part of multi-purpose husbandry strategies, although perhaps not a primary focus. The restricted role of dairying may be reflected in the absence of specialised vessel types at the site, including sieves for instance, and in broadly contemporary texts concerning the functions of ceramic vessels. It is therefore likely that non-ceramic containers were used for secondary products such as butter/ghee, yoghurt and cheese, or that some ceramic types fulfilled multiple functions.

8.5 Conclusions

In this chapter, we have taken a contextual, multi-proxy, and practice-centred approach in order to reconstruct the 'everyday histories'[109] of Kani Masi's LB inhabitants as they pertain to subsistence and foodways. This approach allowed us to identify four main activity areas associated with the preparation and disposal of food remains, which catered to ostensibly higher-status consumers and events in Area I during Phase 1, and appear to have nourished craftspeople and workers associated with the industrial complex in the north-western part of the site in Phase 2.

Significant beer brewing took place in multiple rooms of the Area I building, as shown by the distribution of *namzītu* vessels (Family J) across several rooms. Furthermore, the contextual associations of Area I storage vessels with drinking paraphernalia rather than with cooking pots suggests that many of the jars and pithoi in this area were used for beer production and storage. This is a pattern of some significance given that contemporary textual sources from southern Mesopotamia indicate that beer production fell under institutional control.[110] Mainly caprine-based stews, most likely prepared in Area II, and accompanied by flat breads or other cereal-based products, formed the basis of meals consumed in this building.

All of this differs drastically from the faunal remains, cooking techniques, and ceramic repertoire attested in Area III, where pig bones with few signs of grease and marrow extraction predominate, cooking pots for making stews are almost completely absent, and the ceramic repertoire points not only to distinct culinary techniques but also consumption practices. Area III pottery is generally more roughly produced and more irregular in shape than vessels recorded in Areas I and II. Vessels associated with individual consumption such as small bowls and cups are present in much lower frequencies in Area III, while an abundance of tall rough goblets suggests communal vessel use. A single *namzītu* base points to very limited beer production in Area III.

Although sources of animal protein as well as modes of food preparation and consumption differ in the two areas, the extensive and varied meat sources in the diets of the site's inhabitants might suggest a relatively shallow social hierarchy, at least as it pertains to access to foodstuffs. This hypothesis might be supported by the consistent presence of cattle throughout all major areas, an animal which is typically high status and rarely taken out of living circulation. Direct evidence for human nutrition in the form of collagen and dental stable isotope values is limited and confined to sub-adult individuals. These point to a predominantly C_3 plant-based diet, with limited and inconsistent C_4 plant consumption, while the importance of animal protein in the children's diet is difficult to estimate accurately at this time.

There are several strands of evidence that suggest that centralised, storable wealth and redistribution were of

108 Helmer *et al.* (2007).

109 Pollock (2015a).

110 Boivin (2018, 126-182); Calderbank (2021a, 36-41).

limited concern to Kani Masi's inhabitants. This includes the limited number of large and medium storage vessels, as well as discrete storage areas at the site, and an almost complete absence of measuring vessels. The limited evidence for wool and textile production, which much like cereal grains and livestock present storable forms of wealth in which Mesopotamian state institutions took great interest,[111] presents a further notable absence in this regard. Overall, the faunal and botanical assemblages at Kani Masi are broadly comparable to other sites in LB Mesopotamia, but goats are more numerous than elsewhere. This differs from other LB faunal assemblages and texts, where sheep as a major source of secondary products, especially wool, always take preference.[112] Textile production tools, such as spindle whorls and loom weights are limited across exposed contexts, while the presence of a flax seed from Area III could point to plant-based fibre or linseed oil production. The demographic profile of the Kani Masi caprines also suggests that meat production formed the focus of animal husbandry, with milk and wool being more minor products. This also fits well with the relative abundance of pigs at the site, which were reared for their meat, and whose frequency differs, for instance, from contemporary Nippur. At Nippur, a major dietary shift appears to have occurred between the Old Babylonian (MB) and Middle Babylonian (LB) periods with cattle, pig, and goat diminishing significantly in favour of sheep.[113] Such a change did not occur at Kani Masi; quite the opposite seems to have been the case.

None of this is to say that central administrative oversight was entirely lacking at Kani Masi, which several sealings with seal impressions attest to (see Chapter 10). However, the numbers of sealings too are surprisingly limited given the large areas exposed and the imposing character of the Area I building. Thus, we might see this as a further indication that a centralising authority may have had a comparatively limited overtly extractive presence in the everyday lives of Kani Masi's inhabitants.

Palaeoclimatic records suggest that the climate during the second half of the second millennium BCE was relatively arid, especially during the LB I-II (Phases 1-2), with wetter conditions prevailing in the LB III and into the Iron Age (Phases 3-4) (for more detail, see Chapter 11.5). Despite fluctuations in precipitation, however, there appears to be little difference in the economic regimes of the LB component of Kani Masi (SRP046) and at the neighbouring MB I site of SRP094 (see Chapter 5.3.1). Regional survey results also indicate that, while there is limited continuity in site occupation from the MB to the LB, the environmental conditions and affordances of site locations in the two periods are remarkably similar. LB communities, thus, were not changing settlement locales to adjust to new climatic conditions, but moved for other, most likely social or political, reasons (see Chapter 13). This suggests the existence of a relatively stable core range of agricultural practices, which took advantage of the different available environmental niches, and that were designed to buffer against the risks of one or more crops failing. This is supported by the wide range of crops and animals present at Kani Masi, including the presence of millet, a summer crop, in a context that may date as early as the mid-fifteenth century BCE.

This wide range of crops and animals, and the tight integration of agricultural and pastoral practices at Kani Masi, leave little room for the traditional *topos* of a pastoral-centred Kassite society or economy (see also Chapter 1.3), and supports earlier work that has more generally challenged undue analogies between modern pastoral Zagros lifeways and prehistoric and Bronze Age societies.[114] This is further underwritten by strontium and oxygen isotope results, which show that while Kani Masi's children may have visited upland regions, and one may have travelled further afield to or from southeast Iraq, mobility was mostly local in character. This also broadly maps onto some of the livestock mobility proxies discussed above.

Despite predominantly local mobility, and the apparent local idiosyncrasies in economic and food practice that this may have supported or given rise to, Kani Masi's inhabitants appear to have participated intensively in LB Babylonia's wider cultural networks. This participation in Mesopotamia-oriented communities of practice can be traced not only in the ceramic assemblage already discussed in Chapter 7, but also in the ritual practices that we will focus on in the following Chapter 9, and in the nature and use of administrative technologies documented in Chapter 10.

111 Breniquet (2020).
112 Sallaberger (2014).
113 Boessneck (1978); Boessneck and Kokabi (1981).
114 See also Bernbeck (2008); Potts (2014b); Arbuckle and Hammer (2019).

9

Death, Ritual, and Memory: Depositional Practices at Late Bronze Age Kani Masi

9.1 Introduction

The LB settlement at Kani Masi produced a wide range of ritual depositions. They include burials and other depositions of human remains, the ritual closures of buildings and activity areas, as well as commemorative offerings placed amidst the decaying walls of abandoned structures. Although partially distinct in their materialities, many of these depositions present cognate and often interconnected ritual interventions that brought about, symbolised, and commemorated ruptures in the settlement's social, material, and temporal fabric: the loss of a member of the community, the abandonment and closure of houses and production locales, and their subsequent remembrance. Guided by these congruences and the fuzzy conceptual boundaries of different depositional practices,[1] we group behaviours together in this chapter that are conventionally investigated separately, with the aim of gaining a more holistic understanding of the ritual world of Kani Masi's LB inhabitants. The discussion below is ordered broadly by practice as well as chronologically, keeping in mind that there is both conceptual and some chronological overlap between categories.

This chapter should be read in tandem with the stratigraphic discussions in Chapter 6, the presentation of the LB ceramic repertoire in Chapter 7, and with the preceding Chapter 8, where we discuss subsistence and culinary practices that closely interconnect with the consumption-oriented locales and rituals presented here.

9.2 Burials and human remains

Unlike the two MB I burials uncovered at the nearby mound of SRP189 (Chapter 5.3.4), which were both adult interments in a dedicated burial ground, articulated human remains from LB SRP046 all belong to babies and children. Only very occasionally were skeletal fragments of adults encountered. Kani Masi's adult population must have been buried in an as yet unidentified cemetery. Likely candidates for such a cemetery are the low mounds that surround the settlement core on SRP046 and that produced LB surface finds (see Chapter 11.2-3).

The younger members of the Kani Masi community were buried predominantly in Area I and Area III, in simple pits under the floors of buildings while they were still in use, or in fills of rooms that had fallen out of use. One child was placed into the ashy refuse heap of a large pottery kiln and food production area (Burial AIII.2). Also attested are jar burials and jars whose shape and placement reference neonatal burials but

1 Cooper *et al.* (2020).

Burial	Area	Locus	Age	Type	Pos.	Side	Dir.	Location	Grave goods
Phase 1a									
AIII.1	III	V85/L180	5y±1y	inhum.	flexed	R	N	subfloor	1 tall goblet (F.2a), 2 bead necklaces
Phase 1b									
AI.1	I	Z88/L16	4-5y±1y	inhum.	flexed	R	NW	subfloor	A squat cup (Type C.1a) with a disc base and two small bottles (Type D.2), some faunal remains
AI.2	I	Z88/L17	2.5-6.5y±1y	inhum.	flexed	R	N	ruin	1 small jug with a disc base (Type E.1), 1 bead and shell necklace, gold ring, tablet and sealing fragments
Phase 1c									
AI.3	I	Z88/L19	6m±3m	inhum.	flexed	L	SE	ruin	
AI.4	I	Z88/L9	5-8y±2y	inhum.	flexed	R	W	ruin	Top half of tall goblet (Type F.4)
AI.5	I	Y88/20	neon.	jar				floor	Bottom half of a squat goblet (Type F.1b)
Phase 1d									
AI.6	I	Z88/L14	neon.	jar					
AI.7	I	Z88/L14	neon.	jar					
AI.8	I	Z88/L14	-	jar					
Phase 2									
AIII.2	III	V85/L116	6y±2y	inhum.	flexed	R	N	midden	faience beads

Table 9.1 Summary of burials from SRP046 in broadly chronological order.

without surviving skeletal remains. With the exception of two subfloor burials (Burials AIII.1 and AI.1), infant and juvenile inhumations at Kani Masi appear to form part of a wider depositional practice associated with the closure, and the commemorated afterlives of Phase 1 and 2 structures and activity areas. A later phase of occupation (Phase 5), potentially contemporary with the baked brick structures of Phase 4, also includes at least one possible grave structure, although no human remains were found associated with it.

Below, we discuss each of the burials and more sporadic finds of human remains in chronological order (Table 9.1), before moving to compare the Kani Masi record with contemporary LB burial practices in the wider region. Detailed osteological descriptions of all human remains from SRP046 can be found in Appendix VIII.4.

9.2.1 Phase 1a

The earliest attested burials at Kani Masi are subfloor inhumations, which were dug into the floors of buildings associated with the first phases of large-scale occupation at the site. The burials associated with Phase 1a, thus, speak to the practices, beliefs and cultural associations of the community that first built the LB settlement at Kani Masi.

Figure 9.1 Juvenile subfloor inhumation in Area III (Burial AIII.1).

9.2.1.1 Burial AIII.1

The earliest attested burial is a subfloor inhumation of a juvenile of around five years of age (V85/L180).[2] The child was buried under the floor of what appears to have been a large, trapezoidal building constructed of unbaked mudbrick and seemingly on virgin soil. A charcoal sample from a deposit sealing the burial was radiocarbon dated to between 1505 and 1418 cal. BCE and provides a *terminus ante quem* for the construction of the earliest phase of the building (for more detail on radiocarbon dates, see Table 6.4 and Appendix II.1).

The child was placed in a narrow, elliptical burial pit in a flexed position on the right side and facing north (Figure 9.1). A tall-footed goblet of the Type F.2a (Figure 7.10.13) was placed against the face of the individual, who was buried wearing two striking multi-coloured beaded necklaces. One necklace had larger beads consisting of different types of marble, faience, and rock crystal, carnelian from the Caucasus or India, and a shell (*Engina mendicaria*) from the Gulf or the Red Sea (see also Appendix IX). The second necklace was made from very small, short, tubular and multi-toned cream, blue, and pink faience beads. These bead types are all known from the third millennium BCE onwards and are considered typical for Bronze Age burials in terms of both material and form.[3] A female adult burial from Tell Khaiber, for instance, was accompanied by a very similar necklace consisting of beads made of agate, carnelian, turquoise, and lapis lazuli.[4] It has been suggested that such ornaments were given to children to protect them from illness or the evil eye as part of more complex rituals.[5]

2 Published as Burial 1 in Glatz *et al.* (2019).

3 Wygnańska and Bar-Yosef Mayer (2018, 286).

4 Campbell *et al.* (2017b, 16).

5 Dunham (1993, 240).

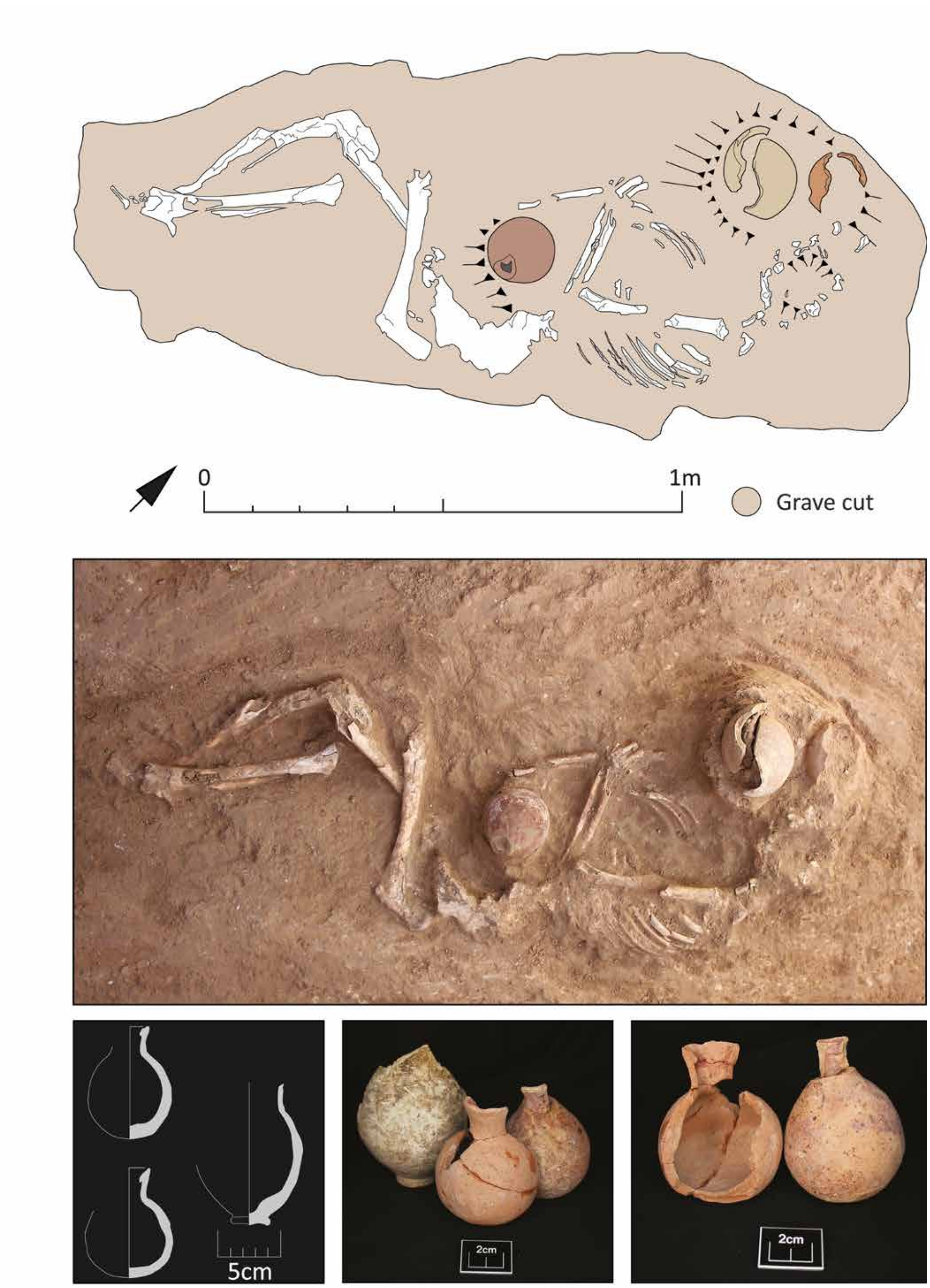

Figure 9.2 Juvenile burial belonging to Phase 1a-b in Area I (Burial AI.1).

9.2.2 Phase 1b

9.2.2.1 Burial AI.1

A second subfloor inhumation, associated with the Phase 1a or 1b occupation of the Area I structure, includes the more or less complete skeleton of a juvenile aged between four to five years of age (Z88/L16, Figure 9.2). The child was buried in a flexed position on the right side and facing northwest. The burial was accompanied by three vessels: a buff-coloured squat cup with a disc base (Type C.1a, Figure 7.6.1) and two almost identical small bottles with inverted rims folded on the interior (Type D.2, Figure 7.9.2-3). The latter were made from an unusual, orange-to-red fired fabric and with reddish purple paint or slip on the outside of the vessel body and on the inside of the rim. These bottles are unique at Kani

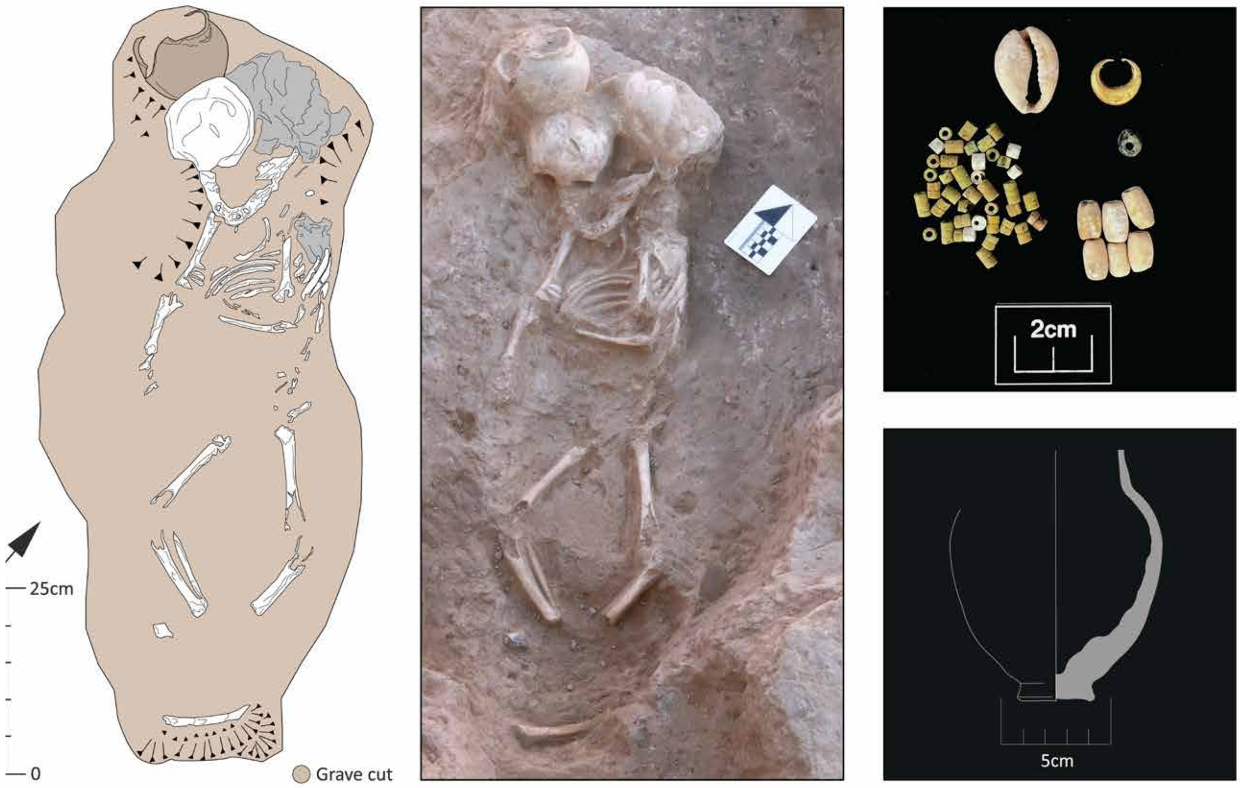

Figure 9.3 Juvenile inhumation in the south of Area I (Burial AI.2).

Masi (see Chapter 7.3.1.4), but find parallels elsewhere in Babylonia and the Hamrin. A small number of highly fragmented white faience beads of the same type as those found in Burial AIII.1 were also encountered near the skull and neck. A charcoal sample found adjacent to the skeleton was dated to 1497-1317 cal. BCE, suggesting that the burial was placed there during either Phase 1a or 1b, more likely the latter, and before the final Phase 1c occupation that is represented by undisturbed bricky foundation material and a floor surface above the grave.

9.2.2.2 Burial AI.2

Burial AI.2 presents an inhumation in what appears to be an abandoned room in the southern part of the Area I building (Z88/L17). The primary inhumation consists of a mostly complete juvenile skeleton between two and seven years of age, who had been placed on the right side (Figure 9.3). A charcoal sample from underneath the cranium of the deceased produced a radiocarbon date of 1506-1319 cal. BCE. A sample taken from three articulated caprine carpals in the southward extension of the deposit sealing the burial produced a very similar date range of between 1495 and 1305 cal. BCE.

Phytoliths were present all around the skeleton, suggesting that the individual may have been laid on, or wrapped in, plant material. The child was surrounded by a wide range of other depositions, some more clearly identifiable as grave goods than others. They include a small jug with a disc base (Type E.1, Figure 7.9.4), very similar in style to that in Burial AI.1, though slightly bigger. This vessel was placed close to the head of the deceased on the right-hand side. Two types of faience beads, a black stone bead, and a cowry shell (*Cyprea* sp.), which would have come from either the Mediterranean, the Red Sea, or the Gulf, suggest one or more necklaces were worn by the child. A gold ear or nose ring was also recovered near the head (see also Appendix IX). The symbolic significance of cowry shells is already attested in the Epipalaeolithic and Neolithic and is associated with protective functions and female reproduction; a single shell in a juvenile burial likely presents a protective concern.[6] Several cowry shells and beads also accompanied an infant burial at Tell Zubeidi.[7] At contemporary sites where skeletons have

6 Golani (2014).

7 Boehmer *et al.* (1985, Pl. 97.4).

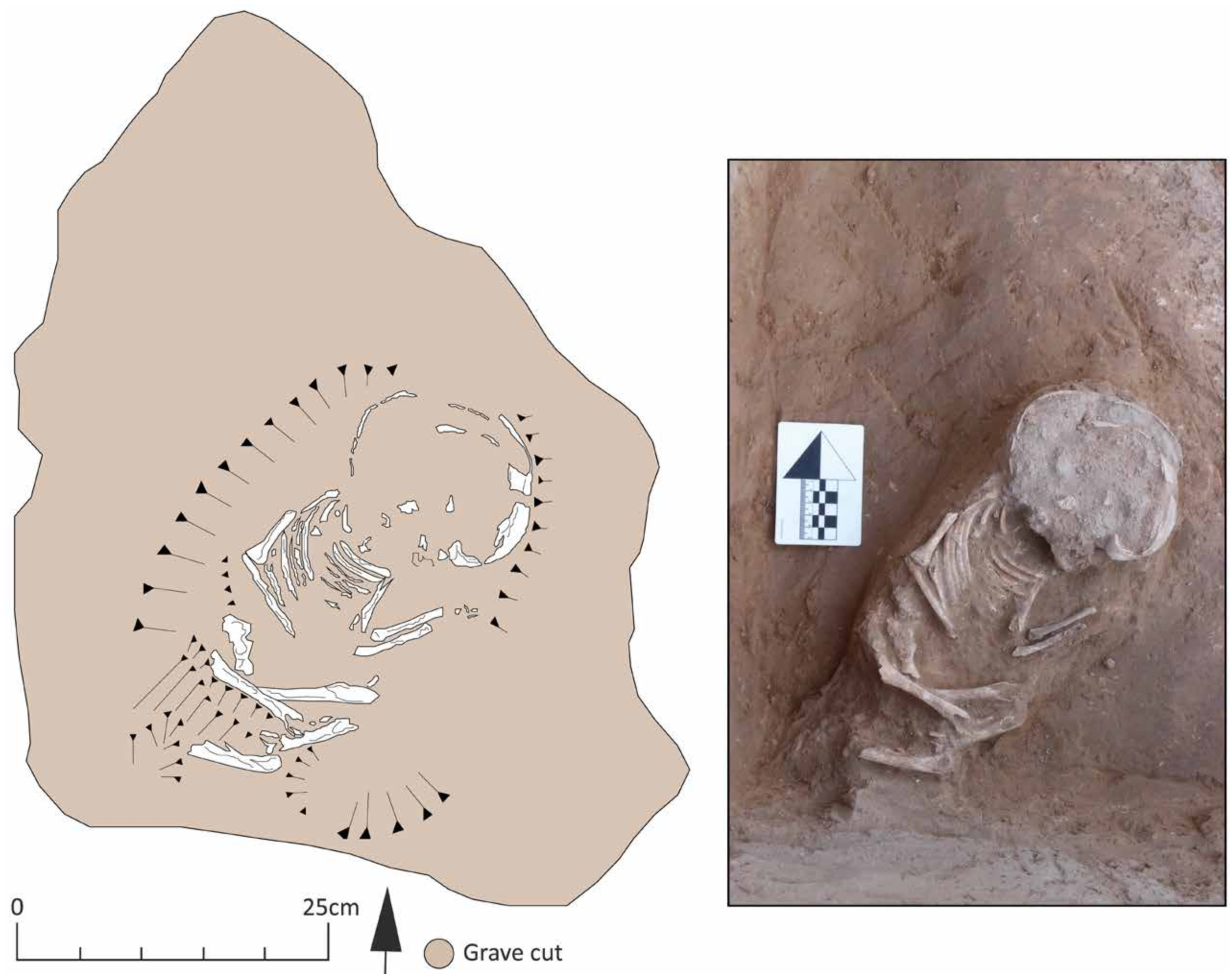

Figure 9.4 Infant burial dug into post-abandonment fill in the southern part of Area I (Burial AI.3).

been sexed, ear and nose rings appear to be associated preferentially with female bodies, including the so-called 'Lady of Yelhki' burial.[8]

Also found associated with the juvenile skeleton were the very partial remains of two further individuals, one infant and one adult (Appendix VIII.4.3). In the absence of evidence for further disturbed graves, these partial human remains may be adding a further ritual dimension to this depositional event. This may be reinforced by the presence of several fragmentary clay bullae and tablet fragments that were found deposited near the juvenile skull (see Chapter 10.3.1). It is not entirely clear, however, whether the sealings were placed with the individual, or whether they were mixed into the deposit covering the burial (Z88/L15). The latter consists of a dense mixture of broken ceramic vessels, mudbrick, stones, and animal bones that were covered in, and held together by, a thick and extremely hard whitish substance that had been poured over the deposit securely sealing it. This hardened mix of pottery, bricks, and faunal remains, which include predominantly caprine, but also cattle, horse, gazelle, and dog (see Appendix VI.5.3, Table VI.17), extends several metres to the south of the burial (Z88/L36, L34). In the more southerly area, a further fill layer followed, which in turn was overlain by a thick ashy deposit (Z88/L32). This suggests an elaborate sequence of ritualised actions that accompanied and followed the interment of the juvenile individual.

The pottery associated with this depositional sequence is mundane rather than ceremonial in character. Of the 121 diagnostic sherds from Z88/L15, the majority are storage jars and pithoi (42%), supported by a high concentration of cooking pot sherds (7%), and even an overfired and warped goblet sherd. More tellingly perhaps is the complete absence of cups, which are otherwise abundant across the building in Area I (11% of Phase 1b total, for more detail see Chapter 8.2.1.1), as well as the low frequency of goblets (5%

8 Sternitzke (2017, 392).

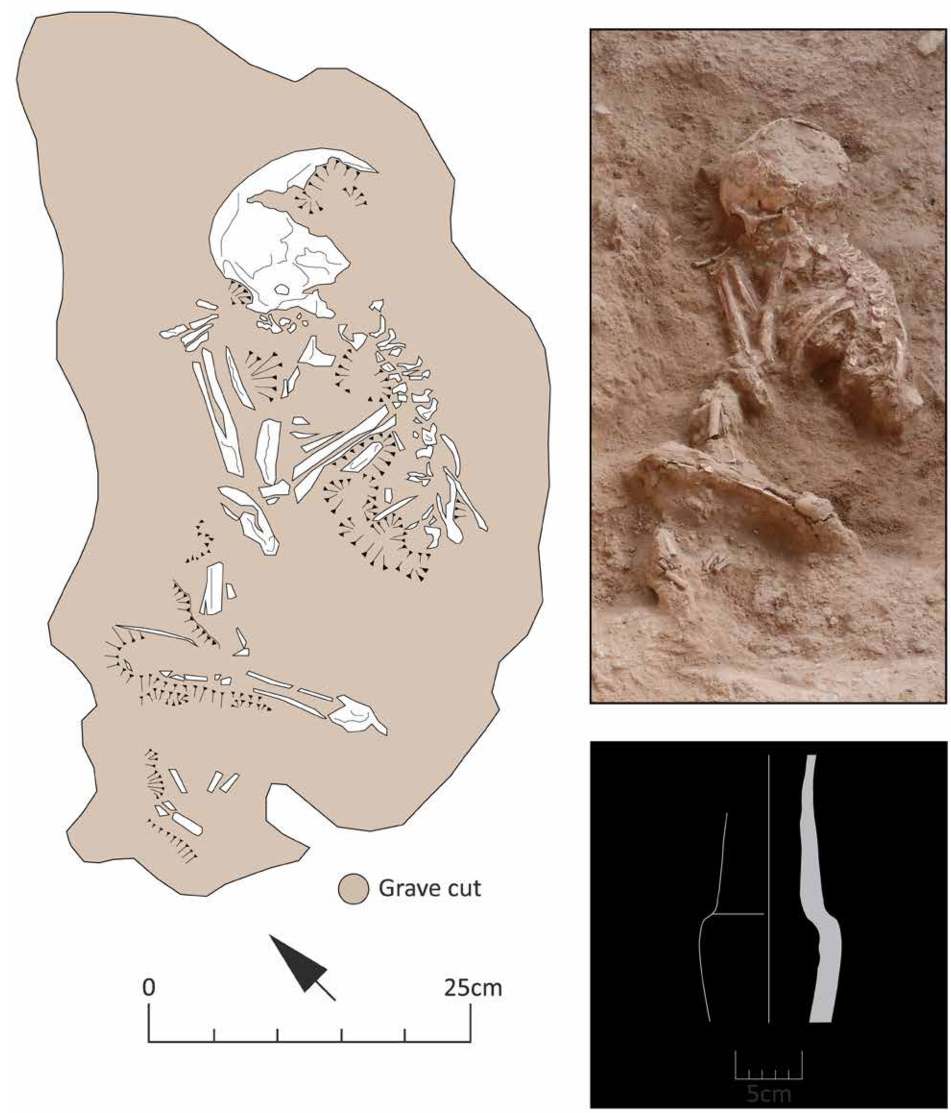

Figure 9.5 Juvenile interred in post-abandonment fill in Area I (Burial AI.4).

compared with 15% of Phase 1b total). Thus, the pottery in question is unlikely to have featured directly in ritual acts associated with the funeral, such as graveside feasting, and may be refuse from elsewhere brought in to cover the burial. The faunal remains associated with these deposits partly support this scenario. There are some meat bearing and some non-meat bearing bones, including evidence for marrow and grease extraction in Z88/L34-L37. Other finds may be more closely associated with ritual practices, including a left dog radius (Z88/L15), three equid elements from the forelimb, and a cattle metatarsal (Z88/L35) (see Section 9.3 below).

9.2.3 Phase 1c

An infant (Burial AI.3) and a juvenile burial (Burial AI.4) were found placed into the accumulating abandonment debris along the south-eastern face of Wall 7 in Area I and above the floor surface of Room 7 (Z88/L6 and L13).

9.2.3.1 Burial AI.3

Burial AI.3 (Z88/L19) includes the mostly complete skeletal remains of an infant aged around six months and a small number of fragmentary faience beads. The baby had been placed into a simple burial pit in the abandoned Room 7 in a flexed position on the left side and facing southeast (Figure 9.4).

9.2.3.2 Burial AI.4

A second and somewhat later interment (Burial AI.4, Z88/L9) of a juvenile aged around five to eight years was dug into the abandonment layers partially above Burial AI.3 (Figure 9.5). The child was lying in a flexed position on the right side facing west. The upper part of a tall goblet (Type F.4) accompanied the individual. A charcoal sample from the soil surrounding the skeleton provides a radiocarbon date range of 1433-1288 cal. BCE.

Figure 9.6 Neonatal jar burial associated with the Phase 1c closing ritual (Burial AI.5).

9.2.3.3 Burial AI.5

As discussed in Chapter 6.2.1.1.2, the southern part of the Area I structure appears to have been abandoned following Phase 1b or possibly earlier, while the northern suite of rooms was still in use in the subsequent Phase 1c.

Burial AI.5 consists of neonatal remains in the form of a petrous bone and several small rib fragments that were recovered from the inside of a round-bottomed jar. The jar had been placed upright on the floor along a wall in the northern Room 1 while it was still in use (Y88/L20, Figure 9.6), with a Type F.1b goblet lying alongside. The placement of either disc-base cups or goblets in association with jar burials, either inside or directly outside the jar, is also common at Tell Imlihiye and Tell Zubeidi.[9] The wider depositional context of this neonatal jar burial suggests that it played a part in the ritual activities that appear to have concluded the use of the Area I structure between c. 1417-1289 cal. BCE and that we present in detail in Section 9.3.2 below.

9.2.4 Phase 1d

Phase 1d presents a period of re-use in the southern part of Area I that followed relatively soon after the structure's abandonment, and that, on the basis of stratigraphic considerations, appears to predate Phase 3 commemorative depositions (see Chapter 6.2.1.1.4).

9.2.4.1 Burials AI.6, AI.7, and AI.8

In the south-eastern part of Area I, three nearly complete vessels were found placed into the substantial post-abandonment fill of Room 7 (Y88/L14, Figure 9.7). Two of these vessels contained the partial remains of neonates (Burials AI.6 and AI.7), with bones also scattered in the surrounding area. A third vessel contained several unidentifiable bone fragments, which suggest another neonatal jar burial (Burial AI.8). This latter burial was comprised of an ovoid, round-bottomed jar (Type H.4) with a deliberately lopped off neck/rim, and a large bowl with a thickened, grooved rim band (Type B.2).

A charcoal sample from inside Vessel 1 produced a radiocarbon date of 1391-1132 cal. BCE and a second charcoal sample from the soil surrounding Vessel 2 was dated to 1277-1056 cal. BCE. The first of these dates is broadly contemporary with a second inhumation in Area III (Burial AIII.2), confirming that there is very likely some temporal overlap between the final phases of occupation in Area I (Phases 1c and 1d) and the craft-related changes in the use of Area III (Phase 2).

9 Boehmer *et al.* (1985, Pls. 19.1-2, 92.1-2, 94.2, 102.6, 103.2).

Figure 9.7 Neonatal jar burials of Phase 1d in Area I (Burials AI.6-8).

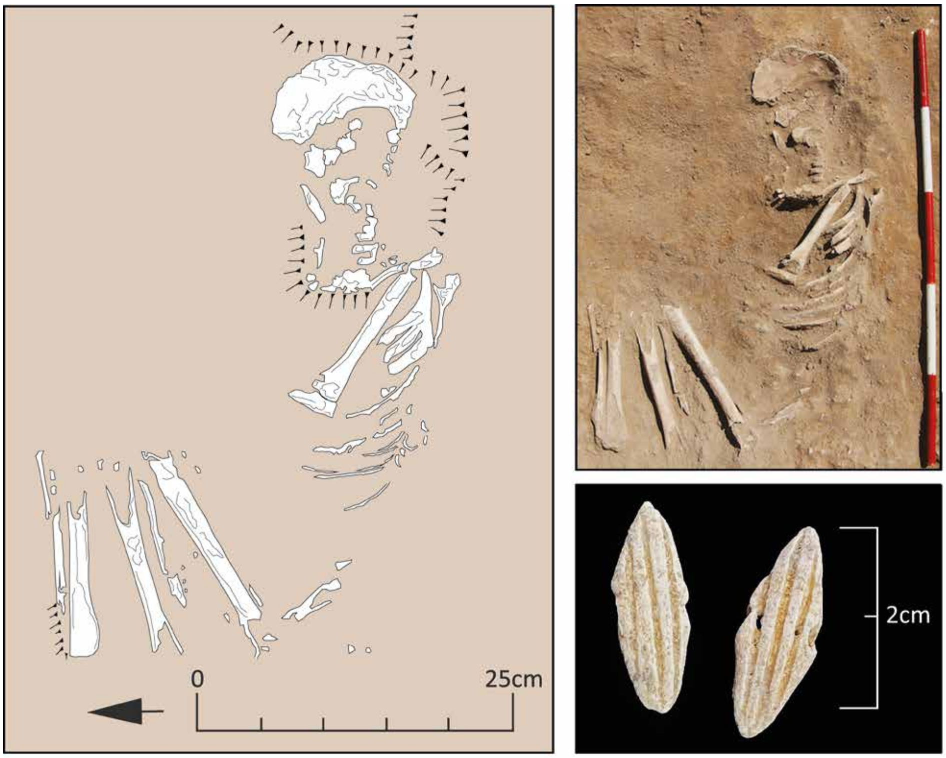

Figure 9.8 Juvenile in Phase 2 fill deposit in Area III (Burial AIII.2).

9.2.5 Phase 2

9.2.5.1 Burial AIII.2

Once the earlier structure in Area III had gone out of use it provided the foundation for several large kiln structures. East of the kilns and associated working areas was a large waste disposal area. Early during the midden build-up, a juvenile of about six years was placed in this area with no discernible burial pit, and subsequently covered by more ashy refuse (V85/L116, Figure 9.8).[10] The individual was flexed and placed on their right side facing north. Two small seed-shaped faience beads and a small, highly fragmentary metal ring (not illustrated) were associated with the skeleton (see also Appendix IX). A radiocarbon date from an adjoining locus (V85/L164) broadly places the inhumation to between 1391-1128 cal. BCE.

9.2.6 Jar depositions without human remains

Deliberate depositions of large jars that are typologically similar to those used for neonatal burials were identified in the industrial Area III (Figure 9.9.A), the midden of Area IV, and in the likely outdoor space of Area V (Figure 9.9.B-D).

The Area V deposition is particularly interesting as it includes a large jar (Family H), whose base and rim had been carefully removed and a bowl (Type A.1) wedged into the opening at the top of the vessel from the inside. Parallels for this practice are known from Grab 60 at Tell Zubeidi in the Hamrin, which was dug into a wall following the abandonment of Siedlung I,[11] as well as at LB Nippur.[12]

No skeletal remains, however, were recovered from inside this jar, or from those found in Areas III and IV. One explanation for the absence of human remains might be taphonomic processes and the actions of scavengers, such as rats or foxes, or perhaps practices of deliberate removals. Alternatively, it is possible that these jars were deposited without human remains, perhaps fulfilling cognate ritual functions as neonatal depositions, such as the closure and commemoration of structures and activity areas as appears to be the case for Burial AI.5 (see Section 9.3.2 below). Although it is not possible to draw firm conclusions due to the lack of direct stratigraphic relations across different excavation areas (see discussion in Chapter 6.2), all three empty jar depositions date relatively late in the LB occupation sequence, most likely Phase 3. This is also supported by associated vessels. Ripple-sided bowls (Type A.1), for instance, are the dominant bowl type in Phase 3 (see Chapter 7.5.5).

9.2.7 A potential grave

During Phase 5, which may be contemporary or somewhat later than the Phase 4 baked brick structures in Areas I and VIII (see Chapter 6.2.5), several small structures were

10 Published as Burial 2 in Glatz *et al.* (2019).

11 Boehmer *et al.* (1985, Pl. 95.4).

12 Zettler (1993, Pl. 25.b).

Figure 9.9 Jar depositions without human remains.

built, using partial baked bricks. This includes a square structure in Area IV (DD89/L2), which was found partially covered with stacks of upright, unfired mudbricks (Figure 6.18.D). No human remains were found, but the shape and construction methods suggest it was a grave or a cognate ritual deposition. Similar graves are attested from thirteenth to twelfth century BCE Babylon, Tell ed-Der, Uruk, Nippur, Tell Zubeidi, and a few earlier examples at Tell Yelkhi.[13] Examples from Babylon and Tell Basmaya also include stacked upright brick coverings.[14]

9.2.8 Burial summary

To briefly summarise, all the graves excavated in the LB settlement at Kani Masi belong to neonates, infants, and juveniles. Highly fragmentary remains of adults were also occasionally encountered, including in the graves of children. The skeletal remains were generally poorly preserved and limited information could be gleaned about the lives and health of the Kani Masi children through osteological analyses. Stable isotope analyses on collagen from Burial AI.1, and sequential tooth enamel samples from Burials AI.4 and AIII.1 produced some insights regarding the children's diet and mobility (for a detailed discussion, see Chapter 8.3.3.2). Some of the young members of the Kani Masi community appear to have moved within the wider Sirwan and Hawasan watersheds, and one may have travelled as far as south-eastern Iraq.

In Phases 1 and 2, Kani Masi's inhabitants laid their children to rest in four types of burials. This includes subfloor pit burials in Phase 1a, and burials in abandoned parts of structures in pits dug into accumulating room fills later on. One child was simply placed on top of a midden deposit and then covered over by more ashy refuse, while several neonatal jar burials were placed along the walls of buildings. Almost all the older babies and children were

13 Sternitzke (2017, 366, Fig. 14.04b, 269, Tab. 14.01).

14 Ibid.; Almamori *et al.* (2020, Fig. 27.2, Grave 25).

interred in flexed side positions, usually on the right and facing north, west or northwest. Only one infant was placed on the left and facing southeast. Grave goods were found associated only with older babies and children, and while generally modest, they are more abundant in the Phase 1a and 1b burials than in later interments. Burial AI.2 stands out in terms of the range of items that accompanied the individual as well as the elaborate manner in which the burial was sealed.

The above assemblages and behaviours allow us to situate Kani Masi's LB inhabitants within a wider community of shared funerary practice and beliefs. Overall, the burial evidence from Kani Masi (SRP046) shares a number of strong similarities with LB sites in the Hamrin region and with the wider Middle Babylonian/Kassite cultural sphere in central and southern Mesopotamia, as well as with some graves in western Iran. There are, however, also some noteworthy local idiosyncrasies.

In LB Mesopotamia, burial practices range from subfloor inhumations, usually flexed and often with pottery and jewellery as grave goods, to brick-built tombs, and single and double jar burials.[15] The LB Kani Masi burial record consists of neonates, infants and juveniles, which compares well with Tell Zubeidi and Tell Imlihiye, where they also predominate.[16] In her synthesis of LB burial practices, Sternitzke noted that of the 44 child burials attested for this period across Mesopotamia, over half were buried within houses, around a third in ruins, and just 16% in open areas.[17] This corresponds well with the Kani Masi burial record. However, simple earth-cut graves, which are most common at Kani Masi, are predominantly associated with adults and not with children in the wider region; the latter are preferentially buried in jars at other contemporary sites.[18]

The majority of personal ornaments in the Kani Masi graves are bead necklaces made from a variety of semi-precious and more ubiquitous stones as well as faience and some shell. Similar bead necklaces and bracelets are widely attested across Mesopotamian sites and found with all age groups.[19]

The pottery deposited in burials at Kani Masi is also typical of those used in LB graves elsewhere in the Middle Babylonian/Kassite cultural sphere. In particular, similar ranges of vessels are attested in the Tell Zubeidi graves.[20] At Tell Zubeidi and Tell Imlihiye cups and goblets, and in one case a large pithos sherd, were also found placed close to or on the face or the head.[21] Similar cups and goblets are also attested at broadly contemporary cemeteries and, in one instance, also a settlement context in western Iran.[22]

Sternitzke lists the most common vessels in Middle Babylonian graves as: wavy-sided bowls (Type A.2), cups/small jugs (Type C.1a and Family E), baggy jars with rounded bases (Family H), goblets (Family F), stemmed cups (Type C.2), and small globular bottles (Type D.2).[23] Almost all of these vessels are attested in burial depositions at Kani Masi. Baggy shaped jars and ripple-sided bowls functioned as containers, while goblets, small globular bottles, and cups/small jugs with low disc bases were deposited as grave goods either alongside the body or directly next to the burial jar. All of these vessels are common types in the LB ceramic repertoire of greater Babylonia and all, except for low disc-base cups (Type C.1b) which were only found in Area VI, were generally in use for everyday activities at Kani Masi (see Chapter 7.3.1.3). Goblets in particular can be associated with the consumption of beer (see also Chapter 8.4.2.1.1) and with a wide range of other ritual behaviours at the site (see below).

The stemmed cup (Type C.2), despite its abundance across occupational areas at Kani Masi, is not found associated with any burials. Even in the dense concreted deposit covering Burial AI.2, not one of the 121 diagnostic sherds were cups, a stark contrast with the rest of the assemblage. This pattern is mirrored in the Hamrin, where of the 80 graves from Tell Zubeidi and Tell Imlihiye, just one (Tell Imlihiye Grab 11) contains a stemmed cup placed next to the head of a child.[24] Social convention seems to have dictated that, while goblets and low, disc-base cups were appropriate for accompanying the deceased, stemmed cups were not.

The two small round bottles (Type D.2), while unique to Burial AI.1 at Kani Masi, are well-attested in funerary contexts in the Hamrin and in southern Mesopotamia. The bottles are often red in colour and painted with black or brown floral or geometric motifs.[25] The number of such vessels per burial seems to be a regionally distinct phenomenon. Usually in the Hamrin, just one bottle is interred with an individual,[26] and they are associated with earth-cut and brick-lined graves. In southern Babylonia, two to three bottles per grave are more common,[27] while one burial from Isin (Burial 20) has nine.[28] Several such bottles are also attested in funerary contexts at Tell Basmaya.[29] According to Sternitzke, the bottles "come into fashion at the end of the Kassite period (c. 1200 BCE)";[30]

15 Sternitzke (2017, 359-362).
16 Boehmer *et al.* (1985, 5-7, 39-35).
17 Sternitzke (2017, 365, Fig. 14.3).
18 Ibid., 365-367.
19 Ibid., 392-393.
20 Boehmer *et al.* (1985, Pls. 91-104).
21 Ibid., Pls. 18.4, 93.3, 94.1, 96, 98.4.
22 Overlaet (2003; 2005); see also Thrane (1999; 2001, 69-74, Pls. 22-33).
23 Sternitzke (2017, 386).
24 Boehmer *et al.* (1985, Pl. 50.222).
25 Armstrong and Gasche (2014, 101-102, Pl. 89.1-11).
26 Sternitzke (2017, 388-389).
27 Armstrong and Gasche (2014, 101-102).
28 Hrouda (1977, Pls. 28, 37; 1981, Pls. 34-35).
29 Almamori *et al.* (2020, Figs. 29.2, 41).
30 Sternitzke (2017, 388).

this is backed up by Armstrong.[31] The secure and sealed stratigraphic context and associated radiocarbon date for Burial AI.1 between c. 1497-1317 cal. BCE, however, places the use of the bottles as burial goods much earlier.

Absent from graves at Kani Masi are so-called faience buckets and shell rings, which are found frequently in LB burials in the Hamrin, and in central and southern Mesopotamia. They also appear in funerary contexts in the Early Iron Age (EIA) cemeteries in western Iran, together with drinking cups and goblets found in the Sirwan/Diyala valley and in Mesopotamia.[32] Thus, faience buckets are generally understood as funerary objects.[33] By contrast, and as we discuss in more detail in Section 9.4. below, at Kani Masi, faience buckets, disc-base cups, and ripple-sided bowls form ritual assemblages that do not include human remains. This is also the case for astragalus bones, which were found in two LB graves in Babylon,[34] but are associated with a closing ritual at Kani Masi (see Section 9.3 below).

A small number of Middle Babylonian graves contained faunal remains, which are generally interpreted as grave goods.[35] Multiple interments are known as well as consecutive uses of crypts, where earlier skeletal remains are moved to make place for later interments. However, it seems that the incorporation of disarticulated human remains in burials is so far documented at Kani Masi alone.

Thus, while the Kani Masi burial record ties well into Middle Babylonian funerary practices overall, there are also significant local articulations of, and departures from, common practices to be noted. The most interesting and currently unique aspect of the Kani Masi burial record is the insights that it provides about the conceptual, material, and behavioural intersections of funerary practices with other ritualised behaviours at the site. The most salient of these are associated with the closures and subsequent commemoration of Phase 1 and 2 buildings and activity areas.

9.3 Ritual closures

9.3.1 Phase 1a

The earliest potential indicators for a ritual marking of a building's end of life were excavated in Area II, where Phase 1a is represented by a small section of a reddish-yellow sun-baked mudbrick wall. A surface and reddish mudbrick collapse (Y82/L22) and subsequent fill deposit (Y82/L21) yielded pottery, including drinking vessels, and notable faunal remains. Together they point towards a feasting event and deliberate depositions of dog, cattle, and equid remains, which bears similarities with a more extensively documented later closing ritual in Area I that we discuss in Section 9.3.2 below (Figure 9.10.A-D).

The Area II depositions were sealed by a mudbrick packing with few finds (Y82/L20), which presents a levelling event around 1488 to 1292 cal. BCE. This is followed by a long sequence of hearths and ashy midden deposits alternating with levelling episodes and the laying of new walking surfaces, whose material culture, faunal and botanical evidence points to a role in food production (see Chapter 8.2.1.2).

Despite the same sampling regime, archaeobotanical remains from the earlier Phase 1a contexts in Area II (Y82/L21 and L22) are very limited compared to later loci, which contained significant quantities of burnt dung fuel from in and around discrete fireplaces. By contrast, Phase 1a produced a sizeable faunal assemblage, which is dominated by caprines, including several identifiable sheep remains, as well as pig, cattle, horse, gazelle, fish, and crab (Table VI.18).

Among the faunal remains are several deliberate depositions of otherwise rarely encountered body parts, such as an intact cattle humerus and a complete equid mandible. The complete cattle humerus is unusual, as all other cattle long bones at the site were fully broken down in order to extract bone marrow (see discussion of culinary practices in Chapter 8.4.2.2). The horse mandible belongs to a mare aged 13-15 years, whose teeth show signs of bit wear and whose mandible shows evidence for skinning (Appendix VI.5.4.4.2). Some gnawing, most likely by a dog, is attested on the cattle bone, suggesting that the deposit, although it appears to have accumulated quickly, lay exposed long enough to allow carnivores to opportunistically gnaw on the bones. The same deposit also contained the right radius of a dog, which bears a cut mark on the proximal end of the shaft, implying the animal's carcass was deliberately disarticulated. The presence of parts of a dog foreleg, which is also attested in the more extensively exposed Phase 1c ritual event in Area I, may point to an association with the goddess Gula (see Section 9.3.2 below). A rare bowl (Type A.5) was found alongside (Figure 7.38.C). Although only a fairly limited assemblage (36 sherds), pottery from Phase 1a in Area II demonstrates a mixture of functional types, including cooking (8%), brewing (6%), storage (25%), and food and drink consumption (18% and 43%).

9.3.2 Phase 1c

The most striking and complex ritual context excavated at Kani Masi is a closing ritual that concluded the use of the Phase 1c building in Area I. A charcoal sample from Room 1 dates this event, which is sealed by the debris of the collapsed walls of the structure, to between 1417 and 1289 cal. BCE. Ritual activities included

31 Armstrong (2017, 428, Fig. 15.07).
32 Overlaet (2003, 74-75, Figs. 50-51, 55, 95, 98, 185).
33 Clayden (1998); Sternitzke (2017, 389); Wicke (2008, 215-217).
34 Sternitzke (2017, 395).
35 Ibid.

Figure 9.10 Phase 1a wall and fill deposits in Area II.

a large-scale feasting event, as evidenced by an extensive drinking cup and goblet collection strewn on the floors of Rooms 1 and 4, and associated faunal remains and installations (Y88/L20) (for pottery distributions, see Chapter 8.2.1.1). The specific constellation of deposits in Room 1, moreover, allows us to link this event to the cult of the goddess Gula.

The special social and ritual function of Room 1 in Phase 1c can be inferred from several lines of evidence. This includes the construction of a curved drainage installation lined by baked bricks, each broken in half or into smaller pieces, in the south-western part of Room 1 (Figure 6.6.A-C). The feature has no predecessor in Phase 1b, nor does it have an easily identifiable utilitarian function. It begins and ends in what would have been a roofed space, it was left uncovered unlike the LB drainages recently documented at Kurd Qaburstan,[36] and there are no indications that it formed part of sanitary, craft, or food-processing activities that would require the channelling of liquids. Clustering at either end of the drainage channel, and also found within it, were large quantities of drinking vessels, which suggest that its primary function may have been to receive libation offerings.

Organic residue analysis (ORA) was performed on a collection of stemmed cups (Type C.2) and footed goblets (Family F) from the sealed Phase 1c deposit in Room 1, as well as on a brewing vat and on cups that were deposited as ritual offerings amidst the ruins of Room 1 (Phase 3) (see below, also Chapter 8.4.2.1.1). Analytical results

36 Schwartz *et al.* (2022, 223, Figs. 15-16).

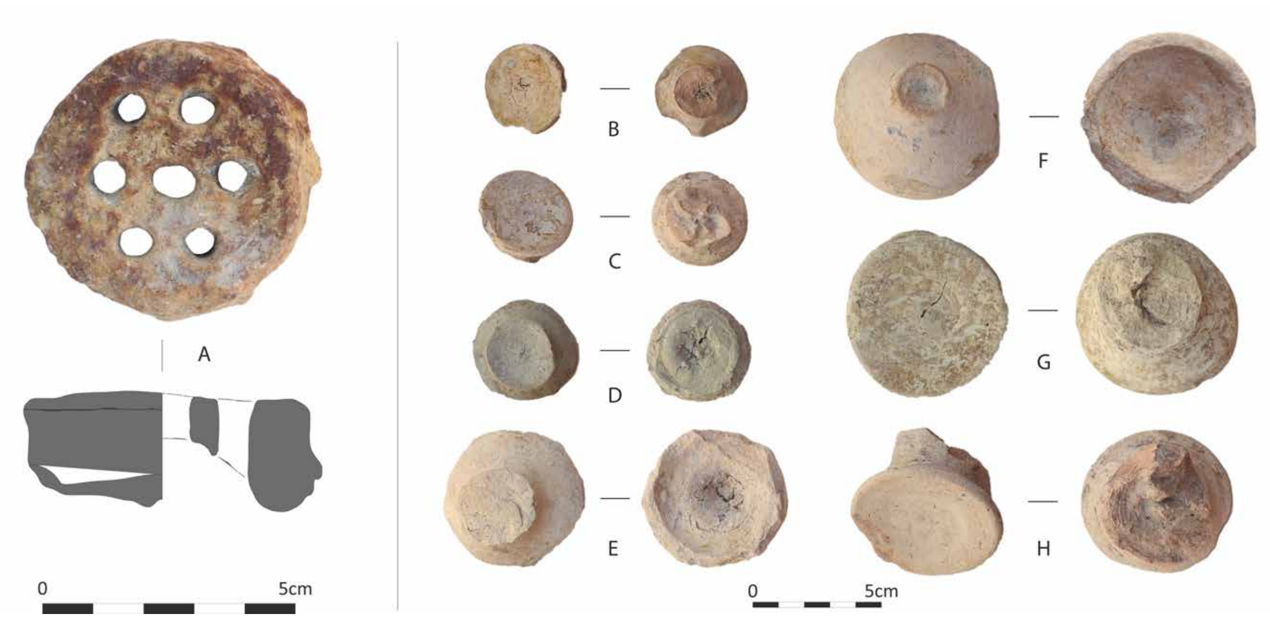

Figure 9.11 Reworked commensal equipment found in Room 1: A) chipped sieve-neck vessel rim and B-H) lids/stoppers.

suggest the production and consumption of barley beer from these vessels.

Most studies of ancient Mesopotamian beer have associated its consumption with medium to large jars, from which the beer was collectively sipped using long straws, sometimes with metal filters attached to the top. Goblets and cups have tended to be associated with wine;[37] although some have suggested a more varied range of beer-drinking equipment.[38] In line with changes in the Middle Babylonian ceramic repertoire, the Kani Masi ORA results not only confirm a change in beer consumption equipment but also allow us to unambiguously link several widely attested vessel types, including the iconic footed goblet (Types F.1-2), with its consumption. Both cups and goblets are ubiquitous at excavated urban sites and their monumental precincts in central and southern Mesopotamia, but they are also attested across a wide range of sites in the SRP survey record (see Chapter 11.2-3). There is, thus, nothing intrinsically prestigious about either these vessel types or their contents, although their concentration in the Area I building points to their use in socially significant consumption events.

In social terms, the association of both small to very small drinking cups and the medium-sized footed goblets with beer suggests a shift from late third and early second millennium BCE collective beer drinking experiences to more individualised ones. The small drinking vessels recovered from the floor and collapse debris in Area I take a variety of shapes ranging from squatter to slender, elongated shapes; sizes and the shape of footed stems also vary a great deal (see Chapter 7.4.4.2). Where preserved, vessel volumes of stemmed cups, however, appear to cluster around 100-200 ml. The larger footed goblets also vary in shape with some smaller, more rounded varieties, and others tall and elongated. Vessel volumes vary between 300 and 600 ml (see Table 7.3 and Figure 7.7). This relatively restricted capacity and the open, outward tapering rims of the goblets make their use as storage container unlikely. They are also not well suited to pouring, spilling a lot of liquid in the process. Beer may, thus, have been consumed from them directly or through straws. Unlike the large jars shown on earlier depictions, neither the cups nor the goblets are very stable when placed on the ground or a table, and so would have had to be held while full; the larger vessels lending themselves to sharing by passing the vessel among participants.

To shed some light on the community that took part in this ceremony, it is important to draw on the discussion in Chapter 7.4.4, which focused on the degree and nature of standardisation measured amongst the 65 stemmed cups and 59 footed goblets recovered from Area I, Phase 1c. This analysis demonstrated a high level of intentional standardisation – a shared social concept of what constitutes an acceptable vessel – coupled with significant mechanical diversity – indicating either the low skill of the potter(s) in effectively replicating this concept or else the work of many potters with varying skill levels/standards. The patterns identified strongly suggest that the Phase 1c community attending this

37 McGovern (2003).
38 Ellison (1978).

particular event came from various places, and that each brought with them their own vessel(s).

Where precisely some of the attendees of such events came from is unknown. One intriguing find from Room 1 does, however, hint at an extensive geographical reach. Alongside the cups and goblets discussed, a unique sieve-neck vessel rim (Type M.2, Y89/L5) with seven pierced holes was recovered with a series of other chipped lids/stoppers (Figure 9.11). This sherd would originally have topped the neck of a jar, presumably as a straw holder for shared beer consumption. While there are no instances of such vessels in Babylonia during the LB, the closest parallels come from Susa, Chantier B, Phases V and VII,[39] as well as from the Gulf, with numerous examples found associated with the Royal Burial Mounds of A'ali on Bahrain.[40] At some point in its use-life, the sieve-neck rim from Kani Masi was broken off its associated jar and deliberately shaped as a portable disc. It is plausible that this piece of makeshift commensal equipment was transported over a long distance to facilitate a specific type of ceremonial drinking that accompanied the closure of the Area I building.

The distribution of pottery in Area I discussed in Chapter 8.2.1.1, demonstrates the spatial curation of beer brewing and cooking activities in Phase 1c. Brewing vessels were spread evenly across several rooms (Rooms 1, 2, 4, 6 south and courtyard north), with just one or two diagnostic vessel parts per room. Cooking vessels, on the other hand, were largely recovered in the south of the building, away from the main concentrations of drinking vessels discussed above.

The faunal assemblage from Area I is the largest at Kani Masi, with large collections of animal remains also attested in Areas II and III (see Chapter 8.3.2, Table VI.14). The Area I assemblage differs, however, from the other two areas, which are associated with food production. While the overall preservation of the faunal remains at the site is predominantly good, the material from Area I is characterised by poorer preservation, indicating differences in taphonomic histories which may relate to both pre- and post-depositional processes. Gradual build-up of organic materials from intermittent consumption is not as conducive to good preservation. The continued building, abandonment, and re-building of the Area I mudbrick structure will have further disturbed the assemblage.

The faunal assemblage associated with the final occupation of Room 1 (Y88/L20) consists mainly of caprine remains, with those further identifiable being only sheep, alongside some cattle. Loci above and below the main deposit also include pig bones. This is also the only context in Area I Phase 1 c that includes the remains of wild species: deer, gazelle, and a burnt crab claw (Table VI.15).

The predominance of sheep in the sealed Room 1 deposits is particularly interesting, as sheep represent the preferred sacrificial animal in Mesopotamian religion.[41] The unprovenanced texts associated with the Sealand Dynasty, for instance, suggest that sheep were used for sacrificial purposes,[42] and the inscription of Agum-kakrime mentions a "lamb of the diviner".[43] Mesopotamian sacrifices required the roasting of meats, whereas culinary recipes focused on meats tenderised in stews or broths.[44] Very few faunal remains from Kani Masi show signs of burning, and even fewer contexts contained calcined bone, but Phase 1c contexts in Area I form one such concentration (see Appendix VI.5.2.2).

The importance of Area I as a ritual space is further underlined by the highest concentration of astragali at the site. The astragalus is a non-meat bearing part of animal feet, with collections of astragali generally interpreted as gaming pieces,[45] but they are also attested in graves, and may have been used in divination.[46]

A further and more specific indication that Room 1 and adjacent spaces had a ritual function comes in the form of an articulated right scapula, humerus, and radius of a dog in the sealed deposit (Y88/L20). A canine tibia fragment also comes from the same context. Articulated bones are rare at Kani Masi, which marks this out as a deliberate deposition. Similar depositions of dog limbs were found at contemporary Tell Sakhariya, ancient Ga'eš, in the marshes of southern Iraq, which may be associated with religious activities dedicated to the goddess Gula.[47]

The goddess Gula is associated with childbirth, medicine, and healing and is first attested in the Ur III period in southern Mesopotamia.[48] Over the course of the second millennium, Gula became one of the main Mesopotamian goddesses alongside Ištar and was worshipped in all major lowland cities, including the newly established Kassite capital at Dūr-Kurigalzu.

Dogs are the sacred animal of Gula, with her dedicated temple at Isin being known as the Dog House, or the Temple of the Dog.[49] Gula and her dogs are depicted on several *kudurru* stele,[50] carved stones which record the land grants of Kassite rulers to their subordinates that would have been displayed in local temples. The forelimb

39 Gasche (1973, Pl. 33.1-5).
40 Laursen (2017, Figs. 29, 69, 96.4-6, 363, and Appendix A, Fig. 4).

41 Scurlock (2002, 397).
42 Dalley (2009).
43 Stein (2000, 153).
44 Bottéro (2004, 43).
45 Gilmour (1997).
46 Susnow *et al.* (2021).
47 Twiss (2017, 263).
48 For a recent overview, see e.g. Sibbing-Plantholt (2022).
49 Frayne (1990, E.4.1.10.04).
50 Seidl (1989).

found in the Area I structure at Kani Masi is the same as that depicted at Gula's feet on a late Kassite *kudurru* (1307-1282 BCE).[51] Canine figurines were also found in the vicinity of the Gula temple at LB Nippur, alongside a bronze dog pendant.[52] It is, thus, highly likely that rituals associated with the goddess Gula were conducted in Area I, tying Kani Masi's LB inhabitants into another Middle Babylonian sphere of religious practice.

Neonatal remains placed in a jar on the floor along Wall 1 in the northwest of Room 1 (Burial AI.5; Figure 9.6) during the closing ritual may speak to Gula's involvement in complicated births. Gula, for instance, was responsible for cutting the umbilical cord,[53] and she could be called upon to grant a favourable destiny to a newborn,[54] to treat diseases in infants,[55] and to "bring up the dead from the netherworld".[56]

The ritual deposition of human remains is well attested in Bronze Age Southwest Asia, and some would have involved sacrificial killings.[57] The most spectacular human sacrifices are those attested at the so-called Royal Cemetery at Ur,[58] where recent research has demonstrated that the 'retainers' in the so-called death-pits met violent ends.[59] Sacrificial deposits involving humans are also known from mid-to-late third millennium BCE Tell Umm el-Marra, which involved equids, dogs, infants, and libation vessels.[60] In the late third and early second millennium BCE, partial human remains were found in what may be a closing ritual for a monumental building at Tell Brak.[61] A large circular monument dating to the first half of the second millennium BCE at Tell Umm el-Marra contained several layers of sacrificial depositions, including one with the remains of 13 individuals showing signs of perimortem blunt force trauma together with a dog and birds.[62] The placement of infant and juvenile remains on floors and in or along walls are usually interpreted as burials of naturally deceased babies and children, but some have also interpreted such depositions as foundation or building sacrifices.[63] It is not possible to determine whether the neonatal burial at Kani Masi contained a naturally deceased baby or formed part of a wider sacrificial event. Its presence, however, certainly reinforces the association of the building and its closure with the cult of the goddess Gula.

Textual sources also associate a range of medical tools with Gula, including surgical equipment such as razors, scalpels, and knives.[64] No such implements were found in the sealed Phase 1c deposit, but Area I has the highest concertation of whetstones at the site, which point to the use and upkeep of such implements in the building (Appendix V.3). This is broadly confirmed by the presence of a bronze blade, perhaps a razor, which was found in the earlier, Phase 1a, burnt horizon of Room 1 together with a carnelian bead and a perforated marble artefact (see Chapter 6.2.1.1.1).

In summary, we propose that the sealed assemblage of the Phase 1c Room 1 presents the remnants of a closing ritual associated with the worship of the goddess Gula. This involved sacrificial activities as well as feasting and drinking before the walls of the building were seemingly deliberately collapsed. After this, the structure was left to decay, while commemorative rituals took place within its decaying walls long after it had been closed.

9.3.3 Phase 2-3

The disuse of the industrial installations in Areas III and VII, is followed, as in the case of the building in Area I, by a phase of diverse ritual and funerary depositions. The most evocative of these depositions was found in Area VII (L80D/L7). A compact dark brown deposit that contained two concentrations of baked bricks and overfired, greenish-blue brick fragments was found above the surfaces connecting earlier fire installations, Kiln AVII.1 and Oven AVII.1. Placed amid the eastern concentration and deliberately covered by the bricks and brick fragments was a large cylindrical ceramic object, most likely a stand with fenestrations at the top that has a prominent decorative relief showing three composite creatures or *Mischwesen* (Figure 9.12). The object is, as far as we know, unique, although large ceramic cult stands are attested in other LB Babylonian ritual contexts, such as the Gula Temple at Isin.[65] Morphology, iconography, and depositional context, including the deliberate covering of the relief by overfired bricks, point quite unambiguously not only to a ritual function of the object itself but to a deliberate act of deposition that may have marked the closure of the industrial complex. The symbolism of the stand's relief decoration is intriguing in its own right, as it appears to reference the complex psychology of Mesopotamia's relationship with the Zagros mountains.

The central figure on the decorative frieze is a scorpion man with bird's legs and body, the upturned tale of a scorpion, and a bearded human face. He is flanked on

51 Louvre SB21; AS6066.
52 Gibson (1990a).
53 Sibbing-Plantholt (2022).
54 Asher-Greve and Westenholz (2013).
55 Böck (2014, 62-69; 2015, 330).
56 Wasserman (2008, 78).
57 Green (1975); Recht (2018).
58 Woolley (1934).
59 Vidale (2011); Baadsgaard *et al.* (2011); Baadsgaard and Zettler (2012).
60 Schwartz (2012; 2013).
61 Oates *et al.* (2001, 42-50); Molleson (2001).
62 Schwartz (2013).
63 Green (1975, 59-79); see also Recht (2018).
64 Wasserman (2008, 80-81).
65 Haussperger *et al.* (1981, 9, Pl. 2.1, Fig. 1).

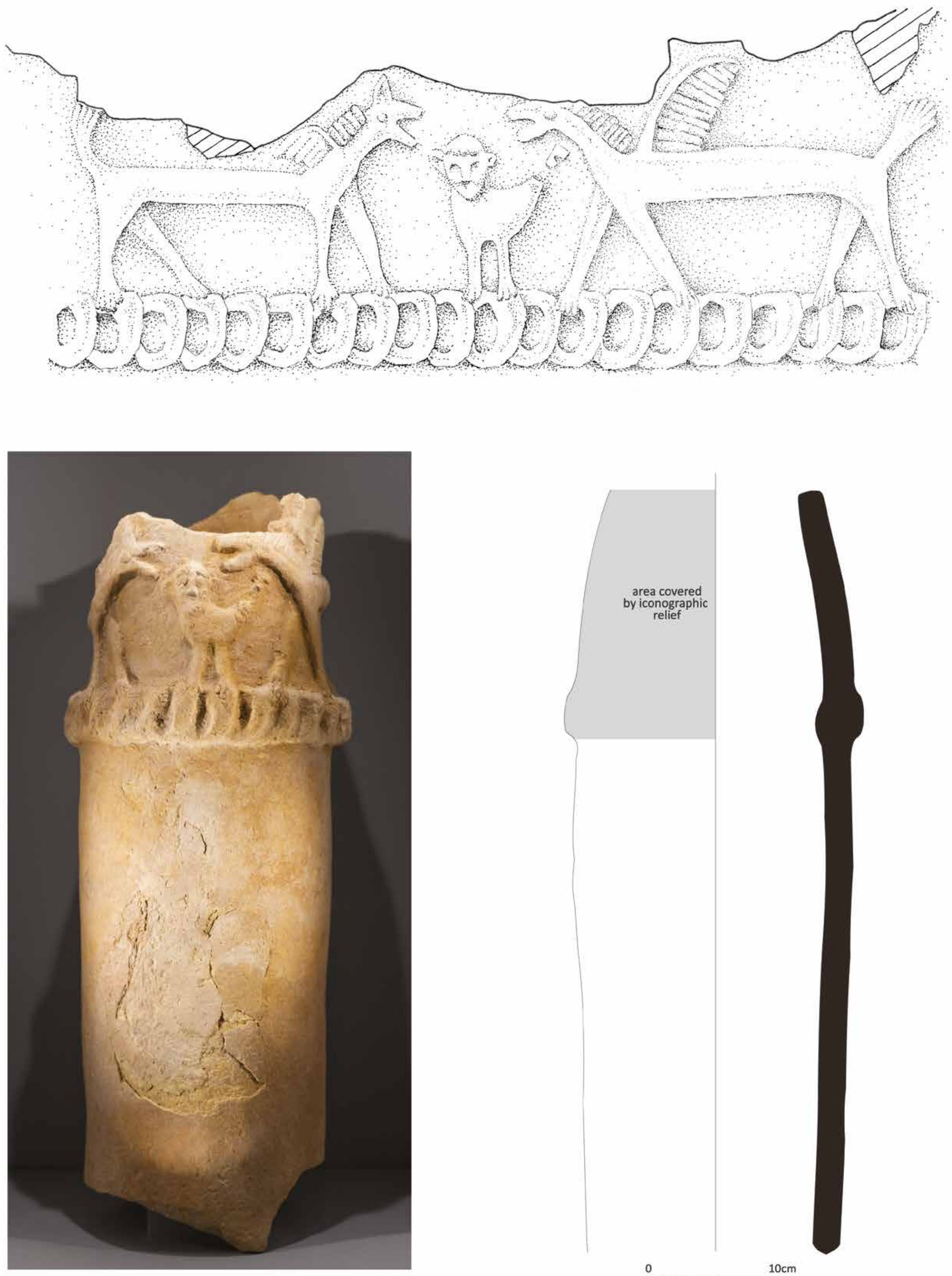

Figure 9.12 Ceramic stand with iconographic relief from Area VII.

either side by two winged creatures that can be identified either as lion- or snake-dragons. In Mesopotamia, scorpion people (*girtablullû*) are first attested in the ED III. A scorpion man is depicted, for instance, on one of the plaques covering the sound box of the lyre with the blue-bearded bull's head from the Royal Cemetery of Ur.[66] Scorpion people are associated with Tiamat, the goddess of chaos in the Babylonian Epic of Creation,[67] and in the Gilgamesh Epic a scorpion man and woman guard the gate of Mount Mašu, where the sun rises.[68] Scorpions are depicted frequently on Babylonian *kudurru* stones such as the donation of Marduk-apla-iddina I.[69] A scorpion *Mischwesen* with human face, the body and legs of a bird, and a scorpion tail is depicted on the *kudurru* of Nabu-kudurri-usur I (1126-1103 BCE).[70]

The two creatures flanking the scorpion man at Kani Masi defy ready identification because of the rudimentary rendering of features on the one hand, and what appears to be an element of deliberate blending or ambiguity on the other. They share some characteristics of lion-dragons, including the lion forelegs and the bushy lion tails. Lion-dragons are generally depicted with wings from the Akkadian to the Neo-Babylonian period.[71] They may be equated with the Asag or, more likely, with the Imdugud/Anzu. The Asag is a monster in Mesopotamian mythology who mates with KUR, the mountain, and is accompanied by an army of stone allies.[72] The Anzu is a monstrous bird that steals the tablet of destinies from the god Enki.[73] In the Lugalbanda poem, the hero wanders the Zagros mountains and comes upon the Anzu fledgling in its nest.[74] Such lion-dragons appear frequently on Babylonian *kudurru* stones, where they represent an aspect of the war-god, Ninurta, who in Sumerian myths defeats the mountainous lands to the east of Mesopotamia as well as the Asag and the Anzu.[75] A lion-dragon with wings and with a pointed ear or horn similar to those on the Kani Masi stand may be depicted on the reverse of the *kudurru* of Marduk-apla-iddina I, which was found near Sarpol-e Zahab.[76]

Snake-dragons or *mušhuššu* tend to be depicted with horns, a snake's body and neck, a lion's forelegs, and a bird's hind legs.[77] The two creatures depicted on the Kani Masi ceramic object do not have scales, but their elongated bodies resonate more with the depictions of snakes in Mesopotamian iconography than of lion-dragons. It is also unclear whether the Kani Masi dragons are depicted with lion ears or *mušhuššu* horns. Lion-dragons with some characteristics of snake-dragons are frequently depicted on Babylonian relief carvings in association with, or standing in for, the god Marduk.[78] Marduk rose from a relatively obscure position in the Mesopotamian pantheon to become a great god during the Old Babylonian period, when Hammurabi made Babylon his political centre, and became the chief deity in the course of the later Kassite period.[79] Snake-dragons are depicted either partially, such as on a fragmentary relief carving from Susa, where *mušhuššu* heads decorate Marduk's ship, or seated with lion's feet and tail, with bird's feet, or in the form of a snake.[80]

9.4 Commemorative rituals

A final ritual practice identified at Kani Masi is the memorialisation of abandoned buildings and activity areas through the deposition of offering assemblages. Such commemorative depositions have been observed in Areas I, III and VI.

9.4.1 Area I

Two cult-related depositions suggest the continued significance of the abandoned Area I building as a place of ritual and memory in Phase 3 (Figure 9.13 and Figure 6.13.A-B). Offering AI.1, which was placed on top of or dug into the final collapse layer in the central part of Room 1, consisted of two very similar drinking cups with globular bodies, flaring rims, and low disc bases (Type C.1b), a faience bucket with loop handles,[81] and a gold earring. Also found nearby was the better part of a beer-brewing vat (Type J.3) (Figure 6.13.C). Offering AI.2 was dug into the western wall of Room 1 and consisted of a simple ripple-sided bowl (Type A.1) in which a squat jug with a high shoulder (Type E.1), and a faience bucket with simple rim were stacked.[82] The high-shouldered juglet is unique in the Kani Masi assemblage, but finds excellent parallels in a burial from Tell Zubeidi.[83]

Faience buckets are small pyxides made of glazed frit, a highly friable vitreous material that is generally associated with Late Kassite burials at both the major urban centres of Babylonia and the more modest estates

66 Woolley (1934, 280, Tomb PG/789, P1. 105.U.I0556).
67 Dalley (1989, 237); Talon (2005); Lambert (2013).
68 Dalley (1989, 96-97); George (2003, 71).
69 Borger (1970, 1-11); Seidl (1989, 222, Pl. 33).
70 Ibid., No. 67.
71 Black and Green (1992, 121).
72 van Dijk (1983); Black *et al.* (1998-6, ETCSL t.1.6.2).
73 Dalley (1989, 203-228); Annus (2001); Foster (2005).
74 Black *et al.* (1998-6, ETCS t.1.8.2.2).
75 Alster (1972); van Dijk (1983); Black and Green (1992, 142-114); Black *et al.* (1998-6, ETCSL tr163 and t.1.6.2).
76 Borger (1970, 1-11); Seidl (1989, 222, Pl. 33).
77 Black and Green (1992, 166); Wiggerman (1995).
78 Seidl (2017, 320, Fig. 12.13).
79 Sommerfeld (1982); Lambert (1984, 1); Tenney (2016); Nielsen (2018, 165-166).
80 Seidl (2017, 319, Fig. 12.12).
81 Clayden (1998, Type II).
82 Ibid., Type I.
83 Boehmer *et al.* (1985, Pl. 98.4).

Figure 9.13 Offering sets deposited in Phase 3 in Area I.

and villages of the Hamrin such as Tell Zubeidi and Tell Imlihiye. Individual faience buckets have been found as far afield as Susa, Mari, Emar, Ugarit, Megiddo, and Enkomi.[84] A Babylonian origin for these vessels is generally assumed,[85] but their increasing prominence along the Sirwan/Diyala could equally point to a local tradition.

Faience buckets are usually associated with burials at Middle Babylonian sites in lowland Mesopotamia and in the Hamrin, as well as in the upland cemeteries of Lurestan.[86] This is, however, not the case at Kani Masi, where they are not found associated with human remains. Rather than grave goods then, the Kani Masi offering sets were used to commemorate buildings and activity areas, especially the abandoned and decaying Area I structure, decades and perhaps generations after it had been ritually closed and its walls toppled.

9.4.2 Area III

The role of faience buckets at Kani Masi in the commemoration of structures and activity areas is reinforced by a small fragment of a faience bucket that was found lodged into the fractured wall stump of the dome of the second Phase 2 pottery kiln in Area III. The deposition of a jar (Type H.4), whose type is associated with the burial of neonates in earlier phases, but which lacks any human remains, may also be part of the closure or commemoration of this part of the site (see Section 9.2.6 above).

9.4.3 Area VI

Another intriguing set of depositions, which also date to Phase 3, were recorded in Area VI. Here the magnetic gradiometer survey in 2017 suggested the presence of two large trapezoidal buildings (see Chapter 6.2.3.5). Excavations did not reveal any of the walls, but instead unearthed over twenty clusters of complete or near-complete ceramic vessels. The vessels appear to have been deposited along the walls and relatively soon after the abandonment of the building given the similar heights of the depositions. Bar the extensive plough action, which is responsible for the fragmentation of some vessels or vessel

84 Clayden (1998, 50).
85 Moorey (1994, 178-179); Clayden (1998).
86 Clayden (1998); Wicke (2008, 215-217); Sternitzke (2017, 389).

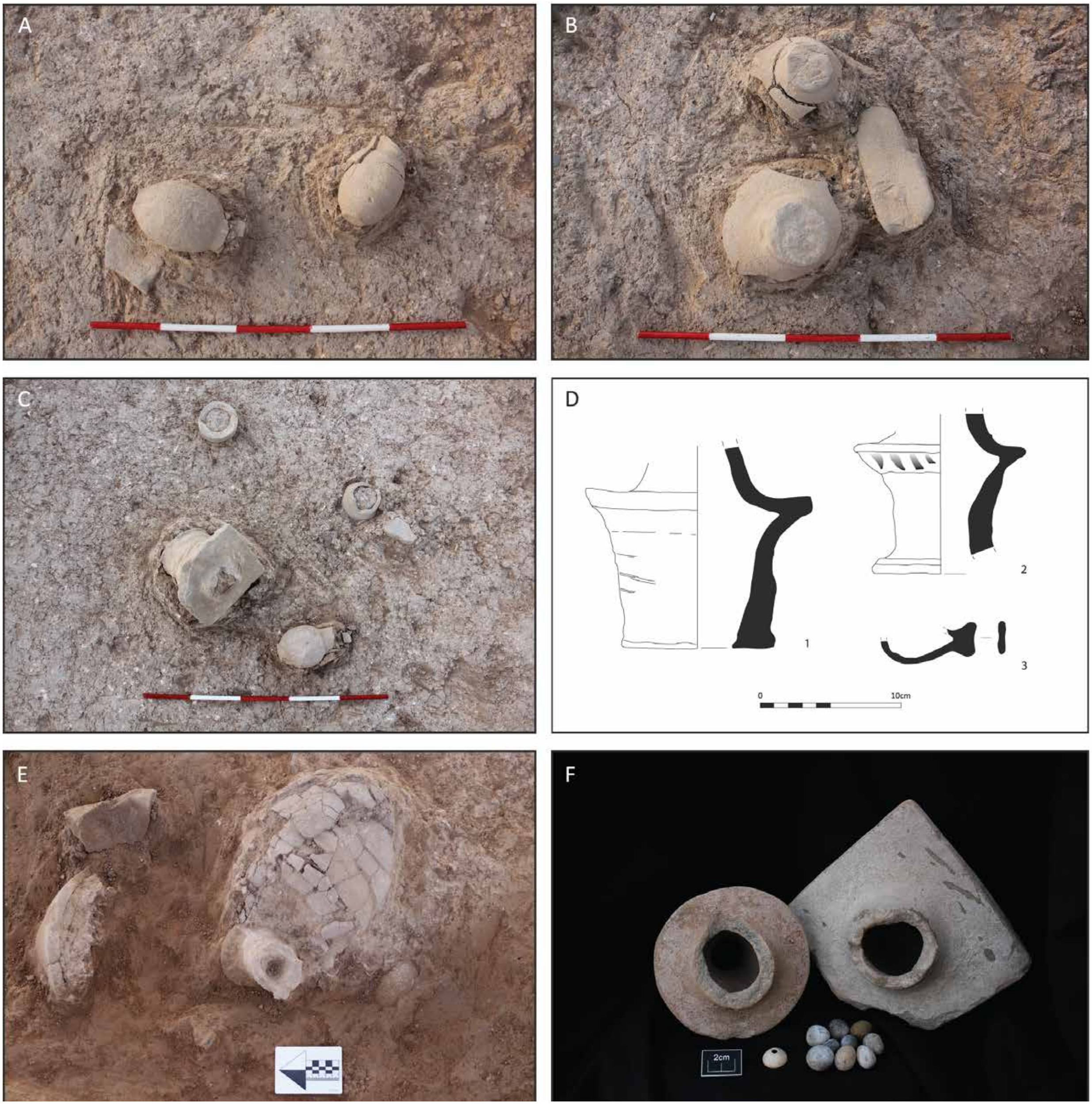

Figure 9.14 A-B) Vessels found strewn on likely floor surface in Area VI and C-F) tubular stands, smoothed pebbles, and a pierced shell found on the same surface.

parts, this deposit was otherwise undisturbed. Very limited and fragmentary faunal, no botanical remains, and limited stone implements were recovered from Area VI, which suggests that food preparation and consumption played a limited role in the documented practices. Excavations in Area VI also yielded no viable radiocarbon samples, but the recovered pottery, which finds its closest parallels in the Phase 3 deposits in Area I, points to the LB II-III (see Chapter 7.5.5).

The vessels recovered from Area VI include numerous small straight/ripple-sided bowls (Type A.1), almost all of which were found lying up-side down, as well as several elongated cups with squat disc bases (Type C.1b), which were lying on their sides (Figure 9.14.A-B). With the exception of larger pithoi (Type I.1a), and a round-bottomed jar (Type H.4), which were placed or toppled on their sides and fractured *in situ* from the pressure of the surrounding soil, limited vessel fragmentation as well as several unusual artefact arrangements suggest that these are all purposeful depositions.

One such arrangement consists of a large jar (Type H.4), tall goblet (Type F.2), and a hollow ceramic cylinder

Figure 9.15 A-C) Rectangular arrangement of goblets and cylindrical jars in Area VI, D) goblet containing two large cylindrical beads.

that flares into a circular flat surface covered in the eroded remnants of a dark red paint/slip (Figure 9.14.D-F). Another similar object, but with a squared horizontal surface was found nearby (Figure 9.14.C, D, F). The function of these tubular objects is unclear, and we have not as yet found any published parallels.

A second notable group consists of four vessels which were placed upright in a near-perfect rectangle (Figure 9.15.A-C). The arrangement includes one tall straight-sided goblet (Type F.4) and a cylindrical goblet with flat base and upturned rim (Type F.5) on the eastern side (Figure 9.15.C.2 and 4), and two tall, straight-sided goblet bodies (Type F.4) in the west, whose upper bodies had been damaged by ploughing (Figure 9.15.C.1 and 3). The Type F.5 goblet contained two large cylindrical beads, one made of stone and one of faience (Figure 9.15.D, Appendix IX). The rectangular space marked out by the four vessels contained several small (c. 1.5-2 cm diameter) rounded pebbles, a fragmentary metal pin, and a piece of a pierced shell (Figure 9.14.F). Other finds consist of a hollow fish-shaped ceramic object associated with a bovine tooth (Figure 7.19.11), which may have been used as a small rattle, as well as two stone loom weights. A very fragmentary shell-ring was also recovered. These unique depositional arrangements are difficult to interpret as anything other than the remnants of ritual actions associated with the earlier building, and most likely with its commemoration.

9.5 Conclusions

In this chapter we have presented and analysed the spectrum of ritual behaviours attested at LB Kani Masi. These include the burial and other deliberate depositions of complete and partial human remains and their accompanying artefactual assemblages, a series of closing rituals for buildings and activity areas, as well as commemorative offerings. The materialities and, thus, very likely also symbolism and meaning of these practices tie the inhabitants of Kani Masi quite unambiguously into a Mesopotamian religious world. More specifically, they reflect developments associated with the Middle Babylonian/Kassite cultural sphere, in whose pantheon the goddess Gula occupied a prominent position. At the same time, the symbolism of the ceramic stand's relief decoration recovered from Area VII, which depicts mythological creatures associated with the mountains, appears to rationalise lowland Mesopotamia's relationship with the Zagros highlands, and with it the transitional spaces and mediatory roles that Kani Masi's inhabitants would have occupied in geographical, cultural, and perhaps also political terms.

With the exception of the burials, however, the ritual practices and behaviours, as well as some ritual material culture are as yet unique. This includes the burial of seemingly empty jars in ways cognate to neonatal and infant burials, the deposition of a highly symbolic artefact close to a craft production area, feasts and potential sacrificial occasions marking the closures of buildings, and the use of faience buckets in commemorative rather than burial assemblages.

Similarly undocumented elsewhere is the significant fluidity that appears to have existed within and between these different depositional behaviours and their material paraphernalia, and in particular the close association of these practices with mundane routines. Pottery vessels form a central component of these activities: storage jars functioned as funerary vessels for neonates and in non-inhumation depositions, eating bowls capped these vessels, and low disc-base cups, goblets, and ripple-sided bowls formed accompanying offerings. As with other strands of evidence (see Chapters 6-8), this may be read as further indicators of a relatively flat social hierarchy at the site, with limited material distinctions identifiable between daily practice and ritual occasions, and across different functional parts of the site.

Organic residue analysis results indicate that cups and goblets were used for the serving and consumption of beer. These same vessels were used in drinking rituals prior to the closure of significant structures, in their subsequent commemoration, as well as in more mundane contexts associated with the production and discard of food remains. The large quantities of goblets recovered and their ubiquity in ritual contexts, moreover, suggest that they played an important role in the socialisation of Kani Masi's inhabitants and those living in contemporary settlements in the wider region, where cups and goblets appear in often large quantities in surface assemblages (see Chapter 11.2-3). Tall goblets were even deposited alongside infants and juveniles, members of the community who in life would have struggled to use these heavy, often unwieldly vessels. This points to goblets as central to processes of identity formation, beginning at an early age. On the other hand, stemmed cups, despite their abundance across almost all areas of the site, and especially amongst the commensal assemblage in Area I, appear to have been deemed inappropriate as grave goods. Given that stemmed cups were more susceptible to change through time (see Chapter 7.3.1.3), this may suggest that these vessels were subject to passing trends rather than deeply ingrained cultural norms.

Despite limited evidence for deep-reaching interventions of a central authority at the site (see Chapters 8.5 and 10), visual uniformity in material culture, on a surface level at least, was clearly important to pottery producers and consumers at Kani Masi (Chapter 7.4.4). The pottery assemblage displays a relatively restricted formal repertoire, including amongst drinking vessels. At the same time, there is significant subtle variety in the shapes, forming techniques, and fabrics of stemmed cups and goblets, as demonstrated by close analysis of the many cups and goblets deposited as part of the Area I closing ritual. This pattern of diversity suggests that vessels were either produced by numerous different potters specifically for the occasion, or, more likely, participants, not all necessarily local, brought their own drinking vessels with them to participate in the feasting and drinking, and perhaps to deposit a personal token in the structure that was being terminated and subsequently remembered.

Considering Kani Masi's open settlement plan, the absence of defensive architecture, weaponry, or signs of violent assaults and destructions, limited interest in the accumulation, measurement, and administration of storable wealth, such as grain and textiles, as well as a focus on the production of meat rather than secondary products, it seems plausible that Kani Masi's significance lay in its strategic socio-geographic position at the northern limits of LB Babylonian cultural and political reach. Located between highland and lowland landscapes and cultural spheres, it appears to have played an important role in the production of a transitional community that was, if not politically controlled, then culturally closely aligned with lowland Mesopotamia. This social and cultural closeness was produced and maintained through commensal and ritual practices, seemingly centred around the cult of the goddess Gula.

10

Tokens of Authority: Seals, Sealings, and Administrative Practice at Late Bronze Age Kani Masi

10.1 Introduction

Excavations at Kani Masi recovered several fragmentary bullae found in association with the large Phase 1 structure in Area I, and with a refuse deposit in Area II that is likely associated with Phases 3-4. Two of the bullae were impressed with cylinder seals and preserve iconography and Sumerian cuneiform consistent with Kassite glyptic traditions. As part of the larger sealing assemblage recovered from Area I, these sealings reveal the presence of local administrative practices at LB Kani Masi (SRP046).

10.2 Finds contexts

Sealing AI.1 was recovered in Area I amidst several smaller, uninscribed fragments of clay sealings. The assemblage was found associated with an irregularly shaped and tightly packed deposit (Y88/L15), consisting of a dense mixture of broken ceramic vessels, mudbrick, and stones covered in, and held together by, a thick and extremely hard whitish layer (for more detail, see Chapter 6.2.1.1.2), and the juvenile Burial AI.2 that was sealed by this deposit (see Chapter 9.2.2.2). The burial and the deposit above appear to be part of an abandonment phase of the southern rooms of the main structure in Area I. A charcoal sample from underneath the cranium of the deceased produced a radiocarbon date of 1506 to 1319 cal. BCE. A bone sample from the southward extension of the deposit sealing the burial produced a very similar date range of between 1495 and 1305 cal. BCE.

The fragmentary clay bullae, which were found near the skull, were either placed with the burial, or formed part of the layer sealing it. They could have been deliberately incorporated into its matrix, or as accidental refuse. The latter scenario may be compared to the sealings of the cook lú-itu-da from Nippur, which were recovered in a refuse pit near cooking installations and a possible storage room.[1]

A fragment of a second inscribed sealing (AII.1) comes from the upper deposits in Area II (Y82/L4), c. 50 m to the west of the building complex in Area I. Excavations in Area II revealed multiple living surfaces interspersed with rich ashy layers, which are related to periodic food preparation and midden formation. Thus, the sealing fragment recovered from Area II also comes from a secondary or refuse context. A radiocarbon date from the adjacent Y82/L3 ranges between 1220-903 cal. BCE and suggests that the deposition of

1 Zettler (1987, 237).

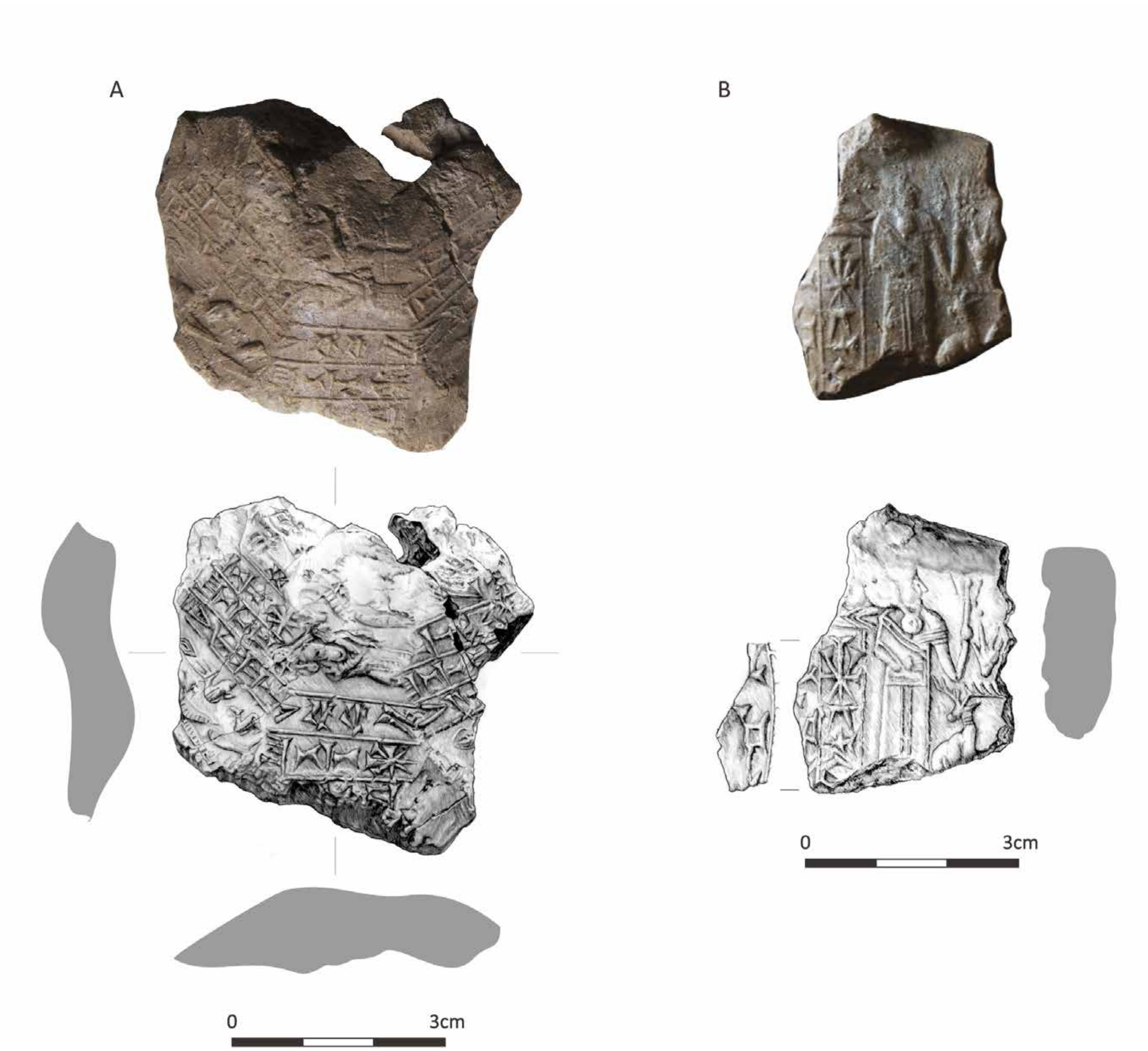

Figure 10.1 Bullae and sealings from Kani Masi: A) AI.1 and B) AII.1.

the sealing likely took place during Phase 3 or even Phase 4 (see Chapter 6.2.3.2). The sealing itself may be cautiously placed in the fourteenth to thirteenth century BCE on stylistic grounds (see Section 10.3.2 below), which would likely associate its original use with Phase 1 or 2.

10.3 Sealing iconography and inscriptions

10.3.1 Bulla and sealing AI.1

Bulla AI.1 was rolled three times with a cylinder seal. The three impressions on the bulla were consistently oriented so that in each instance, the text was legible from left to right (Figure 10.1.A). A similar consistency in sealing practice is attested on the comparably shaped bullae recovered in the excavations at nearby Tell Zubeidi.[2] Also, faint impressions of a cord were preserved on the reverse of Kani Masi Bulla AI.1. The orientation of the impressions, as well as the morphology and size of the bulla, suggest that it was used to seal a vessel or small container.[3] At the same time, a similarly shaped bulla from Nippur (bulla No. 1), which also preserves cord impressions, seems to be comparable to Bulla AI.1.[4]

2 Boehmer (1981, 76); Boehmer *et al.* (1985, Fig. 696.a-c; cf. 704).

3 For the size of door-sealings see, e.g. Zettler (1987) and Potts (1990).

4 Matthews (1992, No. 189).

The layout and iconography of Sealing AI.1 from Kani Masi are consistent with Matthew's 'First Kassite' type.[5] 'First Kassite' sealings characteristically enclose the text in registers that extend the entire height of the seal impression (see Sealing AII.1, below). The iconography of Sealing AI.1 depicts two standing figures accompanied by a Kassite 'rhomb,' a seated stag with horns, and a seated ram.[6] In typical Kassite style, the central figures face the same direction.[7] The lead figure in the scene, which is only preserved in the first impression on the bulla, is striding with his right leg forward. He is wearing an open tunic that is textured with a hatched fringe.[8] A knee-length loincloth is faint but visible underneath the tunic. The second standing figure is preserved only in the second sealing on the bulla, where he faces away from the initial line of the inscription. He has a long, rounded beard[9] and is wearing a closed tunic with his right arm upraised.[10]

10.3.1.1 Epigraphic and textual commentary

The three-fold sealing of the bulla allows for a composite reconstruction of a 4-line inscription. The inscription was only four lines in length, which can be concluded from the appearance of the Kassite 'rhomb' preserved on the first and third impressions. Additionally, the left edge of the seal can be observed in the initial impression, which is located on the left side of the bulla. Two additional impressions of the seal were subsequently rolled out on the bulla immediately to the right of the previous impression. The subsequent resealing of the bulla obscured the right edge of the sealing, as each succeeding impression was made over the top of the previous one. Therefore, the right edge of the sealing is very poorly preserved, and the extent of the lines is difficult to determine. At the same time, the height of the iconography on the sealing suggests that only one or two signs have been lost. The text in the legend is a prayer, which is a common genre found on Kassite seal(ing)s. It reads:

1) ⸢nu⸣-ha-ha-lam ⸢x⸣ [x]	Let him not forget ⸢x⸣ [x]
2) šu-ti ^{d}⸢ša$_{3}$$^{?}$⸣-[zu x]	Accept ⸢O Mar⸣[duk$^{?}$] [x]
3) šu-ti ⸢zu x⸣ [x]	Accept ⸢O x⸣[x]
4) lú -⸢x⸣ ka ⸢x⸣ [x]	The one who$^{?}$ ⸢x⸣ [x]

Line 1: The opening line of the prayer contains the most notable feature of this text. Epigraphically, the initial four signs are clear: ⸢nu⸣ ha ha lam. Clear traces of a sign, maybe two, are visible after /lam/ on the third impression of the sealing. The interpretation of the extant signs ⸢nu⸣ ha ha lam is not without difficulty. The crux of the issue is that the use of the negative nu is unexpected with modal verbal forms. One might also compare the Akkadian form *ul lišēlûnim*, which is preserved in a first-millennium bilingual grammatical exercise.[11] Jeremy Black remarked on this form, "…since there is no reason to assume that Babylonian was not the native language of the compiler, or scribe, we should assume a deliberately unidiomatic form intended in some way to illustrate the composition of the (unfortunately missing) Sumerian form".[12]

It is striking that the text begins with a verbal form. A Kassite sealing from the Hilprecht Collection, for example, begins with an Akkadian volitive form[13] and is followed by a succession of three additional volitives. What seems most likely is that ⸢nu⸣ ha ha lam represents a 'back formed' Sumerian expression of an Akkadian vetitive construction (e.g. *ay amši*) where nu represents the negative particle and ha-ha-lam ⸢x⸣ [x] represents an optative form of *mašû*. At the same time, it is worth noting that in Ebla's Treaty with Abarsal (ARET 13 5), which of course dates much earlier than the sealing, there appear to be "optative forms equipped with the preformative of negation nu- …, inexplicable from the point of view of the Standard Sumerian, in which this semantic connotation is given by the prohibitive preformative na- (*nu-hi- > na)…".[14]

Line 2: Either ^{d}⸢ša$_{3}$$^{?}$⸣-[zu…] or [šu]-ti ^{d}NIN [x x].[15]

Line 4: The lú sign at the beginning of the line is clear. The second sign on this line, however, is effaced, and only traces of it are still visible. It is possible that the first two signs may constitute a personal name. Alternately, one might compare other Kassite seal(ing)s that contain nominal phrases, such as lú-⸢sum⸣ ka-aš-[bar zi] ('one who ⸢gives$^{?}$⸣ a [firm] decis[ion]') or ^{d}DN umun g[al$^{?}$] 2) lú-kar zi-a ('the one who saves lives').[16]

10.3.2 Bulla and sealing AII.1

The Bulla and Sealing AII.1 are fragmentary (Figure 10.1.B). The extant portions partially preserve a single impression of a cylinder seal. The sealing has an iconographic register

5 Matthews (1990, 3, No. 7) suggests that this style is current from the late Old Babylonian period until the fourteenth century. Similar 'First Kassite' sealings include Matthews (1990, Nos. 84-85). Also, more generally, see Nos. 78-88; Delgado Stiehler-Alegria (1996, 91-92); De Clercq and Menant (1888, Nos. 188, 266).

6 Matthews (1990, 71-88).

7 Ibid., 50.

8 Matthews (1992, No. 85); Delgado Stiehler-Alegria (1996, 225).

9 Matthews (1992, Nos. 16-17); Delgado Stiehler-Alegria (1996, 91).

10 Matthews (1992, Nos. 14-15).

11 Black (1984, 124-125, 147).

12 Ibid., 50.

13 Matthews (1992, No. 80).

14 D'Agostino (1991, 168).

15 Matthews (1992, No. 85, l.2).

16 Ibid., No. 12.

on sealing larger than the text register; the latter only extends to the shoulder of the lone individual preserved on the sealing. This tendency is not uncommon among Matthews' 'pseudo-Kassite' seal(ing)s. The individual preserved on the sealing is bearded, wearing a closed tunic, and has his rear arm uplifted in a 'devotional' posture.[17] In front of the figure are a horned animal head and a seated, horned stag. The man is depicted holding an object in his left hand. The object being held is slightly effaced, but it may be some variety of stylised flora. At least three clear protrusions are visible extending upward from the object that the man holds. Collectively, these lines may constitute the calyx, petals, and stamen of a flower. Floral motifs are not a hallmark of Mesopotamian iconography; in Elam, however, they were current during the second and well into the first millennium BCE.[18] If the object in the man's hand is some type of flora, both the iconography and the layout of the sealing find their closest comparisons in the so-called 'pseudo-Kassite' sealings from Tell Zubeidi. One might compare, for example, seal(ing)s from Tell Zubeidi, especially Nos. 697a-b, which are dated to the fourteenth to thirteenth century BCE.[19] The Zubeidi sealings preserve a glyptic tradition closely related to the 'First Kassite' style above, yet are distinguished by Matthews as 'pseudo-Kassite' style. Unlike Zubeidi, however, no so-called 'Third Kassite sealings,' which are most likely chronologically very late Kassite period, were recovered from Kani Masi.[20]

10.3.2.1 Epigraphic and textual commentary

As for the inscription on the sealing, only two lines of text are preserved. The extant portions of the inscription are typical of late Kassite formulaic prayers found on seal(ing)s from the period. These prayers are often two or three lines in length and vary as to the deity which is addressed (e.g. DN umun gal arḫuš tuku-a).[21]

The inscription on Sealing AII.1 reads:

1 ^{d}utu umun g[al x x]	O Šamaš, g[reat] lord, [x x]
2 ⸢giš⸣-⸢tuku⸣ ⸢a-⸣[ra-zu]	Who favourably attends [to prayer]
3 [x x x x x]	

Line 1: There may be room for at least one, but no more than two signs at the end of this line.

Line 2: Epigraphically, the most likely reading of the last visible sign in the line is /a/. This suggests the restoration at the end of the line of ⸢a⸣-[ra-zu].[22] This is to be preferred over the reading ⸢giš⸣-⸢tuku$^{?}$⸣ ⸢šudu$_3$⸣.

10.4 Conclusions

These two sealings provide important provenanced examples of Kassite glyptic traditions outside of Nippur. On the one hand, the artistic styles are consistent with the Kassite traditions known from Nippur and the strongly Middle Babylonian/Kassite culture found at Kani Masi, especially Sealing AI.1. On the other hand, while the corpus of sealings is not large, it suggests possible hybridity. Sealing AII.1, for example, if depicting a man holding flora, may be compared with traditions known from Iran while still comfortably within Kassite glyptic traditions from the so-called 'pseudo-Kassite' tradition.

17 Matthews (1990, 20-21; 1992, 3).
18 Porada (1986, 181-185, esp. 184).
19 Boehmer *et al.* (1985, 70).
20 See further, Matthews (1990, 70ff).
21 Matthews (1992, 20, No. 120).
22 cf. Limet 1971 (No. 4.23 for giš-⸢tuku⸣ a-ra-zu).

11

The Later Second and Early First Millennium BCE in the Lower Sirwan Region

11.1 Introduction

In preceding chapters, we developed a detailed picture of the Late Bronze Age (LB) community at Kani Masi, the cultural practices of its inhabitants, and the site's settlement history (Chapters 6-10). We now move back to the regional scale. Below we present the settlement and landscape developments that took place in the later second and early first millennia BCE in the lower Sirwan region.

The temporal granularity of ceramic surface assemblages – much like in previous periods – also affects the LB and Iron Age (IA), both of which are characterised by significant degrees of formal conservatism. The local, stratified, and radiocarbon-dated pottery typology developed at Kani Masi's SRP046 and presented in Chapter 7.3, nonetheless, permits us to propose a comparatively fine-grained dating of LB surface assemblages (Table 11.1). By contrast, an almost complete absence of well-stratified IA assemblages in central and southern Mesopotamia as well as along the Sirwan/Diyala, means that the lower chronological limit of LB types is difficult to define. Many of the types that are well attested at Kani Masi and other Babylonian sites are produced well into the twelfth and eleventh centuries BCE,[1] and potentially for much longer. Cognate issues of long-term continuity in potting practices also affect our ability to date pottery associated with north Mesopotamian traditions. Many of the ceramic types commonly described as Middle Assyrian are present until the seventh century BCE, while a scarcity of stratified assemblages dating to the LB-IA transitional period and the early part of the IA further hampers our ability to date surface assemblages associated with the Neo-Assyrian cultural realm in a fine-grained manner.[2]

Recent excavations at IA sites in the western Zagros piedmont have also documented the presence of local traditions, influences from western Iran, as well as a long-term typological continuity across historical sub-periods. This includes the LB-IA transition from the late second to early first millennium BCE at the Dinka settlement complex in the Rania plain,[3] and the period spanning the collapse and aftermath of the Neo-Assyrian empire at the site of Bestansur in the Shahrizor plain.[4] A test sounding at Tepe Qalandari (SRP143) by the SRP in February 2018 produced architectural features and a radiocarbon date in the later IA, but few ceramic finds (see Section 11.4.3 below). In light of this lack of stratified local assemblages, and wider issues of chronological resolution, we – for now – aggregate all IA finds.

1 Armstrong and Gasche (2014).
2 Anastasio (2011, 348).
3 Herr (2019, 100-101).
4 Cooper and Gardner (2013).

Dates BCE	Period (Mesopotamia)	SRP phasing
1600-1400	Early Kassite	LB I
1400-1250	Middle Kassite	LB II
1250-1150	Late Kassite	LB III
1150-300	Second Dynasty of Isin and later Babylonian dynasties, Neo-Assyrian, Achaemenid	IA

Table 11.1 Approximate dates and periods discussed in this chapter.

Site	LB g.	LB I-II	LB III	IA	Site	LB g.	LB I-II	LB III	IA
SRP002				x	SRP107		x		x
SRP005				x	SRP108				x
SRP011				x	SRP109				x
SRP017		x			SRP113	x			
SRP018	x	x	x	x	SRP119	x			x
SRP019	x			x	SRP121				x
SRP021				x	SRP127	x			
SRP024				x	SRP129				x
SRP025		x		x	SRP132				x
SRP026				x	SRP143	x			x
SRP027				x	SRP150	x			
SRP032				x	SRP152	x			x
SRP039				x	SRP155	x			
SRP042		x			SRP165	x			
SRP043		x	x		SRP170				x
SRP046	x	x	x	x	SRP171		x		
SRP087			x		SRP172			x	
SRP089				x	SRP184		x	x	x
SRP092		x		x	SRP195				x
SRP095	x				SRP196	x			
SRP096				x	SRP197			x	
SRP102				x	SRP201				x
SRP106		x			SRP215		x	x	

Table 11.2 Late Bronze Age and Iron Age sites in the lower Sirwan region (see also Appendix I).

The transition from the Middle Bronze Age (MB) to the LB along the Sirwan brought with it a series of significant settlement transformations (Table 11.2 and Figure 11.1). Many of the small sites that had been established during the early second millennium BCE now lay abandoned, and several, spatially substantial, centres newly emerged. With the exception of a few long-term settlement foci, discontinuity also characterises the transition from the LB to the IA. Raw settlement counts increase, but these have to be considered in the context of the much longer timespan of the IA as defined here. Unlike the LB, whose recorded settlement communities appear to be culturally fairly unform and oriented towards Babylonia, IA surface assemblages display a more diverse range of cultural affiliations. Below we discuss relevant surface assemblages and emergent patterns in more detail, starting with sites that show evidence for occupation in the LB I-II and more general LB materials, Phases 1-2 at SRP046, followed by finds locations with signs of occupation in the final or LB III, broadly contemporary with SRP046 Phases 3-4. We then move on to evidence for settlement during the IA.

11.2 The lower Sirwan region in the Late Bronze Age I-II

Overall site numbers decline from a total of 32 attested in the MB to 26 with evidence for LB occupation. If we only consider sites with MB II surface assemblages, we note an increase from 7 to 12 in the LB I-II. Settled area also increases from the MB II to the LB I-II, which is carried by a small number of large new foundations.

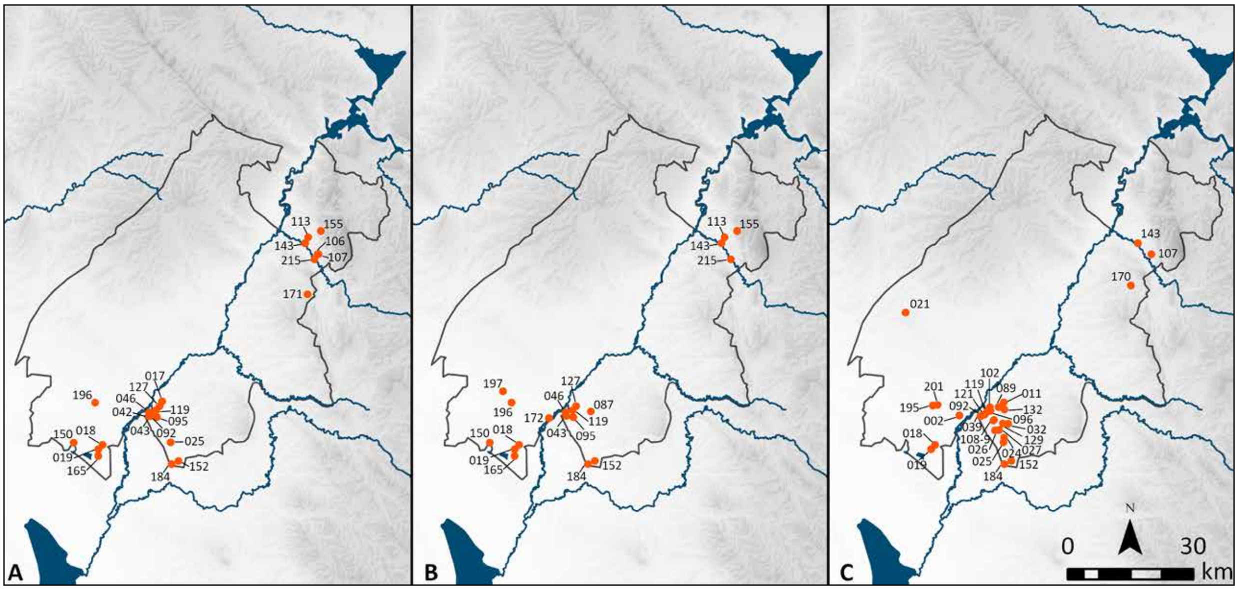

Figure 11.1 Maps showing A) Late Bronze Age I-II, B) Late Bronze Age III, and C) Iron Age sites in the lower Sirwan region (DEM GTOPO30 ©USGS).

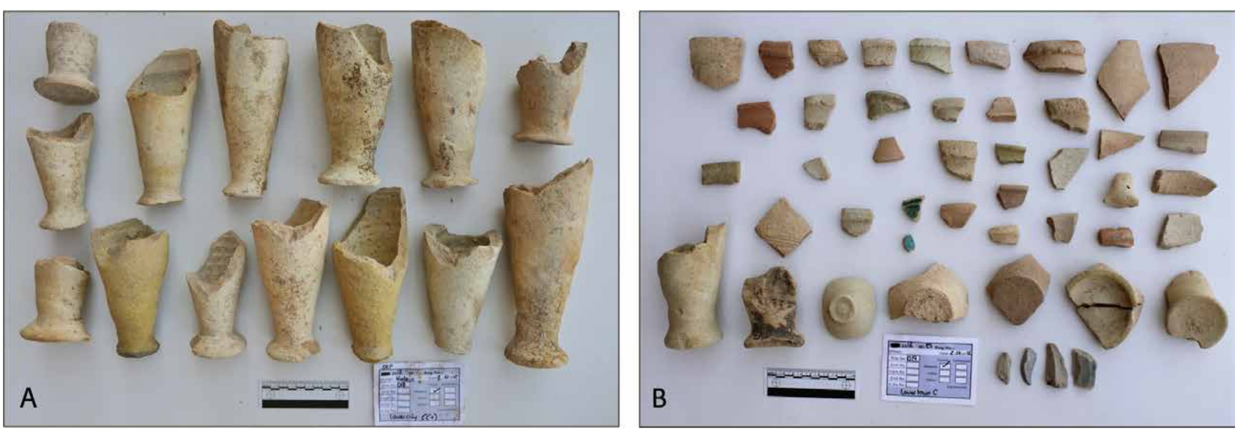

Figure 11.2 A) Footed goblets (Type F.1) from Tepe Kalan (SRP018) and B) Binah Bakh (SRP019).

11.2.1 Right bank

The main LB site in the northern part of the Qubba plain was the c. 21 ha large Tepe Kalan (SRP018), which consists of a tall mound and extensive lower town. The surface of the lower mound is littered with large quantities of footed goblets (Figure 11.2.A, Family F) and other shapes associated with the LB I-II such as large bowls (Figure 11.3.1), which are similar to Type B.2 and examples from Tell Yelkhi,[5] as well as a range of Type C.2 drinking cups (Figure 11.3.2-3). The nearby c. 13 ha site of Binah Bakh (SRP019, Figure 11.4) also produced several footed goblets (Figure 11.2.B, Type F.1).

The c. 10 ha multi-period mounded complex of Qubba Tepe (SRP150), which was already occupied during the Late Chalcolithic (LC) and the MB II, shows continuity in settlement into the LB. Surface finds include a series of small bowls with beveled rims (Figure 11.3.4-5) that find comparisons at Tell Yelkhi[6] and at Gurga Chiya.[7] Also present are a jug base (Figure 11.3.6) of Type E.2, two vats with multiple grooves at the rim (Figure 11.3.7-8), which match Type I.3 and also find parallels at Tell Yelkhi Level II[8] and Tell Khaiber,[9] as well as a squared large

5 Valtz (2002-3, Pl. 141.47-49).

6 Ibid., Pls. 141.18-40.

7 Wengrow *et al.* (2016, Fig. 5.37-40).

8 Valtz (2002-3, Pls. 144-145).

9 Calderbank (2021a, Pl. 13.1-5, Type 25.2).

Figure 11.3 Late Bronze Age I-II and Late Bronze Age general pottery from the lower Sirwan region.

Figure 11.4 Views of SRP019, SRP095, SRP127, SRP215, SRP155, SRP121, SRP096, and SRP089.

jar rim (Figure 11.3.9) with parallels at Gurga Chiya.[10] Taken together, the surface assemblage of Qubba Tepe tentatively points to a main phase of occupation in the LB I-II. A bowl with triangular everted rim (Figure 11.3.10) of Type B.4 from Quba (SRP165) can be dated more generally to the LB. North of the Gumar hill range, Tepe Gumar II (SRP196), which was also occupied during the preceding MB, produced a pithos ring base of Type I.5 (Figure 11.3.11), which can be dated to the LB.

11.2.2 Left bank

Across the Sirwan in the Bnkura plain, the imposing multi-period site of Tepe Imam Mohammed (SRP017) produced limited evidence for a LB I-II presence in the form of a fine, chaff-tempered bowl with simple rim (Figure 11.3.12) that compares to Type A.4, as well as examples from Tell Yelkhi[11] and Tell Khaiber.[12] The nearby SRP042 produced a more extensive LB I-II surface collection, including a footed goblet base (Figure 11.3.13, Type F.1), a jar rim with rounded band (Figure 11.3.14, Type H.1), a large, deep bowl/open pithos (Figure 11.3.15), and vat with multiple grooves at the rim (Figure 11.3.16, Type I.3), which also finds comparisons at Tell Yelkhi[13] and Tell Khaiber.[14] A vat with ribbed rim (Figure 11.3.17) from SRP092 most likely dates to the LB I based on comparisons with Tell Yelkhi Level 2[15] and Tell Khaiber.[16] At SRP119, two LB pithos rims (Figure 11.3.18-19) find close comparisons in Family I, with one closely matching Type I.1a. SRP095 (Figure 11.4) produced a fragmentary base of a Type F.2 goblet (Figure 11.3.20), and SRP127 (Figure 11.4) a triangular shaped LB jar rim of Type H.1 (Figure 11.3.21).

Further south, Tepe Sawz (SRP025), whose main occupation appears to date to the MB (see Chapter 5.4.2.2), also produced surface material indicative of occupation in the LB I-II such as two cup bases (Figure 11.3.22-23), which bear some similarities to Type C.2b, but have a lower foot that is more comparable to examples from Tell Yelkhi,[17] Tell Khaiber's latest phase 'goblets',[18] and cups from Bakr Awa.[19]

The surface collection of the substantial low mound of Bawa Plawi (SRP152), which is today surrounded by a fruit orchard and has been damaged by military installations, produced a number of sherds that can be dated to the LB. They include a jar with rounded band rim (Figure 11.3.24) of Type H.1 and a phithos with waisted band of Type I.1 (Figure 11.3.25). One of the most extensive LB occupations outside of Kani Masi is attested at the tall mound of Tepe Bawa Mahmood (SRP184). The site today functions as an active Islamic shrine and burial ground. Material dating to the LB I-II includes a complete profile of a wavy-sided bowl (Figure 11.3.26, Type A.2), small to medium sized jars with waisted (Figure 11.3.27, Type H.3) and triangular rims (Figure 11.3.28, Type H.2), as well as a pithos with waisted rim (Figure 11.3.29, Type I.2).

11.2.3 Uplands

The most convincing location for a LB I-II settlement in the Hawasan valley is Tepe Chalah Razay (SRP215, Figure 11.4), a small site atop a gravel terrace overlooking the river that was later re-used as a cemetery. Shapes that can be generally dated to the LB include a jar rim with waisted band (Figure 11.3.30, Type H.3) and a footed goblet base (Figure 11.3.31, Type F.2). Tepe Shaho (SRP106) produced a local variant of a band-rim bowl (Figure 11.3.32) very similar to examples from Tell Khaiber,[20] Tell Bderi,[21] and Failaka island.[22] The surface assemblage of the neighbouring SRP107 includes a jar with waisted band (Figure 11.3.33, Type H.3) that can be compared also to examples from Tell Yelkhi[23] and Tell Khaiber.[24] A bowl with everted rim (Figure 11.3.34) of Type B.4 and a possible pot stand (Figure 11.3.35), which is similar to an example from Gurga Chiya,[25] also point to a LB presence at Qala Mahmoud Aziz (SRP155, Figure 11.4), an extensive upland ruin field, whose most recent buildings still preserve the lower courses of mudbrick walls. A fragmentary footed goblet base comes from Tepe Ama Husen (SRP113), while Tepe Qalandari (SRP143) produced a bowl-rim (Type B.4) that also fits a general LB date (Figure 11.3.36).

11.2.4 North Mesopotamian connections

The vast majority of LB surface pottery in the lower Sirwan region shares strong similarities with the ceramic traditions of central and southern Iraq. Surface collections from a handful of sites also produced vessels that point to connections with northern Mesopotamia. This includes a series of nipple/button-base cups (Figure 11.5.1-3) from Tepe Kalan (SRP018) with parallels in Middle Jazirah Ib-IIa/b (c. 1400-1150 BCE) assemblages.[26] Similar shapes are also attested in LB II contexts at Gurga Chiya in the

10 Wengrow *et al.* (2016, Fig. 5.16-29).
11 Valtz (2002-3, Pl. 142. 1-7).
12 Calderbank (2021a, Type 5.1).
13 Valtz (2002-3, Pls. 144-145).
14 Calderbank (2021a, Pl. 13.1-5).
15 Valtz (2002-3, Pls. 144-145).
16 Calderbank (2021a, Type 25.2).
17 Valtz (2002-3, Pls. 149-150).
18 Calderbank (2021a, Type 40.2).
19 Miglus *et al.* (2013, Figs. 12, 14a).
20 Calderbank (2021a, Type 10.1).
21 Pfälzner (1995, Pls. 14e.140c-d).
22 Højlund (1987, Types 67B/C).
23 Valtz (2002-3, Pl. 154).
24 Calderbank (2021a, Type 70.3).
25 Wengrow *et al.* (2016, Fig. 5).
26 Pfälzner (2007, Pls. 16-17, 28-29); Duistermaat (2008, Fig. IV.91).

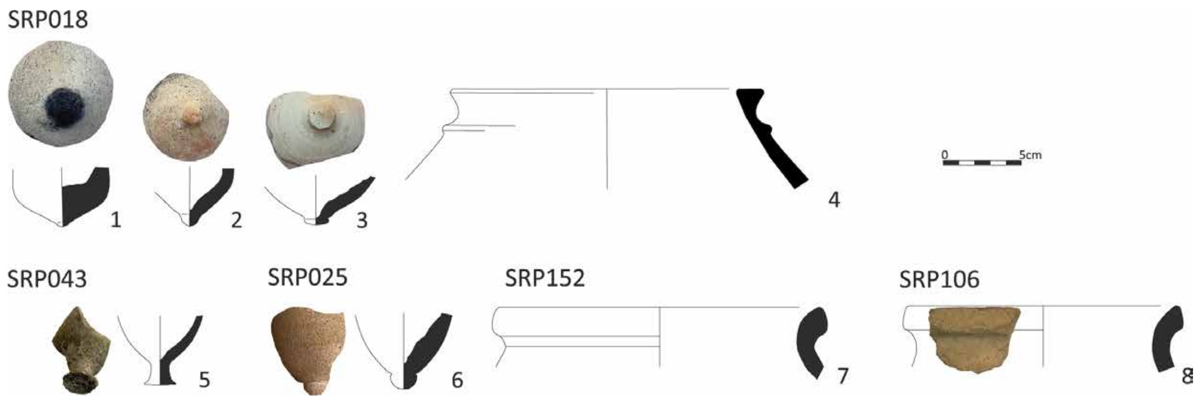

Figure 11.5 Late Bronze Age north Mesopotamian pottery types.

Shahrizor plain[27] and in Level 1C at Tell Yelkhi.[28] These forms, however, also continue into the early part of the IA, the Middle Jazirah III period, c. 1150-1050 BCE.[29] A possible jar with parallels in the Middle Assyrian assemblage is also present (Figure 11.5.4).[30]

Across the Sirwan, SRP043 produced the base of a possible Khabur ware stemmed goblet (Figure 11.5.5), with good comparisons in the Jazirah survey material.[31] Grey-ware fabric in the Jazirah is dated to c. 1400-1300 BCE and has parallels at Nuzi VI-II,[32] while the goblet shape is also attested in the Middle Jazirah III period.[33] It is also similar to straight-sided beakers from Tell al-Rimah.[34] In the Sawzblagh area, Tepe Sawz (SRP025) also produced a characteristic nipple/button base (Figure 11.5.6). Further south, the surface assemblage of Bawa Plawi (SRP152) includes a jar with short, everted neck similar to Middle Assyrian examples (Figure 11.5.7).[35] The same jar type is also attested at the upland site of Tepe Shaho (SRP106, Figure 11.5.8).

11.3 The lower Sirwan region in the Late Bronze Age III

11.3.1 Right bank

In the Gumar plain, SRP197 produced two ripple sided bowls (Figure 11.6.1-2, Type A.1), pointing to a LB III occupation, as did Tepe Asyaw (SRP172, Figure 11.6.3). Further north along the Sirwan, several tall footed goblets were found during construction work in the basement of an electronics shop in the centre of the modern town of Kalar, suggesting a LB III presence in this area.

11.3.2 Left bank

On the left bank of the Sirwan, the surface assemblage of SRP043, which forms part of the Kani Masi site cluster, includes a goblet base with pronounced stem (Figure 11.6.4, Type F.5). Further east, the small site of Gakul Tapa II (SRP087) produced two ripple sided bowl rims (Figure 11.6.5-6, Type A.1). Tepe Bawa Mahmood (SRP184, Figure 11.7.A) also yielded a large collection of pottery dating to the LB III, which comes from an extensive architectural phase just below the modern shrine at the top of the mound. In 2017, the SRP documented part of a floor made of baked bricks, very similar to those of Phase 4 at Kani Masi (Figure 11.7.B-C). The surface assemblage from Tepe Bawa Mahmood includes characteristic cup bases (Figure 11.6.7-9, Type C.1b), a bowl with internal profile (Figure 11.6.10, Type B.1), a footed goblet base (Figure 11.6.11, Type F.2b), and a large jar with triangular rim (Figure 11.6.12, Type B.4).

11.3.3 Uplands

The only convincing LB III pottery from the Hawasan region in the northern uplands comes from Tepe Chalah Razay (SRP215), where a LB surface collection also includes a ripple sided bowl (Figure 11.6.13, Type A.1).

27 Wengrow *et al.* (2016, Fig. 5.51-55).
28 Valtz (2002-3, Pl. 160.28-32).
29 Pfälzner (2007, Pl. 33).
30 Ibid., Pl. 16.155.
31 Ibid., Pls. 16.158-60, 17.170-3, 29.338.
32 Ibid., 241.
33 Ibid., Pl. 33.392.
34 Postgate *et al.* (1997, Pl. 67).
35 Duistermaat (2008, Figs. IV.79-89, 109).

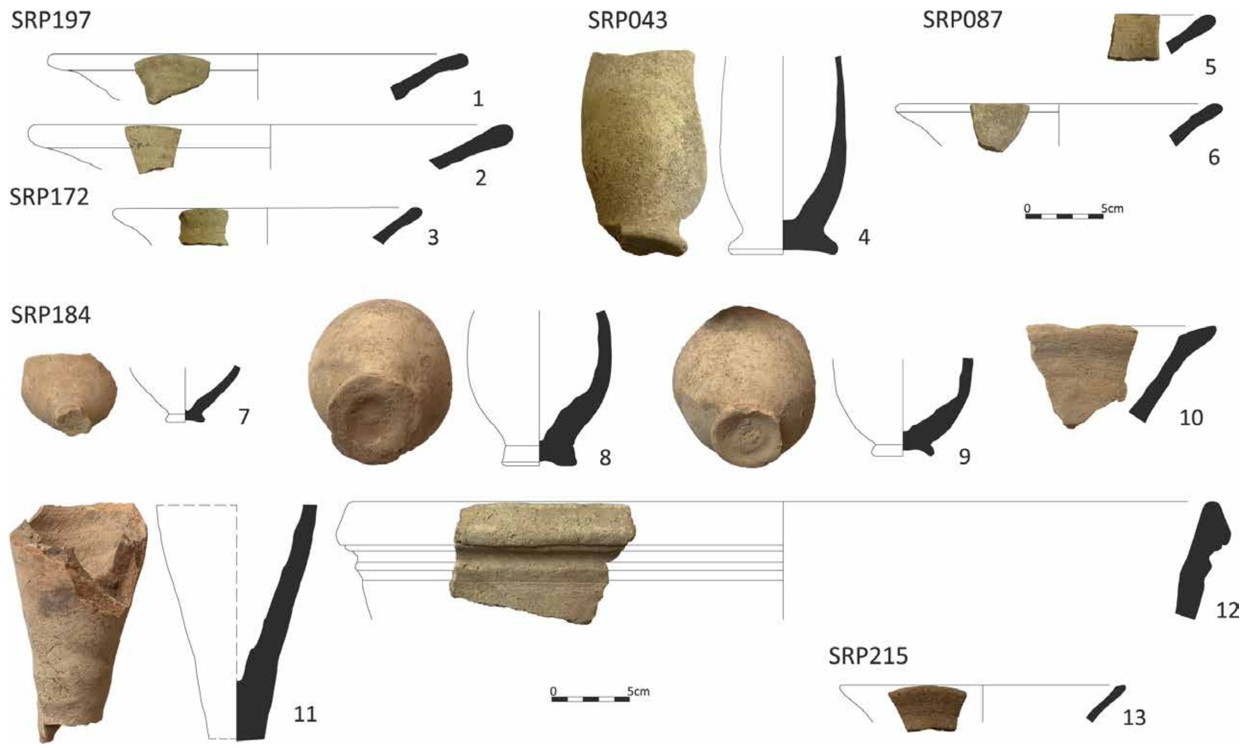

Figure 11.6 Late Bronze Age III pottery from the lower Sirwan region.

Figure 11.7 A) Tepe Bawa Mahmood (SRP184), B-C) Late Bronze Age-Early Iron Age baked brick floor.

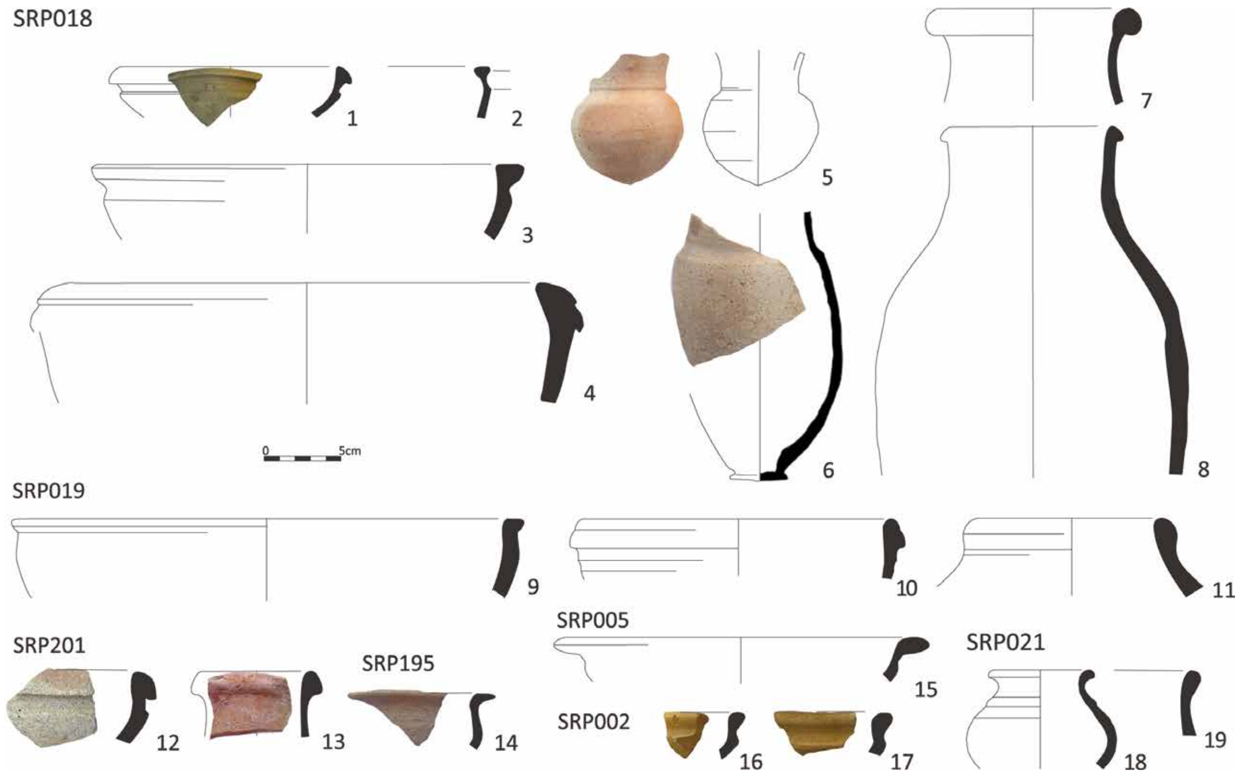

Figure 11.8 Iron Age pottery from the south-western plains.

11.4 The lower Sirwan region in the Iron Age

Evidence for occupation during the IA comes from 30 sites in the SRP survey region. Iron Age sites are found scattered across the research region but are most numerous in the Bnkura plain.

11.4.1 Right bank

One of the largest IA assemblages comes from both the high mound and lower town of Tepe Kalan (SRP018), suggesting that the site continued as a central place from the LB into the first millennium BCE. Surface collections include a carinated bowl with sharp-cut lip made from fine fabric (Figure 11.8.1), which presents a common Neo-Assyrian vessel type,[36] a range of other carinated bowl types (Figure 11.8.2-3),[37] and a large, deep bowl with a thickened and ribbed rim (Figure 11.8.4) that also finds parallels in the IA of northern Mesopotamia.[38] This is also the case for a beaker with pointed base and everted rim (Figure 11.8.5)[39] and several types of necked storage jars with ovoid or sinuous profiles (Figure 11.8.6-8) with comparisons in a range of Middle and Neo-Assyrian assemblages[40] and at sites in the western Zagros piedmont such as the cemetery of Gir-e Gomel[41] and the Dinka settlement complex.[42]

The nearby site of Binah Bakh (SRP019) also produced several pieces, though rather less diagnostic, that may date to the IA. This includes a bowl with everted rim (Figure 11.8.9),[43] a bowl with ribbed rim (Figure 11.8.10),[44] and perhaps also a necked jar (Figure 11.8.11).[45] A bronze fibula (Figure 11.9.A) can be dated to the eighth century BCE or later.[46] A more enigmatic baked clay object with a squared, pitted base and a fragmentary handle in the shape of a feline rump, which may have served as a stamp or perhaps a grooming tool, was also found at this site (Figure 11.9.B).

36 Anastasio (2010, Type BW_07).

37 Ibid., Type BW_07.c; Barbanes Wilkinson and Lumsden (2022, Fig. 2.5.7, Pl. 26.15).

38 Anastasio (2010, Type BW_02); Barbanes Wilkinson and Lumsden (2022, Fig. 2.8.7, Pl. 7.6).

39 Anastasio (2010, Type BT_01).

40 Pfälzner (2007, Fig. 33.384); Anastasio (2010, Types SJ_03, SJ_06); Barbanes Wilkinson and Lumsden (2022, Fig. 2.16.17, Pl. 17.2).

41 Morandi Bonacossi *et al.* (2018, Fig. 16).

42 Herr (2019, Fig. G1.4.2).

43 Anastasio (2010, Type BW_01b).

44 Ibid., Type BW_01b/c; Barbanes Wilkinson and Lumsden (2022, Figs. 2.5.5, 2.7.7, Pl. 14.1-2).

45 Anastasio (2010, Type SJ_06); Barbanes Wilkinson and Lumsden (2022, Fig. 2.17.7-9, Pl. 17.20-22).

46 Stronach (1959, 196-203); Calmeyer (1969, 99-98, Fig. 99, Gruppe 46, Type III 7).

Figure 11.9 A) Bronze fibula and B) baked clay object from Binah Bakh (SRP019).

Surface collections in the Gumar plain also include small quantities of IA pottery. SRP201 produced a carinated bowl (Figure 11.8.12) and the rim of a necked jar (Figure 11.8.13), while SRP195 yielded a bowl with everted, pointy rim and sinuous profile (Figure 11.8.14), which finds comparisons, for instance, in the Godin II assemblage.[47] SRP005 also produced a bowl with everted rim (Figure 11.8.15) with parallels at Bestansur,[48] while the surface assemblage of Tepe Charmu (SRP002) includes two smaller carinated bowls (Figure 11.8.16-17).[49] Surface collection at Qala Kon (SRP021) produced a small jar (Figure 11.8.18) that finds parallels in the Neo-Assyrian repertoire, including at Nimrud,[50] as well as the simple rim of a jar with constricted neck (Figure 11.8.19).

11.4.2 Left bank

Iron Age sites are more numerous in the Bnkura plain to the east of the Sirwan. This includes small numbers of surface finds from War Qatar II (SRP102), which produced a large carinated bowl (Figure 11.10.1), and SRP119, which yielded the rim and neck of a closed vessel with triangular rim (Figure 11.10.2)[51] and a body sherd of a fine-ware carinated bowl (Figure 11.10.3).[52] The surface assemblage of SRP121 (Figure 11.4) includes a deep and lightly carinated bowl (Figure 11.10.4) as well as a necked jar with everted rim (Figure 11.10.5). Tell Majid (SRP039) also produced a necked jar with everted rim (Figure 11.10.6),[53] and SRP092 a jar with grooved rim (Figure 11.10.7) that can be dated to the late and post-Assyrian IA.[54] The SRP096 (Figure 11.4) surface assemblage includes a carinated bowl (Figure 11.10.8) that can be compared to examples from Godin II[55] and a jar or crater with everted rim made from a similar fabric (Figure 11.10.9) with broad parallels at Godin[56] and in Neo-Assyrian assemblages.[57]

SRP089 (Figure 11.4) produced the rim of a large bowl or crater (Figure 11.10.10), while SRP108 and SRP109 each yielded a small carinated bowl (Figure 11.10.11-12). A necked jar (Figure 11.10.13) comes from Tepe Gawr (SRP011, Figure 11.11), whose main occupation likely dates to the Parthian and Sasanian periods. SRP132 produced a carinated bowl (Figure 11.10.14) and necked jar with a band around the neck (Figure 11.10.15), SRP129 (Figure 11.11) a small carinated bowl (Figure 11.10.16),[58] and Tapa Musa

47 Gopnik (2011, Fig. 7.54.46-47).
48 Cooper and Gardner (2013, Fig. 5.18.8).
49 Anastasio (2010, Type BW_04); Barbanes Wilkinson and Lumsden (2022, Type B7).
50 Anastasio (2010, Type MV_01).
51 Ibid., Type BW_06.
52 Ibid., Type BW_30.
53 Ibid., Type BT_06b.
54 Barbanes Wilkinson and Lumsden (2022, Type J5).
55 Gopnik (2011, Fig. 7.54.48).
56 Ibid., Fig. 7.53.28.
57 Anastasio (2010, Type KR_01b).
58 Ibid., Type BW_04a.

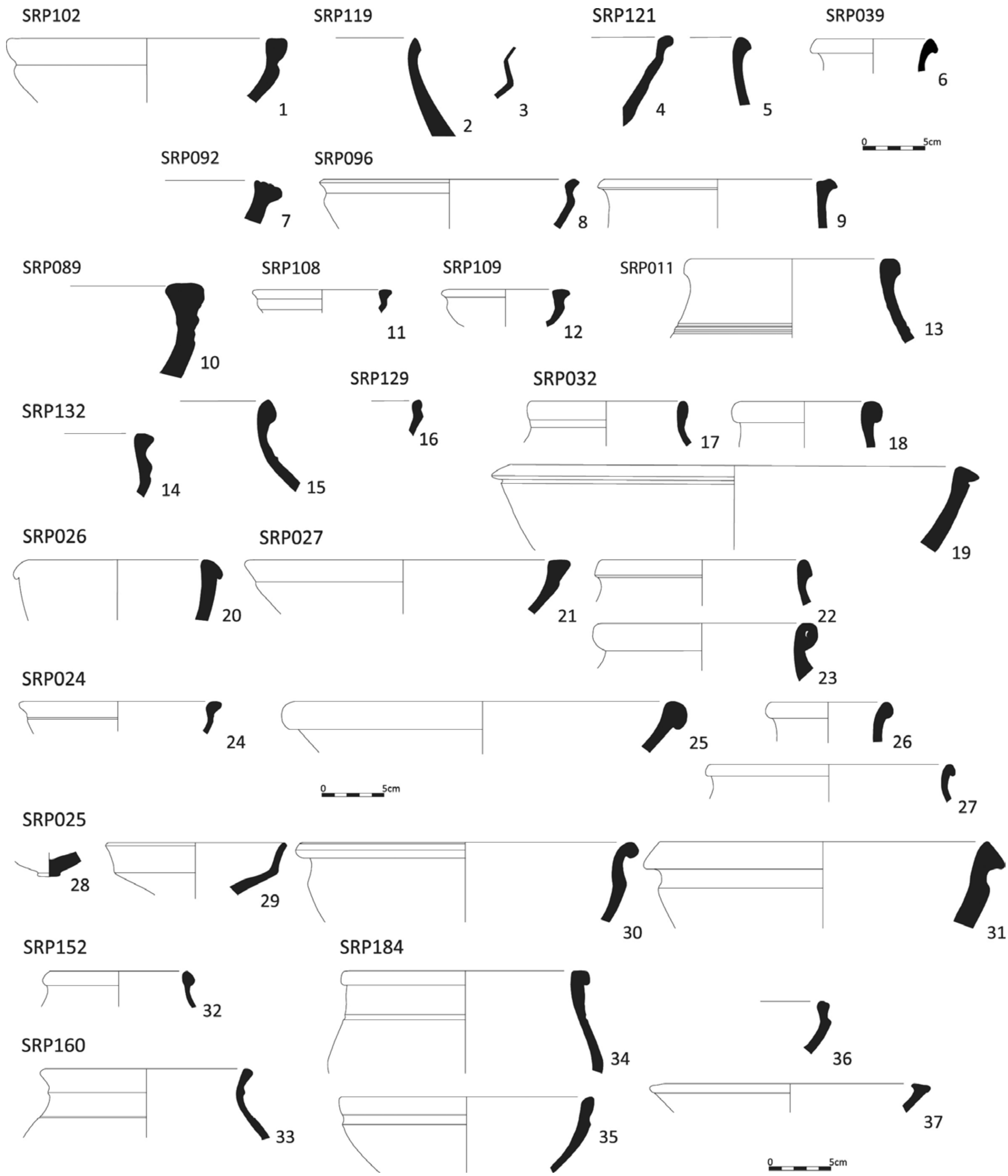

Figure 11.10 Iron Age pottery from the Bnkura plain.

Figure 11.11 Views of SRP011, SRP129, and SRP026.

Figure 11.12 A) On-the-ground and B) aerial view of Tepe Qalandari (SRP143), C-D) exposed baked brick pavement and wall foundations in TT2, and E) the TT1 exposure of a partial wall line.

Osman II (SRP032) two necked jars (Figure 11.10.17-18) and a large bowl with everted rim (Figure 11.10.19).[59]

The surface collection of Sayid Sikhi I (SRP026, Figure 11.11) includes a large bowl with everted rim (Figure 11.10.20) with general parallels at Godin II[60] and in the Assyrian repertoires.[61] Sayid Sikhi II (SRP027) yielded a carinated bowl (Figure 11.10.21), a necked jar (Figure 11.10.22), and a pot stand (Figure 11.10.23) with a parallel at Fort Shalmaneser.[62] Finds from SRP024 also include a carinated bowl (Figure 11.10.24) with parallels at Bestansur,[63] a large bowl with rounded rim (Figure 11.10.25), the rim of a necked jar (Figure 11.10.26), and a large jar with everted rim (Figure 11.10.27) with parallels at Bestansur.

The nearby mound of Tepe Sawz (SRP025) also produced several IA sherds, including a button base (Figure 11.10.28), a small carinated bowl with simple rim (Figure 11.10.29),[64] large carinated bowls with rounded rims (Figure 11.10.30), the former of which is widely attested in the western Zagros piedmont zone including

59 Anastasio (2010, Type BW_02a); Barbanes Wilkinson and Lumsden (2022, Type B6a); Gopnik (2011, Fig. 7.56.76, 78).

60 Gopnik (2011, Fig. 7.56.76).

61 Anastasio (2010, Type BW_21).

62 Oates (1959, Pl. 39.111).

63 Cooper and Gardner (2013, Fig. 5.18.8-10).

64 Anastasio (2010, Type BW_06b); Barbanes Wilkinson and Lumsden (2022, Type B3); Hausleiter (2010, Pl. 59).

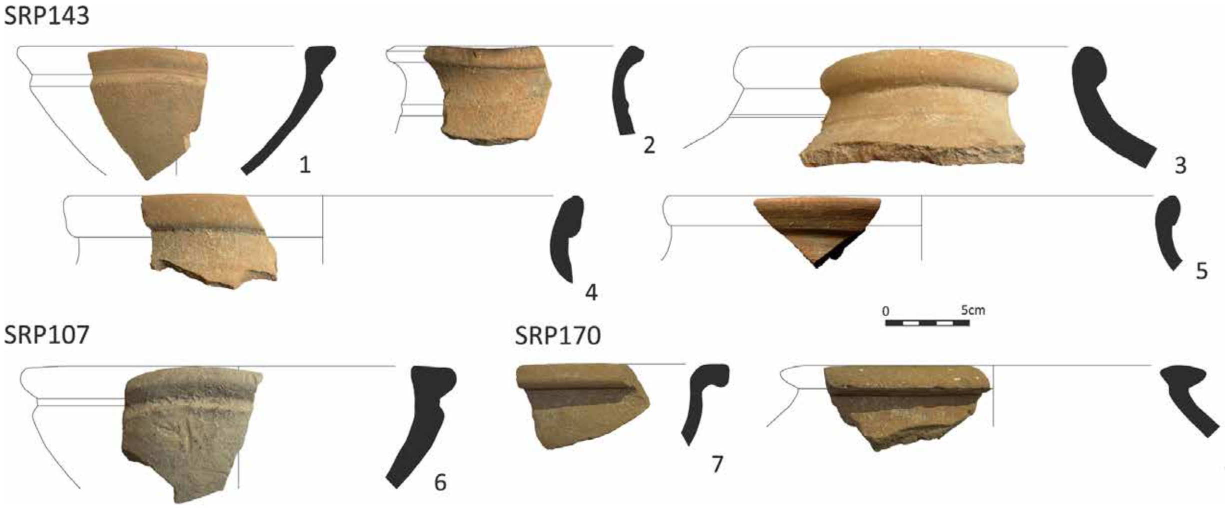

Figure 11.13 Iron Age pottery from northern and upland sites.

at Bestansur[65] and the Dinka settlement complex,[66] as well as a large carinated bowl with pointed rim (Figure 11.10.31).[67]

Further south, the surface assemblage of Bawa Plawi (SRP152) includes a necked jar rim (Figure 11.10.32) with broad parallels at Bestansur[68] and across northern Mesopotamia.[69] A jar with everted rim and ribbed bands (Figure 11.10.33) from SRP160 can be compared to jar forms at Godin II.[70] Tepe Bawa Mahmood (SRP184), which featured a substantial LB settlement, also produced a few transitional LB-IA and IA sherds, including a jar with squared rim (Figure 11.10.34) found in the Jazirah III period[71] and a carinated bowl (Figure 11.10.35) with a similar chaff and grit tempered fabric, as well as a mineral-tempered smaller carinated bowl (Figure 11.10.36),[72] and a larger bowl with thickened rim (Figure 11.10.37).[73]

11.4.3 Uplands

A small number of sites in the northern uplands also produced surface finds, and in one instance stratified contexts, dating to the first millennium BCE. Tepe Qalandari (SRP143, Figure 11.12.A-B) consists of an 18 m tall mound and lower town located to the south of the small BA site of Tepe Ama Husen (SRP113) in the Hawasan valley. Part of the lower town, which is covered by a relatively dense sherd scatter, is being eroded away by the river. The site was first surveyed by the SRP in 2015 and revisited for a 2-day rescue excavation in February 2018 following the disturbance of the site's river-facing side by an earthquake in November 2017 (see also Chapter 1.3). Work included clearing and enlarging the area where the earthquake had exposed a well-preserved baked brick floor and what appear to be wall foundations built with large (c. 20-30 cm diameter), smooth-sided stones interspersed with smaller pebbles (c. 3-8 cm) (Figure 11.12.C-D). The fill above the baked brick surface was almost completely devoid of artefactual material, bar a few very small ceramic fragments.

A sounding (TT1) of 4 × 3 m was placed c. 2 m from the easternmost edge of the paved brick surface (Figure 11.12.E). Following the removal of topsoil and several pits, which contained almost no cultural materials, two small segments of stone walls were revealed at around the same level as the baked brick floor nearby. A radiocarbon date of 751-413 cal. BCE (two sigma, see also Appendix II.1) from a fill deposit above the stone wall in TT1 broadly places the construction of the wall and adjacent baked brick floor in the middle quarters of the first millennium BCE, either in the later Assyrian or Achaemenid period.

The soundings at Tepe Qalandari produced a surprisingly limited assemblage of pottery, mostly very small and undiagnostic. The surface assemblage, which also includes a limited collection of BA finds (see Section 11.2.3 above and Chapter 5.4.2.3), consists of a large carinated bowl (Figure 11.13.1) with broad parallels at Bestansur,[74] a necked jar with everted rim and applied band (Figure 11.13.2) with general comparisons

65 Cooper and Gardner (2013, Fig. 5.18.9-13).
66 Herr (2019, Fig. G1.3).
67 Anastasio (2010, Type BW_07).
68 Cooper and Gardner (2013, Figs. 5.19.7-10; 5.21.10-11).
69 Anastasio (2010, Type SJ_06).
70 Gopnik (2011, Fig. 53.32).
71 Pfälzner (2007, Pl. 31.367).
72 Anastasio (2010, Type BW_04a).
73 Hausleiter (2010, Pl. 60.SF 23.2).
74 Cooper and Gardner (2013, Fig. 5.18.8-10).

at the Dinka settlement complex[75] and at Godin II,[76] and a necked jar with thickened, rounded rim (Figure 11.13.3) that compares to examples from Bestansur Phase 1.[77] Two jars with everted thickened rims are also attested (Figure 11.13.4-5), with one featuring a surface treatment noted also at Bestansur.[78]

SRP107 also produced a large carinated bowl (Figure 11.13.6), while the surface assemblage from the prominent upland mound of Girdi Maskut (SRP170) includes a large bowl with everted rim and sinuous profile (Figure 11.13.7)[79] and a jar with pronounced rim (Figure 11.13.8) similar to hollowed-rim jars in northern Mesopotamia.[80]

11.5 Conclusions

Both the *Land Behind Baghdad* and later surveys and excavations in the Hamrin have characterised the LB as a period of dramatic settlement reduction and ruralisation, followed by a further drop in site numbers in the IA.[81] Adams paints a rather bleak picture of the lower Diyala region during the LB, describing it as "a border district astride the routes taken by invading Assyrian and Elamite armies and probably shifting or contradictory in its relations with outside powers", where small and often newly founded villages such as Tell Abu Harmal and Tell al-Dhiba'i clustered around a few regional centres of limited size.[82]

In the Hamrin, settlement numbers diminished from about 20 sites with evidence for occupation during the Old Babylonian period to eight sites during the LB.[83] LB sites, moreover, are smaller in size than in the preceding period and many are new foundations. Similar to the lower Diyala basin, a small, regional centre at Tell Yelkhi[84] appears surrounded by a scatter of agricultural estates and villages such as Tell Kesaran,[85] Tell Ahmed al-Mughir,[86] Tell Ajamat,[87] Tell Imlihiye, and Tell Zubeidi.[88] Cuneiform tablets and cylinder seals from Tell Imlihiye and Tell Zubeidi provide insights into a localised economy and its interdependencies, while the mention of several Kassite kings[89] suggests some participation in wider Babylonian cultural and political spheres.

The data gathered by the SRP points to very different developments in the lower Sirwan region during the later second millennium BCE (Figure 11.14). The landscapes stretching out on either side of the Sirwan were dotted with small-to-medium LB sites as well as several larger, and, in some cases newly established, settlements. Overall site numbers decline somewhat from the MB. However, if we only take into account sites with MB II surface assemblages, we note an increase in the LB I-II. Underlying these developments is a significant rupture of place, which sees 18 MB sites abandoned, and 12 sites newly founded in the LB. Abandoned MB sites are mainly small settlements between 0.3 and 2 ha in size. They also include two potentially larger sites (SRP164 and SRP208), whose MB occupations, however, are likely to have been significantly smaller than their total recorded site-sizes. Also notable is the seeming lack of a LB presence at long-term upland sites such as Tepe Dar (SRP178) or Tepe Qaburstan (SRP180).

The majority of LB new foundations too are small, and several (SRP042, SRP043, SRP092, SRP095) likely formed part of the extended LB settlement complex at Kani Masi, with SRP046 at its centre (see Chapters 5.2 and 6.2). With a total of c. 40 ha, the Kani Masi cluster is among the largest new LB settlements. Other large new foundations include Binah Bakh (SRP019, c. 13 ha) and Tepe Bawa Mahmood (SRP184, c. 8 ha). Several new LB foundations seemingly occupy sites that had never before been settled, while some sites with very long occupation histories, or with preceding MB occupations, including Tepe Imam Mohammed (SRP017), Tepe Kalan (SRP018), Tepe Sawz (SRP025), Bawa Plawi (SRP152), Tepe Asyaw (SRP172), and Tepe Gumar II (SRP196) in the southern plains, and Tepe Ama Husen (SRP113), Tepe Shaho (SRP106), Tepe Qalandari (SRP143), and Chia Raza Tepe (SRP171) in the north, show continuity or recurrent settlement.

Much like the LB stratified material from Kani Masi (SRP046), surface assemblages from the vast majority of LB sites point to strong and varied connections with Babylonia. One of the larger sites, Tepe Kalan (SRP018), also includes surface pottery with links to northern Mesopotamia, foreshadowing the development of a more intensive cultural connection during the IA.

Abandoned MB as well as newly established LB settlements occupy parts of the Sirwan landscapes that have very similar environmental affordances (Figure 11.15), suggesting broad cultural continuities in local settlement and subsistence practices. This is also indicated by botanical and faunal data from the MB I site of SRP094 and LB SRP046 (see Chapters 5.3.1 and 8). The reasons

75 Herr (2019, Fig. G.1.1.9).
76 Gopnik (2011, Fig. 7.53.18).
77 Cooper and Gardner (2013, Fig. 5.19.5).
78 Ibid., Fig. 5.22.
79 Herr (2019, Fig. G.1.3).
80 Hausleiter (2010, Pls. 116.TM 2 R2, 117).
81 Adams (1965, 33, 56); Boehmer *et al.* (1985); Young and Killick (1988, 4-5).
82 Adams (1965, 53).
83 Young and Killick (1988, Figs. 6-7).
84 Invernizzi (1980); Bergamini (1985).
85 Valtz (1985).
86 Gibson (1981, 145-146).
87 Ibid., 147-149, 153-156.
88 Boehmer *et al.* (1985).
89 Kessler (1982).

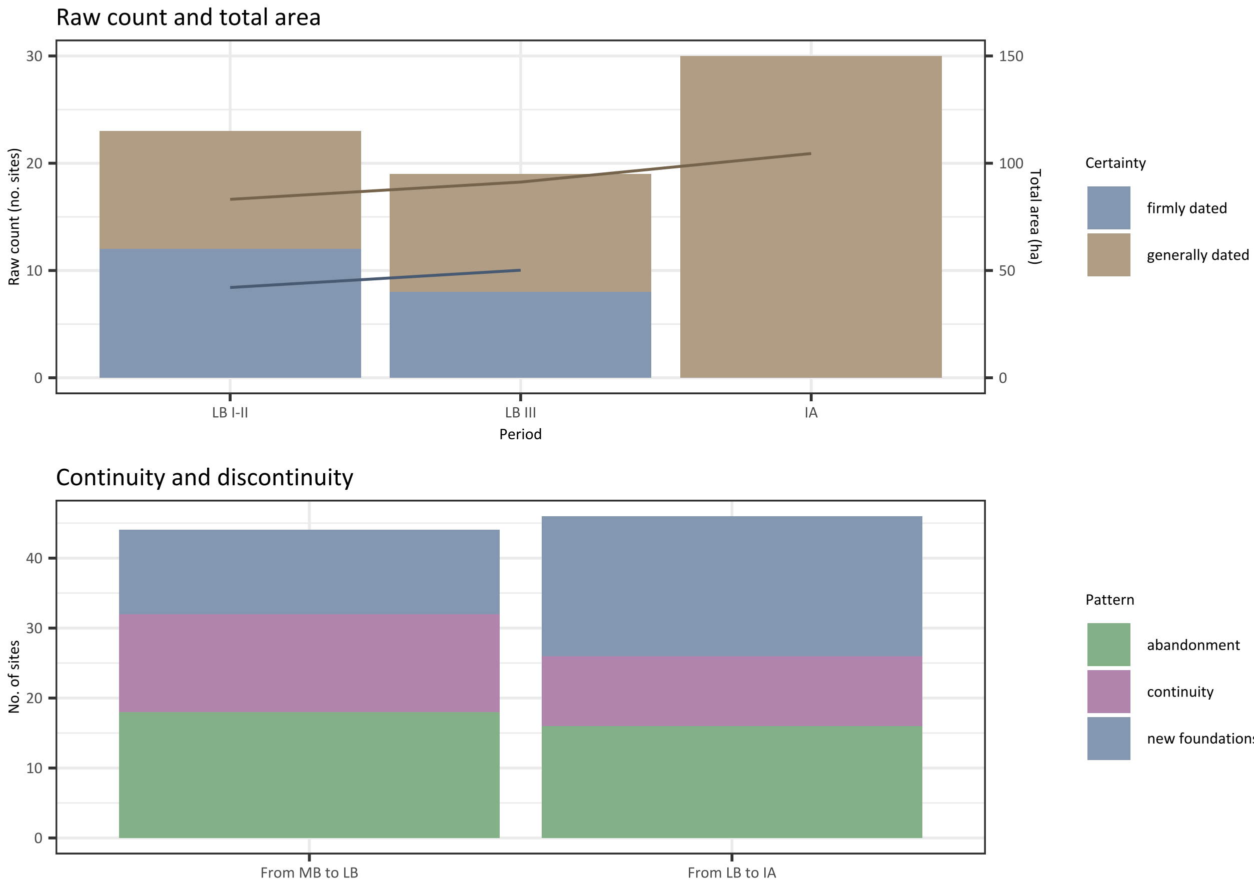

Figure 11.14 Late second and first millennium BCE site counts, total settled areas, and patterns of continuity and discontinuity.

behind the evident lack of persistence that characterises especially smaller settlements in the region, therefore, are unlikely to track drastic changes in subsistence practices, or environmental factors such as soil or climatic variation.

Speleothem records, including the Kuna Ba sequence, suggest that, following a period of favourable climatic conditions in the twentieth century BCE, the regional climate began to shift towards a more arid phase from the MB II (c. 1860 BCE). More arid conditions, with intermittent intervals of higher precipitation, continue into the LB I-II, while persistently higher precipitation is notable between c. 1360 to 1140 BCE or the LB III. This is followed by a drier phase in the early IA until the onset of what Sinha *et al.* describe as a megapluvial from c. 920 to 730 BCE and a subsequent megadrought (see also Chapter 1.2).[90]

As a result of the more arid conditions prevailing in the LB I-II, only sites in the northern upland areas of the SRP research area were located in the rain-fed agricultural zone, receiving in excess of 300 mm annual precipitation. The majority of LB I-II sites in the southern plains, including almost all new foundations, were located in an uncertain rain-fed zone that received between c. 250-300 mm average annual precipitation, while some of the major southern centres, Tepe Bawa Mahmood (SRP184) and Tepe Kalan (SRP018), fall into the uncertain arid zone of c. 200-250 mm average annual rainfall (Figure 11.16). The wetter conditions of the LB III mean that all southern sites lay above the 250 mm isohyet.

Given the significant annual risks involved in dry-farming in the region during the LB, it is somewhat surprising to note that the vast majority of LB sites are located close to seasonal streams, whose volume and duration is directly correlated with precipitation in higher altitudes. Only three sites are located within less than 500 m of a perennial stream or river. This suggests that local communities had developed sophisticated mechanisms to buffer against prevalent environmental risks, and that they practiced subsistence economies rather different from grain-centred Mesopotamian models. Data collected at LB Kani Masi (SRP046) and discussed in detail in Chapter 8, suggest that LB communities managed environmental uncertainty by practicing a diverse range of subsistence strategies, which took advantage of the

90 Sinha *et al.* (2019).

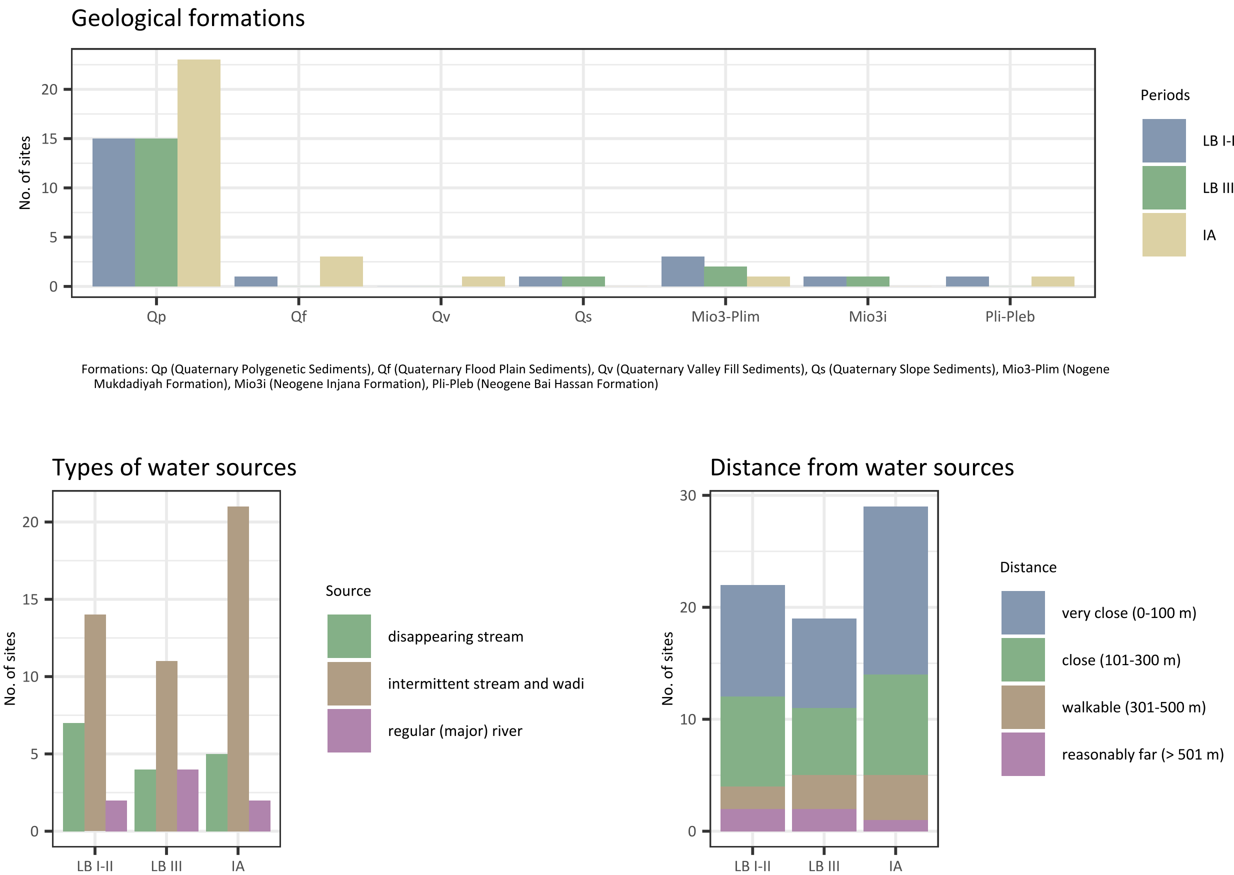

Figure 11.15 Soil quality and accessibility of water for late second and first millennium BCE sites (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

different ecozones in the immediate and wider hinterland of the site. They include the planting of a range of winter and summer crops, the husbandry of sheep, goat, and cattle, alongside an emphasis on pig-rearing, as well as the exploitation of seasonal wild resources. Widespread evidence for meat consumption, including in mundane contexts, points to animals and their management as an important pillar of the local subsistence economy. Limited evidence for storage across the site in Phases 1 and 2, which span the more arid conditions of the LB I-II, moreover, might indicate that food insecurity was not a major issue.

A very similar overall picture emerges for the subsequent IA. Surveys in the Hamrin identified only two sites with Neo-Assyrian surface finds, and four with Achaemenid material. This led Young and Killick to suggest that the region was largely devoid of settlement due to its geopolitical situation as a borderland between warring Assyria and Babylonia, and – invoking a central *topos* in the narration of the region's history (see Chapter 1.3) – at the mercy of hypothetical transhumant and pastoral nomads.[91]

Adams was keenly aware that low IA site counts may be artefacts of coarse chronologies and limited stratified comparative assemblages. Nonetheless, he suggests that "during the first third of the first millennium B.C., … external pressures seem to have forced the large-scale abandonment of settled irrigation agriculture as the prevailing mode of life, and probably to have reduced the total population of the region very substantially as a consequence" in the lower Diyala basin, and to the point where "traces of settled life had almost disappeared".[92] Settlement numbers rise again from the Neo-Babylonian period onwards.

As we have discussed above and in Chapters 6 and 7, we lack for now a satisfactory understanding of ceramic developments following the end of the LB III in Babylonia. The absence of distinct ceramic traditions in Phases 4 and 5 at Kani Masi, however, suggests significant continuity at least into the final second and early first millennium BCE. This means that some of the sites identified as LB may well continue into, or, alternatively, were established during the LB-IA transition. In addition,

91 Young and Killick (1988, 4-5, Figs. 8-9).

92 Adams (1965, 56, 58).

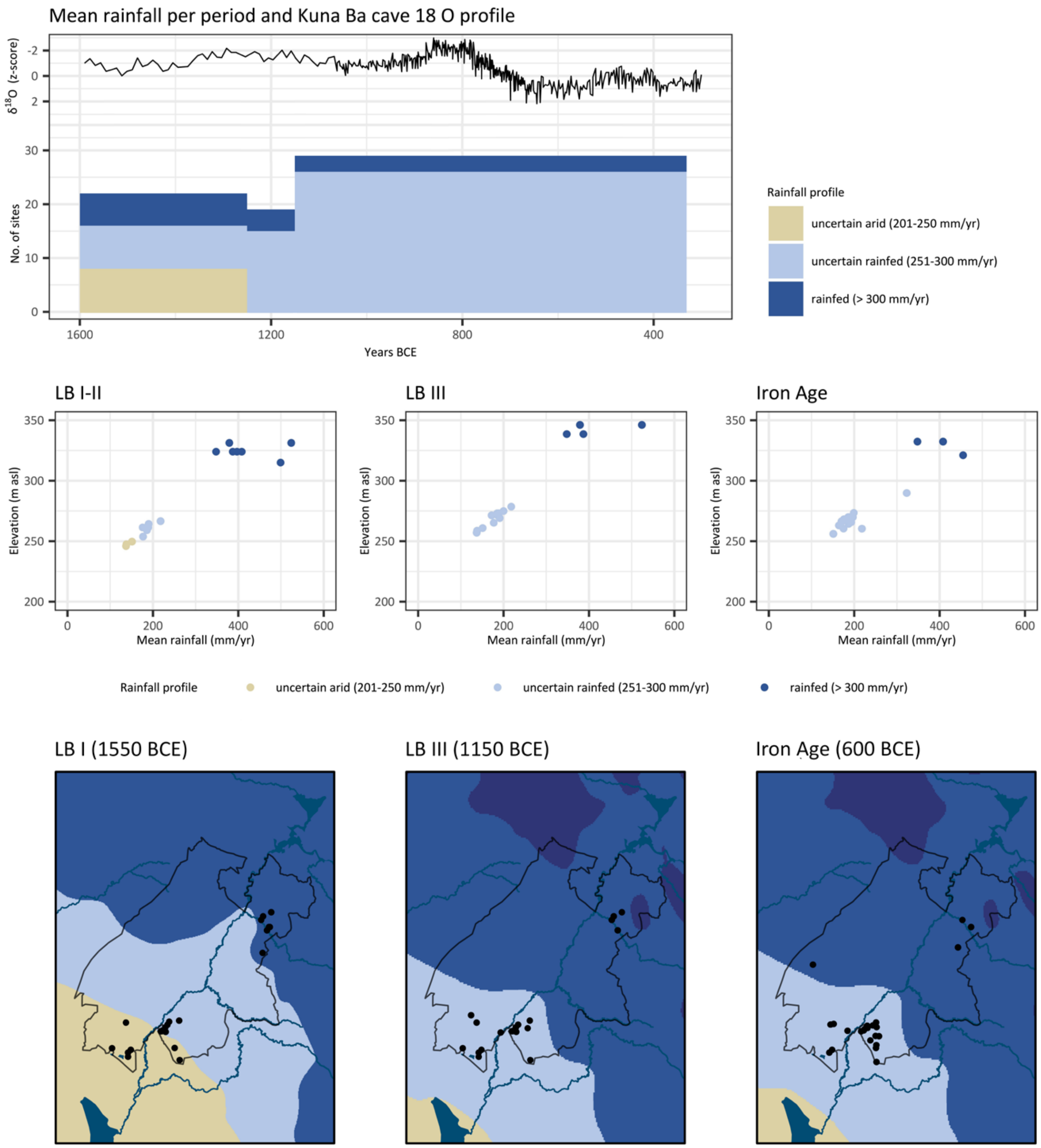

Figure 11.16 Mean rainfall for the late second and first millennium BCE (cubic interpolation after Hewett *et al.* 2022).

the SRP was able to identify at least 29 sites, whose surface assemblages compare to IA sites in the Zagros piedmont, Godin II, or the Neo-Assyrian ceramic tradition, although the latter is attested in a limited range of predominantly coarse wares only. Most of these are new and relatively modest in size. Larger sites continue from the preceding LB, especially Tepe Kalan (SRP018), Tepe Sawz (SRP025), and Tepe Bawa Mahmood (SRP184), pointing to some degree of socio-political continuity in the region. Kani Masi (SRP046) appears to have been abandoned at the end of Phases 4-5, but several neighbouring mounds have produced evidence for subsequent occupation during the first millennium BCE.

Although the lower Sirwan region may have served as a thoroughfare of limited interest and intrinsic value to the Neo-Assyrian empire and other IA powers vying for supremacy in the wider region,[93] it was by no means a landscape devoid of settled communities. As such it compares more readily to the wider western piedmont zone than areas downstream. In the Shahrizor plain, for instance, recent survey identified 13 IA sites, which display varied cultural connections.[94] Excavated IA sites in Iraqi Kurdistan include, for instance, Tell Bakr Awa, which may be the ancient city of Dur-Assur and capital of the Assyrian province of Zamua,[95] the enormous site of Yasin Tepe,[96] neighbouring Bestansur,[97] as well as the Dinka settlement complex in the Dohuk region.[98] Most SRP IA sites connect to this wider piedmont cultural sphere, while some, especially Tepe Kalan (SRP018), show connections to the Neo-Assyrian realm.

Despite continuity in occupation at some of the largest sites, the lower Sirwan IA also perpetuates earlier trends of high settlement mobility at the middle-to-lower end of the scale. As is the case for MB and LB sites, newly established IA settlements occupy locales with comparable environmental characteristics. The IA, moreover, is subject to even greater climatic fluctuations than the preceding second millennium BCE. It would seem very unlikely, therefore, that this long-term trend of limited place-persistence in the lower Sirwan region relates primarily to environmental and climatic factors. Rather, we suggest, it speaks to local socio-political organisation and decision-making, and to liberties, as we shall argue in more detail in Chapter 13.5, afforded to those not too deeply entrapped by intensive agricultural regimes and their technologies, and who are, perhaps as a result, of limited interest to centralising states and imperial powers.

Before we embark on the exploration of this and other long-term trends in the early history of the lower Sirwan region as it can be narrated through the SRP's multi-scalar data, we consider how the SRP has sought to engage and collaborate with, and communicate archaeological skills, knowledge, and contemporary issues to local partners, interest groups, and communities in the following chapter.

93 See, e.g. Radner (2006).
94 Altaweel *et al.* (2012, 25-26, Fig. 6).
95 Miglus *et al.* (2013).
96 Nishiyama (2020).
97 Cooper and Gardner (2013).
98 Radner *et al.* (2021).

12

Present Pasts: Co-creating a Museum Space, Rural Engagement, and Archaeological Site Monitoring

12.1 Introduction

Archaeological and historic sites, such as the mound and castle of Qala Sherwana (SRP001), which we introduced in Chapter 1.3, and others such as Shanidar cave, the Erbil citadel mound, or the Darband-i Gawr and Qizqapan rock carvings, and their historic and folkloric associations, play an important role in contemporary local and regional place-making. Despite burgeoning interest in this cultural heritage, the impact of conflicts, unrest, and economic difficulties experienced by Iraq as a whole, and the Kurdistan Region (KRI) more specifically, have resulted in decades of underfunding of museums and antiquities departments. This lack of resources, including the regular disbursement of salaries for antiquities directorate and museum staff, is posing significant challenges to the effective protection and promotion of the region's rich archaeological and cultural heritage. Archaeological heritage is increasingly under threat from intensified agriculture and accelerated industrial development, while local museums are struggling to adequately cater to the needs of an increasingly diverse public, and to mobilise cultural heritage for social and economic development, as envisaged by the Kurdistan Regional Government.[1]

Over the past decade, international partnerships have presented an important avenue for KRI antiquities directorates, museums, and universities to develop their infrastructure, and to build staff and student capacity in this challenging economic climate. As part of the *Archaeological Practice and Heritage Protection in the Kurdistan Region of Iraq* initiative, the SRP/University of Glasgow partnered with the Sulaymaniyah Department of Antiquities, the Slemani Museum, the Garmian Department of Antiquities, the Garmian Civilizations Museum, and the UK-based INHERIT to develop a co-creative model for the integration of ongoing SRP archaeological research with cultural heritage practice. Project activities included knowledge exchange and capacity building at the regional scale, the co-creation of new museum spaces in Sulaymaniyah and Kalar that centre-stage archaeology as a process, alongside contextual thinking and narrative building, as well as initiatives intended to widen participation and dialogue with rural communities and the

1 Kurdistan Regional Government (2012, 149; 2020, 35); Mohammed-Amin (2022).

region's young. We also developed a model that embeds remote and on-the-ground site monitoring in local heritage management, and, on the basis of assembled project data, proposed a cultural heritage policy framework. A full outline of project rationale, activities, and results is presented elsewhere.[2] In this chapter, we highlight project activities and outcomes in the lower Sirwan region that were developed and implemented in collaboration with the Garmian Department of Antiquities and the Garmian Civilizations Museum, and that draw directly on SRP fieldwork and research.

12.2 Archaeological practice and heritage protection

The core objectives of *Archaeological Practice and Heritage Protection in the Kurdistan Region of Iraq* are to further the safeguarding of archaeological heritage in the KRI, to support informed local decision-making about that heritage's future, and to advance the use of archaeology in the engagement of a wider local public in cultural heritage, in peacebuilding, and in responsible and sustainable socio-economic development. This requires the development of principles for an open, fair, and respectful discourse that uses archaeology, as both a practice and a means for the every-day contextual narration of a shared local past, as an example and point of departure.

We recognise that different periods and their associated material cultures hold more significance to some persons and groups than others, and these views must be considered and respected. However, we also recognise the changeability of these views, and of the local, national, and international socio-political frameworks in which they are situated. Our ongoing objective is to find ways in which archaeology and its practitioners may provide aid in protecting and safeguarding the vestiges of local pasts and help to shape public engagement and discourse surrounding cultural heritage in a way that does not lean into ideological or sectarian division. The project, therefore, foregrounds archaeological process, discovery, and contextual interpretation, as opposed to placing emphasis on material symbols and narratives of autochthony and cultural lineage, which inevitably exclude some communities and individuals, in order to create connections rather than delineating difference.[3]

12.2.1 'Are You an Archaeologist?'

Local and regional museums can play a critical role in these processes. They can act as mediators and translators of archaeological and historical research and knowledge for a wider public,[4] and as facilitators in dialogues around heritage and identity through effective outreach to, and engagement with, their local communities.[5] Consequently, a major focus of project activity was the co-design of two new museum spaces – one in Sulaymaniyah and one in Kalar, educational resources, and outreach programmes, whose design processes incorporated a series of participation activities that engaged a range of interest groups.

These voices included museum and antiquities agencies, educators, representatives of the KRI's Ministry of Education, and tourism experts. Group meetings, one-to-one interviews, and informal feedback collection were variously utilised in the consultation process as the project moved through major milestones. The central challenges were found, as they are in all participatory practice, in balancing scientific integrity, the archaeological and historical accuracy of imagery and data presented, with granting participants sufficient freedom to embrace the "endless possibility of rereading" material culture and heritage.[6] Given the project team's mixed emic and etic perspectives[7] on present-day regional cultural sensibilities, the team's local archaeologists and heritage experts took on a central role here. KRI school and museum-based educators likewise played a principal role, making significant contributions to the design of age and culturally appropriate learning contexts for children that complement and enhance the national curriculum.

The permanent exhibition *Are you an Archaeologist?* in the Garmian Civilizations Museum in Kalar, centres archaeology as a practice and way of understanding the past. It is comparable, in this sense, to *The Curious Case of Çatalhöyük* exhibition,[8] which used 3D printed artefacts, laser-scanned overviews of excavation areas, immersive digital displays, and excavation diaries to grant visitors a window into archaeological field practice and how archaeological interpretation happens using the project's 'reflexive method'.[9] *Are you an Archaeologist?* in addition explicitly connects archaeological practice, knowledge creation, and wider issues of cultural heritage and its protection.

The exhibition invites visitors in Sorani Kurdish, Arabic, and English to become archaeologists, and to see themselves as part of the archaeological team (Figure 12.1.A). Thereafter, large-scale landscape photography (Figure 12.1.B), text, and interactive experiences take visitors on a journey of how archaeologists explore the familiar landscapes of the Sirwan river valley, how they interpret the raw data collected during survey and excavation, how time is conceptualised and sites

2 Glatz *et al.* (2024).
3 Giblin (2014); Newson and Young (2018).
4 Casey (2001); Message (2006).
5 Weil (1997); Hooper-Greenhill (2007).
6 Hooper-Greenhill (1992, 215).
7 Holmes (2020).
8 *The Curious Case of Çatalhöyük:* https://www.soas.ac.uk/gallery/catalhoyuk/ (last accessed 12 November 2023).
9 Hodder (2000).

Figure 12.1 *Are you an Archaeologist*? exhibition at the Garmian Civilizations Museum.

dated (Figure 12.1.C), and, at a broad level, how they make interpretations about the socio-economic structures of past communities, and about their interactions with others in neighbouring and more distant regions.

The exhibition's core objective is to equip visitors with a basic grasp of how archaeological data is reconstructed into plausible narratives about the past. Emphasis is placed on the concept of the archaeological context, the associations between specific artefacts, surrounding features, and regional and wider connections. The front end of the exhibition is dominated by a large print of the Area I exposure at Kani Masi (SRP046), which revealed several rooms of a large mudbrick building dating to Phase 1, and that we discuss in detail in Chapters 6-10 (Figure 12.1.D-E). Two walls faced with broken mudbricks from Kani Masi protrude from the image, while artificial sand and replica finds invite visitors to help excavate the trench. A 3D model of the excavation area allows visitors to stand inside the trench and, by moving the mask, switch between excavation trench view and the interpretation of the central room as a place for feasting (Figure 12.1.F and Figure 12.2). Excavated artefacts and their interpretations are presented in a subsequent section. The aim here is to demonstrate how contextual associations of artefacts and features at site and at regional scales both facilitate and constrain narratives about human behaviour and experience that can be plausibly built through archaeological interpretation.

Figure 12.2 3D model of Kani Masi trench 'excavation' and 'interpretation' view (the digital reconstructions were produced by Grant Cox at ArtAsMedia).

In the final section of the exhibition, visitors are shown various types of damage currently affecting local archaeological sites (Figure 12.1.G). Here, a renewed focus is placed on archaeological context as a crucial component of plausible narratives, and on the damage done to our ability to construct meaningful stories about the past when archaeological context is lost to looting, construction, or intensive agriculture, as well as how such loss can play into political or ideological misuse of the past. Visitors are invited to contribute to the efforts to protect and steward the archaeological heritage of the region in collaboration with the museum, which ties directly into ongoing engagement work by museum staff at local schools and in rural communities.

Complementing the museum spaces are three themed outreach boxes, which were collaboratively designed by Iraqi and international archaeologists, Assyriologists, museum staff, artists, and graphic designers following consultations with Sulaymaniyah-based primary school teachers.[10] Local schools can borrow the boxes from the museums as an alternative to class visits. They are also used by museum staff in their own school and rural community outreach activities. Each box presents an introduction to one of three important aspects of the past: pots and people, food and foodways, and the invention and practice of writing. Also included are trilingual illustrated demonstration cards, an information booklet, and teaching objects relevant to each box's theme: replica pottery, cuneiform tablets, seals, potter's tools, and bone and seed samples, for example. Local museum staff have taken on the task to train interested schoolteachers in the use of the boxes in the museum and during outreach school visits (Figure 12.3.A).

12.2.2 Engaging rural communities

Modern villages are frequently built on top of mounded sites to exploit their elevation and avoid building on good agricultural soils, while many other sites form part of modern agricultural fields, and are regularly ploughed, damaged, or removed to make irrigation more effective. Few groups, thus, encounter archaeological sites and materials in their daily lives as often as rural communities and any serious strategy for the safeguarding of archaeological sites and landscapes must seek to engage them, learn how they understand the physical heritage they interact with in everyday life, and provide them with access to information about archaeological sites' wider cultural and historic significance. Without the engagement of these communities, navigating the complex tensions between socio-economic imperatives, particularly those concerning employment and food-security, and cultural heritage as a resource worth preserving for its own sake and as a source of sustainable local development, may be an insurmountable challenge.

We have sought to engage rural communities with activities designed to inform them about the archaeological heritage in their surroundings, and to enthuse them to help protect such sites. Project activities also represent data gathering exercises, assembling the views of members of diverse rural demographics, including the young and elderly, men and women, and those engaged in a range of subsistence activities, about the archaeology that they live amidst, and encounter during their daily routines.

The Kalar-based team of archaeologists developed a method of small-scale community, and sometimes individual, engagement in the form of interviews and short information talks that to date have been carried out in 30 rural communities and schools near Kalar (Figure 12.3.B-D). This work is currently still ongoing and its results will present a first step towards the development of inclusive and participatory cultural heritage management and protection measures.[11] It also goes hand-in-hand with the project's locally embedded approach to archaeological site monitoring.

12.2.3 Locally-embedded archaeological site condition monitoring

Most archaeological monitoring projects are led and/or executed by researchers based in Europe and the US. By contrast, our goal has been to create a sustainable programme of archaeological site management, co-designed with, and managed by, in-country archaeologists, and to embed this work within relevant institutions at local and regional level.[12]

Beginning in August 2018, SRP researchers trained, and thereafter supported, the archaeologists working for the Garmian Directorate of Antiquities and the Garmian Civilizations Museum in the skills required to take over the satellite-based identification of site damage, following established protocols,[13] and to combine it with field-based assessments and recording using UAVs and on-the-ground photography. Every confirmed archaeological site in the region now has a digital record and damage assessment as a result of this work. A total of 376 sites have thus far been assessed for damage by Nawzad Abdullatif using a diachronic approach that tracks change from the 1960s to the present, resulting in 1307 individual assessments of damage. Of those sites, 326 (87%) were found to have sustained some form of damage; only 50 sites (13%) showed no signs of damage.

10 For more detail, see Glatz *et al.* (2024).

11 Ledwith (2016).

12 For a more detailed discussion of this aspect of the project and its results, see Jakoby Laugier *et al.* (2022).

13 Bewley *et al.* (2016); Zerbini (2018).

Figure 12.3 School and public engagement activities utilising project materials and approaches by the heads of the Garmian Civilizations and Garmian Heritage Museums (Photos by Mohammed Ali).

Most sites identified as having sustained any damage have been affected by multiple categories. Agricultural activities are responsible for at least some damage at a majority of these (280 sites, 75%). Damage was most severe where industrial-scale machinery was used to plough large areas of land, and the bulk of this activity has taken place in the last five years. A total of 173 (46%) sites have been damaged by construction activities. Thirty-eight sites (10%) are affected by conflict-related damage, and 56 sites (15%) were subject to looting. Of these, the majority (45) had few looting holes, and only five sites were severely looted. Everyday living activities, like habitation and the use of dirt tracks, as well as the expansion of towns and villages onto archaeological sites also threaten the integrity of sites. The vast majority of damage to archaeological sites occurred prior to 2011, but the data also suggest a slight acceleration of damage and destruction in the past four to five years.

Intensive agriculture and construction, then, are the most significant threats to the KRI's archaeological sites to date, and are both ongoing and intensifying. Looting, meanwhile, is a relatively minor problem, despite being the focus of most media attention. Therefore, the region's archaeological heritage preservation challenges are comparable to many other countries, requiring the balancing of development and economic needs with cultural heritage safeguarding.[14]

14 Trow and Grenville (2012); Cordemans *et al.* (2019).

12.2.4 A Framework for cultural heritage

As an initial step, we propose that this dataset, the first systematic empirical record of diachronic site damage and risk in the KRI, forms the basis of a data-driven cultural heritage policy that is inclusive, developed with all relevant stakeholders, and tied to national and international legal frameworks and best practice. To pave the way towards the co-production of such a policy and its official adoption, we collaborated with the Directorate General of Antiquities in Erbil to develop a draft strategic framework. This framework includes a series of recommendations to protect and safeguard, to make more accessible, and to responsibly develop the social and economic potential of the region's cultural heritage, including its rich archaeological landscapes.

12.3 Conclusions

As the SRP's cultural heritage component, *Archaeological Practice and Heritage Protection in the Kurdistan Region of Iraq* has initiated the development of a novel, integrated approach to the intricately intertwined issues of archaeology, cultural heritage, public access, development, and peacebuilding. Our initiatives hinge on developing an open discourse that addresses archaeology as more than field methodologies and analytical techniques. By stressing contextual narrative construction as the core principle of responsible, but still imaginative, archaeological knowledge production, the project has supported the development of new, and locally-driven ways of envisioning an engaged and creative archaeology as cultural heritage method.

The dialogues that we have entered into, and the infrastructure that has been collaboratively developed thus far form the basis for continuing efforts of local project staff to engage wider publics, monitor archaeological site conditions, and develop a common cultural heritage policy framework. They also underwrite our future plans to enhance digital capacities, expand collaboration locally and internationally, and to further widen public participation in cultural heritage practice in the region and in the ongoing archaeological research of the SRP. A central contribution of the SRP to this effort remains the continued documentation and analysis of hitherto unrecorded archaeological sites and landscapes. Moving forward in the age of global climate change, we aim to establish a detailed record of the environmental history of the lower Sirwan region in the coming years, including the river itself, which, in addition to historical sites such as Qala Sherwana, has emerged from ongoing ethnographic research by Glasgow PhD student, Yasaman Nabati Mazloumi, as a central symbol of local landscape heritage.

13

An Archaeological History of the Lower Sirwan Region

13.1 Introduction

The Sirwan river holds a special cultural significance for the people who today live along its course, as do a number of well-known archaeological sites and historic buildings. Limited systematic efforts to document and investigate the archaeological landscapes surrounding it, however, mean that little was known about the region's deeper past until recently. Our aim in this volume has been to begin to write bottom-up histories of the lower Sirwan region from the earliest signs of human presence to the first millennium BCE based on the diverse and multi-scalar archaeological datasets that have been gathered by the SRP over the past decade.

In the preceding chapters, we have presented survey, excavation, laboratory, and other analytical results as they pertain to specific periods and key sites, defining in as much detail as possible the prehistoric, Bronze, and Iron Age communities of the lower Sirwan region. In this final chapter, we shift our attention to the long-term trends and developments in four broad spheres of life that emerge from these datasets. They include the (1) settlement practices and (2) livelihoods of lower Sirwan communities, and the broad environmental and climatic contexts within which these unfolded, (3) the cultural worlds that local communities produced and participated in, and (4) the socio-political landscapes that emerged in different periods from local practices and decisions, and from their interplay with external powers. We ask how the long-term settlement histories, subsistence choices, and cultural connectivities, which our datasets are material outcomes of, fit into, nuance, and challenge established historical narratives. We also reflect on how this particular regional case study can contribute to ongoing debates about the diversity and flexibility of past human socio-political organisation, and what resilience and sustainability look like in environmental and socio-political contexts that differ fundamentally from classic Mesopotamian models of urbanism, territorial states, and imperial forms of government.

13.2 Settlement landscapes

The synthesis of a set of basic variables including number, size, duration, and mobility of settlements, alongside their landscape settings and main environmental affordances, brings to the fore three long-term trends in the ways in which prehistoric, Bronze (BA) and Iron Age (IA) communities constituted and placed themselves in, and interacted with, the landscapes of the lower Sirwan region.

They include (1) limited overall settlement numbers, which remain relatively stable over time, (2) low settlement persistence across all periods, especially in the southern plains, and (3) a predominance of small to very small sites, with site-size distributions that suggest limited spatial hierarchisation in most periods. Together, and keeping in mind that settlement hierarchies do not necessarily or in a straight-forward manner

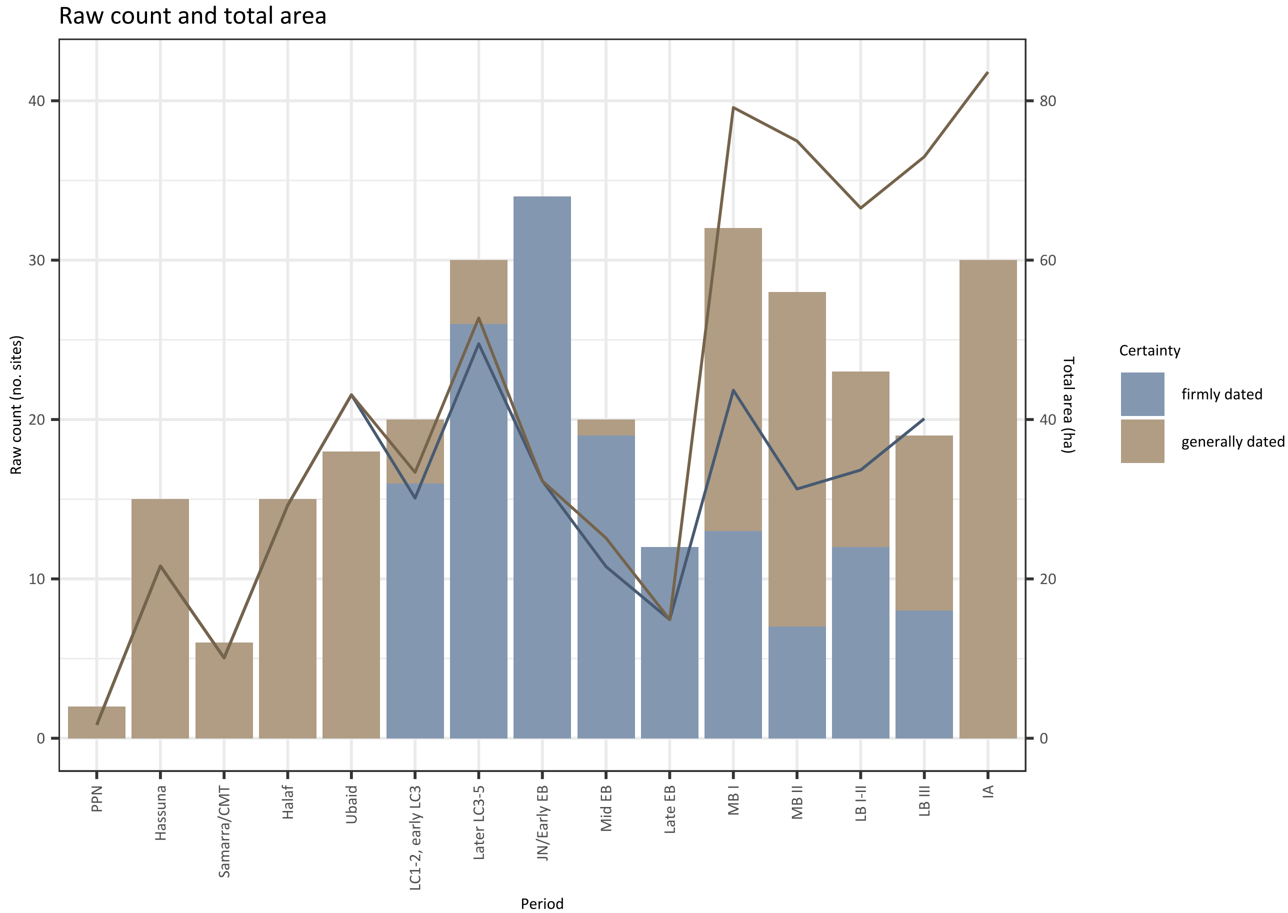

Figure 13.1 Graph showing total site counts with linear presentation of total settled area per period. Sites whose maximum extent post-dates the first millennium BCE have been discounted.

indicate degrees of political centralisation,[1] this points to landscapes occupied predominantly by village- and hamlet-sized communities that shifted comparatively frequently from one place to another, while decisive environmental parameters for site locations remained very similar over time. Also evident is a lack of correlation between short-term changes in global climate and settlement change in most of the periods under consideration.

As shown in Figure 13.1, the number of sites occupying the lower Sirwan region throughout the early-to-mid Holocene is generally limited and broadly similar across different periods. A trend that remains, even when absolute counts are weighted against the duration of each culture-historical phase for which ceramic or lithic type fossils are available, and we keep the relatively small overall sample of c. 230 sites in mind.

Raw site counts from the Late Neolithic onwards range between 15 and 30 sites in most periods. Occasionally site numbers drop to around 10 or below. While the low numbers of Samarra-related sites are the result of painted Samarran pottery generally co-occurring with Halaf and more dominant Ubaid-related material culture, drops in site numbers during the later Early Bronze Age (EB), and most likely also the Middle Bronze (MB) II, appear to be representative of a real decrease in the number of settlements in the region. Absolute site counts are among the highest for the later fourth and early third millennium BCE. Sherd counts for this phase, however, are very limited at each findspot and associated with predominantly small to very small sites. This suggests a dispersal of settlement away from Late Chalcolithic (LC) settlement locales, including sites which may have operated as local centres such as Shakhi Kora (SRP191) and Mala Kunar I (SRP070). Following a dip in site numbers during the third millennium BCE, site counts and total settled areas increase again in the second millennium BCE, followed by a further rise in the IA.

The LB, for which we have a detailed chronological understanding that is anchored in the stratigraphy

1 Duffy (2014); Smith (2021).

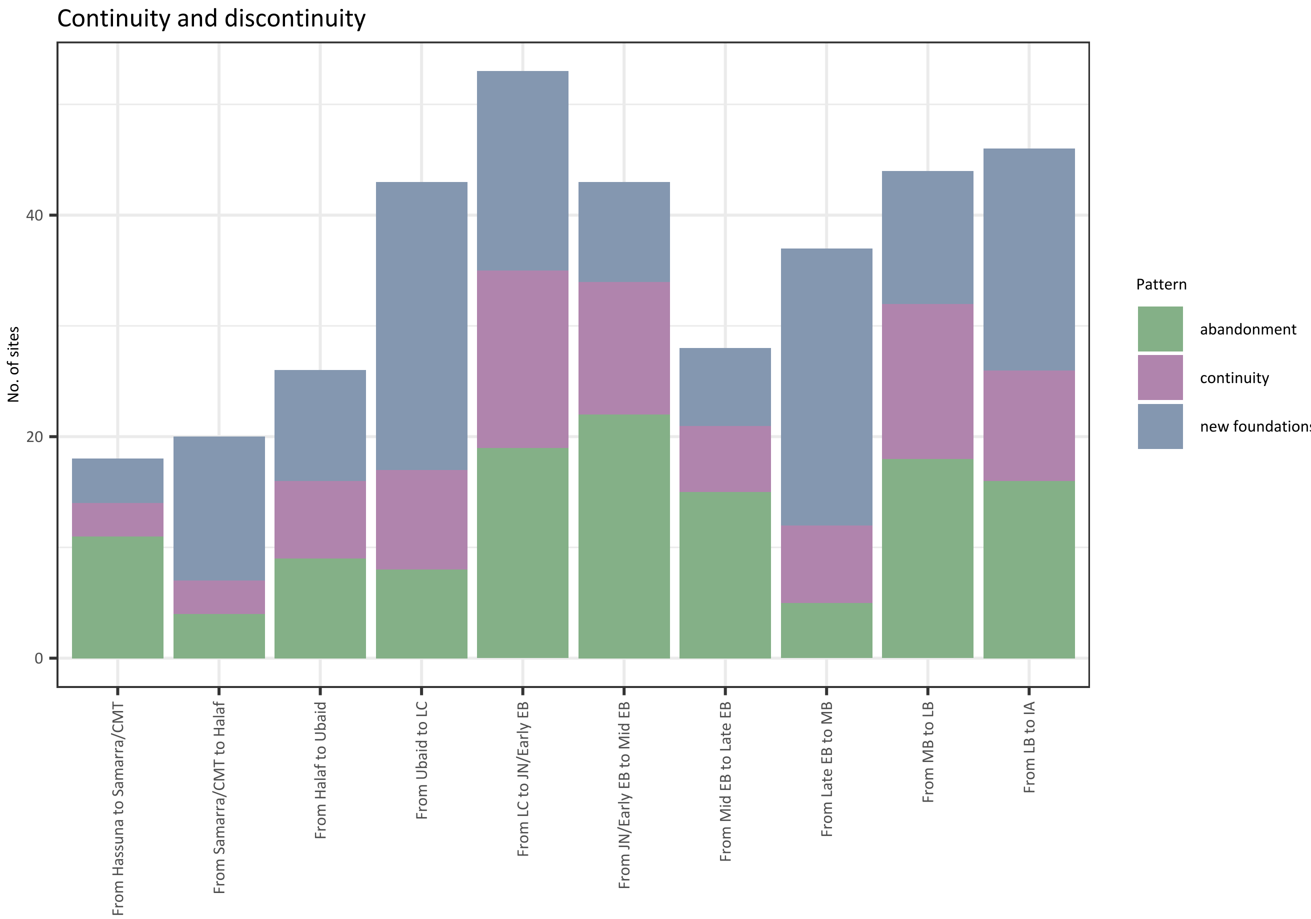

Figure 13.2 Settlement continuity, abandonment, and new foundations for each period.

and absolute dates of Kani Masi (SRP046), sees the development of several large sites, and with them a hypothetically steeper spatial hierarchy in the southern plains. In particular, the LB settlement at Kani Masi appears to have been significantly larger than any other LB site in the region (we discount sites whose maximum extent is associated with later periods). Whether this increase in site sizes can be equated with a significant population increase is not certain, however, given the open and dispersed settlement plan documented at Kani Masi, nor is it clear that its inhabitants exerted political control over its surroundings. The continuity of the largest LB sites into the IA suggests a similar settlement organisation in the first part of the first millennium BCE in the southern plains, while spatially more extensive sites such as Tepe Qalandari (SRP143) develop in the Hawasan valley in the north.

A second recurrent pattern in the SRP dataset is low-to-moderate rates of persistence in settlement locales (Figure 13.2), with sites in the southern plains more frequently abandoned and newly founded than in the north. This trend starts at the end of the early Late Neolithic, with a third of Hassuna-related sites showing no signs of occupation during the final Neolithic and Early-to-Middle Chalcolithic. Almost half of sites with Ubaid-related surface assemblages also show no signs of occupation in the fourth millennium BCE, during which many new settlements were established, including the larger sites of Shakhi Kora (SRP191) and Mala Kunar I (SRP070). Half of sites with LC surface materials in turn lack evidence for occupation in the subsequent JN/ED I, with a similar proportion of sites being newly founded at this time, before settlement numbers begin to fall during the Middle and Final EB.

Against a similar backdrop of limited settlement continuity and new foundations, two new regional centres emerge in the south in the late third and early second millennium BCE: Tepe Imam Mohammed (SRP017) and Tepe Kalan (SRP018). The vast majority of sites in the region, however, remain small to very small in size, pointing to a rural landscape with very limited spatial differentiation. Just over 40% of sites occupied during the MB are (re)occupied at some point during the LB, while about half of LB sites are new foundations. These are mainly small sites, which continue a by now familiar pattern of site mobility that also characterises the transition to the IA.

Exceptions to this broader trend are a few larger sites such as Tepe Kalan (SRP018), Tepe Imam Mohammed (SRP017), and the Kani Masi cluster, which are re-settled over millennia. The first two are tall mounds with lower towns and satellite mounds, while the latter consists of a sprawling scatter of low mounded features. Sites in the northern Hawasan valley display a more continuous and spatially concentrated pattern of occupation, resulting in often tall, but generally small, mounded sites such as Tepe Dar (SRP178), Tepe Shaho (SRP106), or Tepe Ama Husen (SRP113).

The reasons for this frequent shift in settlement locales are difficult to pinpoint with certainty, but environmental or climatic shifts are unlikely to have been major factors in almost all cases. Newly established sites in each period tend to be located in areas with very similar environmental affordances to those abandoned, while episodes of climatic stress do not generally coincide, or can be conclusively correlated, with notable changes in settlement. Also unlikely are issues such as soil depletion given the small-scale nature of most settlements.

Stratified data from LC Shakhi Kora (SRP191), for instance, suggest that its Phase 5 (LC4/5) occupation ended prior to the onset of the 5.2 ka drying event. The LB, which sees the greatest number of sites occupying zones with limited and uncertain annual rainfall, experienced an unprecedented growth in large settlements in the most affected, southern part of the study region. None of these sites show signs of investment in irrigation infrastructure. By contrast, several lines of evidence from Kani Masi (SRP046) point to a flexible and diversified agropastoral subsistence economy that exploited multiple environmental niches and growing seasons in order to reduce the risk of increased dry and variable climatic conditions. The most convincing correlation of regional-scale settlement changes and changes in climatic conditions is the notable increase in the number of villages and hamlets, such as SRP094, across the southern plains during a moister interval in the first centuries of the second millennium BCE.

Small and very small sites dominate the lower Sirwan landscapes not only in the MB I, but make up the vast majority of settlements throughout the early-to-mid Holocene, presenting a third notable long-term pattern. Episodes of greater centralisation and seemingly more hierarchical spatial organisation, whether homegrown or associated with external interference, present interludes to a steady chorus of smaller scale and likely less centralised forms of organisation that local communities persistently (re)turned to.

The long-term trends observed in the SRP data find some parallels in nearby regions. In the north, the Shahrizor survey reported generally low counts of surface finds across all periods, but especially the Neolithic, which is attributed to a combination of geomorphological processes as well as more mobile, or multi-sited communities.[2] Later sites are mostly multi-period, however, which matches more closely the occupation histories of mounds in the upland, northern part of the SRP research region than patterns observed in the southern plains. The limited persistence of settlement locales, which is one of the main long-term trends that characterise the SRP survey data, has also been observed in the Hamrin basin. Young and Killick write that "fluctuation in the intensity of occupation and exploitation is perhaps the single most striking feature of the overall history of settlement in the region," characterising it as "a remarkably fragile settlement pattern … from prehistoric times onwards."[3] The region is further said to lack large sites that are occupied more continuously over longer periods, with most sites occupied during one or two periods only.

Settlement trends on both the Shahrizor plain and in the middle and lower Diyala regions, however, also periodically diverge from those documented by the SRP. The *Land Behind Baghdad* project and later surveys and excavations in the Hamrin, for instance, have characterised the LB as a period of dramatic settlement reduction and ruralisation,[4] with surveys in both regions also reporting very limited IA surface finds.[5] This has led Young and Killick to suggest that the Hamrin was largely devoid of settlement due to its geopolitical situation as a borderland between warring Assyria and Babylonia, and at the mercy of hypothetical transhumant and nomadic pastoralists.[6] Adams also looked to external geopolitical pressures to explain what he thought was a region that had abandoned irrigation agriculture and saw its sedentary population severely depleted.[7]

The results from SRP survey and excavations paint a very different picture of the LB and IA on the lower Sirwan. Although most LB sites were small and likely rural in character, the presence of several large, ritual, production, and potentially administrative centres, as well as of medium-sized settlements, points to a multi-tiered settlement landscape. A similar settlement pattern, including continuity in central places, also characterises the IA. Moreover, and as we discuss further below, the analysis of stratified zooarchaeological and botanical assemblages dating from the Late Neolithic to the LB, make a strong case against the text- and ethnographically

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2 Altaweel *et al.* (2012, 20-25).
3 Young and Killick (1988, 4).
4 Adams (1965, 33); Boehmer *et al.* (1985).
5 Adams (1965); Young and Killick (1988).
6 Young and Killick (1988, 4-5, Figs. 8-9).
7 Adams (1965, 55-58).

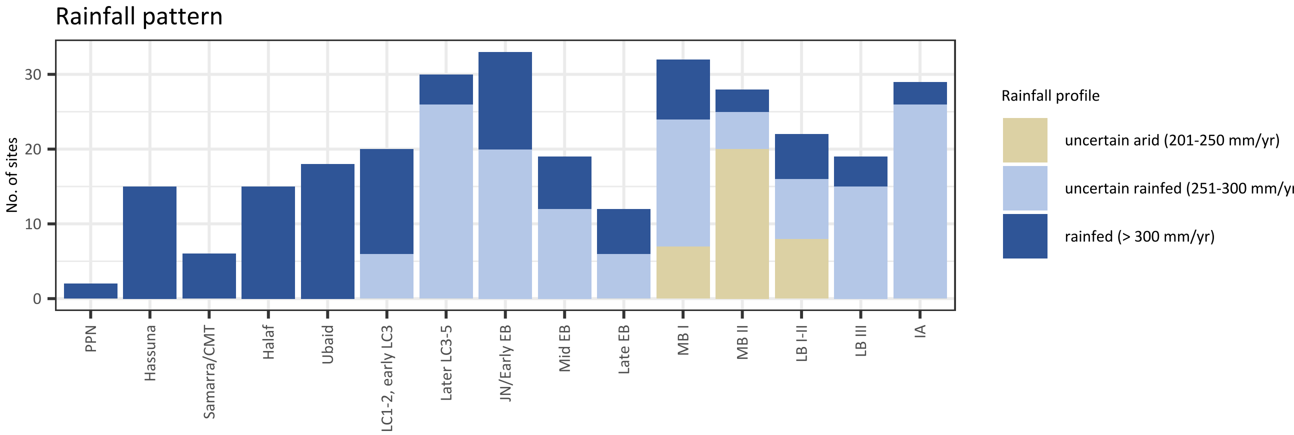

Figure 13.3 Mean rainfall in the lower Sirwan region during the early-to-mid Holocene (source data from Hewett *et al.* 2022).

inspired *topos* that mobile pastoralism defined the region's deep past as much as it did the nineteenth and early twentieth centuries CE.

13.3 Livelihoods

The subsistence modes documented at Late Neolithic Tepe Sirwan (SRP036), and in more detail at LC Shakhi Kora (SRP191) and LB Kani Masi (SRP046), developed from the interplay of prevalent environmental opportunities, limits, and risks on the one hand, and local praxis and choice on the other. A series of developments took place in subsistence practices from the sixth to the second millennium BCE. At the same time, there are also distinctive diachronic similarities, suggesting the long-term, localised development of agropastoral strategies that took advantage of a range of available environmental and anthropogenic niches, and that were supplemented with available wild resources, the seasonal hunting of migratory species, as well as those inhabiting nearby upland zones. This diversified approach allowed lower Sirwan communities to successfully buffer against regular uncertainties in annual precipitation, and seemingly weather major climatic episodes. Lower Sirwan subsistence modes, moreover, conform neither to hypothesised pastoralist, nor to Chalcolithic and later Mesopotamian grain-centred models, which in the lowland plains supported the development of centralising institutions and increasingly hierarchical societies.

Following the occupation of the cave of Ashkawti Manga Wakal (SRP181) by Epipalaeolithic hunter-foragers, Early Neolithic lifeways are attested in the SRP research region at Grda Gozina (SRP010) and SRP177. Soils across the region are relatively shallow and of limited fertility, and with precipitation averaging just above the threshold for reliable dry-farming for most of the early-to-mid Holocene (Figure 13.3), it is not surprising to find Neolithic and most later communities choosing to settle predominantly on the most fertile, Holocene soils in the southern plains (Figure 13.4), and in some cases near artesian springs. More unexpected is a persistent preference for locales close to intermittent, seasonal streams rather than the region's permanent rivers (Figure 13.5).

The northern valleys received consistently more, as well as more reliable annual rainfall, but settlements in the north had to contend with more limited arable land and Pleistocene soils that have less agricultural potential than those further south. The consistently small and very small site sizes in the north are evidently interlinked with these environmental variables, while their strategic placement and persistent occupation histories likely relate to prevalent social and political conditions as well as their roles as communication and trade nodes along routes that led onto the Shahrizor plain and into the western Iranian highlands; routes that later become known as the Khorasan Highway and the Silk Routes. We have as yet no stratified botanical and faunal assemblages from these upland sites, but data from adjacent upland regions in the Shahrizor plain point to mixed economies[8] that are broadly comparable to those of Neolithic, Chalcolithic and Bronze Age communities investigated by the SRP in the southern plains.

A test sounding at the c. 0.9 ha Late Neolithic site of Tepe Sirwan (SRP036) in the Sawzblagh region of the Bnkura plain, produced a small faunal and archaeobotanical assemblage consisting of pulses, most likely lentils, which are resilient, draught-tolerant plants, as well as wild plants, some of which grow near sources of water. Also present were the remains of domesticated caprines, cattle, and hunted gazelle.

The LC settlement at Shakhi Kora housed a sequence of LC3-5 institutional households, which were also

8 Marsh *et al.* (2018).

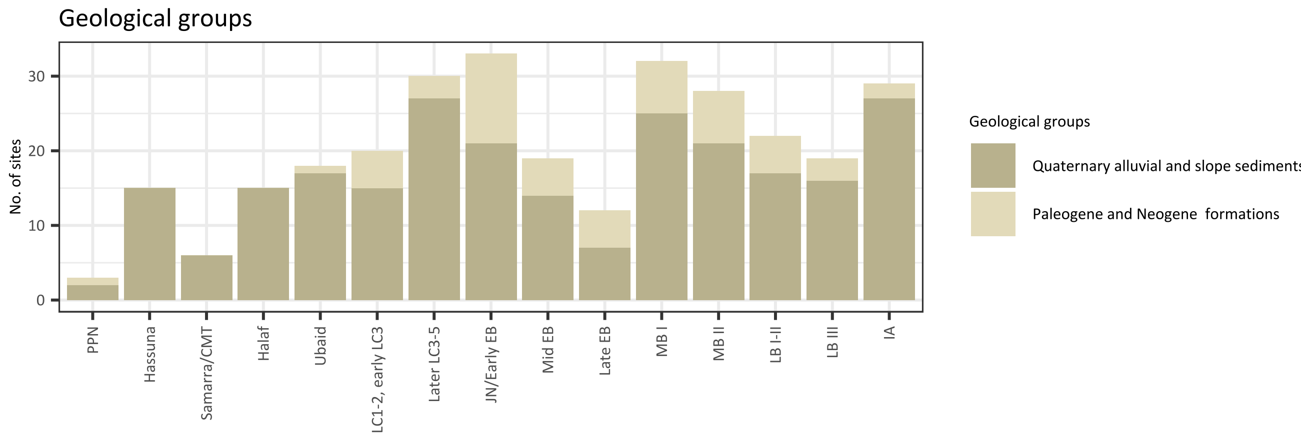

Figure 13.4 Soil types associated with SRP sites per period (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

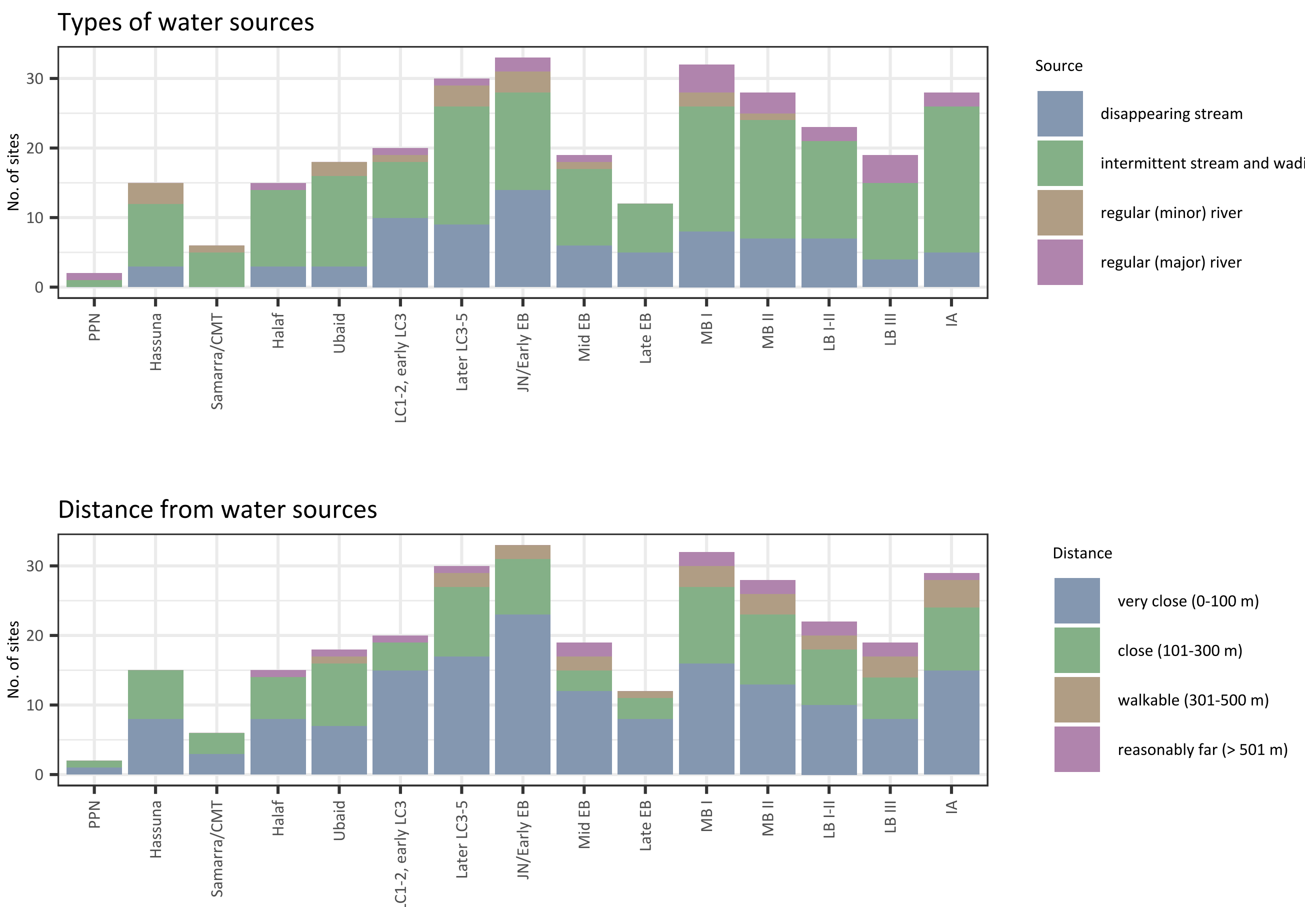

Figure 13.5 Accessibility of water for SRP sites per period (source data: Barwary and Slaiwa 2014; Sissakian and Fouad 2016).

supported by mixed agropastoral economies. Cereal grains attested to date include emmer, einkorn, and barley, as well as fig, some wild grasses, and leguminous seeds. Faunal remains indicate that caprines were the most common domesticated species consumed at the site, with goat currently outnumbering sheep, followed by cattle, pig, dog, and wild resources. Stable isotope analyses of sequentially sampled goat and sheep tooth enamel from Phase 3 (LC3) point to the deliberate manipulation of caprine breeding seasons to intensify husbandry production. Strontium isotope values suggest that this intensification took place close to the settlement; perhaps pointing to the limited geographical reach of early institutional power.

The following EB is one of the least well-represented periods in the SRP assemblage. The limited evidence available suggests a concentration of the region's population in fewer, but still mainly small-scale settlements over the course of the third millennium. We have no stratified local assemblages for this period that would allow us to reconstruct the outlines of EB subsistence practices. In light of earlier and later data, however, it is likely that similar mixed agropastoral models were practiced in the region, and that these differed from contemporary subsistence economies in lowland Mesopotamia. This hypothesis finds some support in a series of Akkadian-period archival texts from Tell el-Suleimah in the Hamrin basin, which includes receipts for grain and livestock payments to a central authority. The Suleimah records show that grain dues were often substituted by livestock, which was cheap compared to grain, pointing to an economy with a strong pastoral component.[9] An inscription by Iddi(n)-Sîn of Simurrum indicates that tribute requirements among upland polities also took the form of livestock in the final third and early second millennium BCE.[10]

At the time when Iddin-Sîn and his son, Anzabazuna, ruled Simurrum (see Section 13.5 below), many new hamlets and villages spread across the lower Sirwan region. Excavations at one such village, SRP094, produced the remnants of two buildings, separated by a small alleyway. Pottery and other finds point to domestic houses, with faunal and botanical remains sketching out a further, mixed agropastoral economy that focused on caprines, but also comprised pig, cattle, and hunted gazelle, the cultivation of emmer, barley, and lentils, and perhaps also the collection of leguminous plants. A similar range of faunal and botanical remains also characterised LB subsistence practices at Kani Masi (SRP046), where surface collections, magnetic gradiometer surveys, and excavations have documented a mix of large, and in some cases monumental, buildings interspersed with craft and food production areas.

Palaeoclimatic records suggest that conditions during the second half of the second millennium BCE were relatively arid, especially during the LB I-II (Phases 1-2), with wetter conditions prevailing in the LB III and into the IA (Phases 3-5). Despite these fluctuations in precipitation, there appears to be little difference in the broad subsistence regimes documented at SRP046, those practiced at the neighbouring MB I site of SRP094, and earlier settlements in the region. At the same time, the inhabitants of SRP046 also developed new pastoral and agricultural practices, which would have further mitigated the risks of unpredictable annual rainfall and longer-term climatic shifts.

The primary food plants identified at LB Kani Masi include hulled barley, emmer, einkorn, and free-threshing wheat. Present for the first time in the SRP's botanical record is millet, a hardy, fast-growing, drought-resistant summer crop. Pulses such as lentils and bitter vetch or grass pea were also cultivated, as was flax. All domesticated plants could have been grown in the vicinity of the site without systematic irrigation infrastructure. As discussed in Chapter 1.2, such infrastructure would have been extremely challenging to implement and maintain due to violent spring floods prior to the damming of the river in the 1960s. The opportunities of riparian wetland areas and the run-off areas of artesian springs, however, undoubtedly formed part of Kani Masi's inhabitants' multi-niche subsistence strategy. Flax, for instance, was likely grown in wetland areas near the river, and flood farming may also have been practiced. Lowered strontium isotope values and a more restricted range of variation in one sheep tooth enamel sample from SRP046 also indicate the use of groundwater to either water animals or grow plants that were consumed by flocks.

Among the animals present on site, caprines are most numerous, followed by pig, cattle, and equids. Dogs are also present, including as sacrificial depositions. Smaller quantities of fish, birds, amphibians, and crab, no doubt from the Sirwan river and other permanent water sources, were also recovered. Gazelle, three different species of deer, and a hare attest to hunting in the vicinity of the site and in the more distant upland regions. Most notable is the ratio of sheep and goat which is c. 19:13. This presents a significant departure from most studied sites of this period, where sheep, favoured especially for their wool as well as milk and meat, always outnumber goats by a significant margin. The profiles of caprines at Kani Masi suggest that meat production was the primary goal of livestock management, with wool playing a minor role. Cattle too were kept for their milk and meat, while pigs make up a surprisingly large proportion of the faunal assemblage. Collagen and sequential tooth enamel stable isotope values from SRP046 caprines suggest that they grazed, or were foddered, much like their predecessors at Shakhi Kora, a predominantly C_3 plant diet. Some sheep may have been moved to the site from south-eastern Iraq, but strontium and oxygen isotope results suggest that flocks were grazed predominantly in the Sirwan valley and near its tributaries. A range of other data also suggest the regular presence of livestock on site.

These subsistence choices underwrote Kani Masi's culinary culture, and how it reproduced its sociality through ritual, feasting, and drinking, which we discuss in more detail in the following section. Kani Masi's LB subsistence practices are also likely to have continued into

9 Foster (2016, 62).

10 Shaffer *et al.* (2003, 11).

the early first millennium BCE in light of the spatial and cultural continuities seen in Phases 3-5, IA occupations at other LB centres, and similarities in settlement patterns.

13.4 Cultural worlds

Against the backdrop of these long-term, re-current, and localised trends in settlement and subsistence practices, the communities of the lower Sirwan region participated in a range of cultural networks, some regional and others more wide-ranging. Starting from the Neolithic, local cultural practice preferentially tied into the traditions of the western Zagros piedmont zone and those of the north Mesopotamian plains. Temporary shifts towards central and south Mesopotamia begin to occur from the sixth millennium BCE onwards, tempered then by a mix of northern and more localised traditions. Southern links are especially notable during the later fourth, third, and second millennia BCE, when social and political ties of varying forms may have contributed to the development of wide-ranging cultural similarities. A more north and eastward focus again emerges in the course of the IA.

The small Epipalaeolithic lithic collection from Askhawti Manga Wakal (SRP181) is too affected by post-depositional processes to draw meaningful comparisons. By contrast, the technological characteristics of the chipped stone industries of Grda Gozina (SRP010) and SRP177 and their raw material sources, tie the lower Sirwan region firmly into piedmont craft and social networks during the eighth millennium BCE. The communities that inhabited or otherwise frequented Grda Gozina (SRP010) and SRP177, thus, were likely among the first to introduce the increasingly sedentary Neolithic lifeways that first developed in the high Zagros into lower-altitude landscapes.

Following the abandonment of the two Early Neolithic sites, the earliest Late Neolithic settlements in the SRP region are culturally related to, but also diverge from, the village-based Hassuna culture of central and northern Mesopotamia. While well-known hallmarks of the Hassuna such as husking trays are ubiquitous, lower Sirwan assemblages comprise almost no painted vessels. Fine, mineral-tempered, and frequently incised pottery, dated by OSL to between the seventh and mid-to-late sixth millennium BCE, present a regional particularity that is also attested in the Shahrizor plain. Lower Sirwan chipped stone practices, which diverge from earlier traditions in their flake-dominated nature, broadly map onto the regionalisation documented in the ceramic record. Most raw materials were obtained locally, with the occasional use of chert from sources in the wider piedmont region, and the procurement of blades and bladelets made from Nemrut Dağ and Bingöl obsidian.

Samarra and Choga Mami Transitional (CMT) pottery is rare in the SRP survey record. At three sites possible Samarra/CMT painted sherds co-occur with Hassuna-related materials, and at a further three they were found together with Halaf and Ubaid pottery. Similar to Tell Abada then,[11] these ceramic traditions appear to overlap not only geographically in the lower Sirwan region, but to a significant degree also chronologically. A total of 15 sites have to date yielded Halaf-related surface finds, many of which are local in character. Of these, three sites appear to have seen a more substantial Halaf cultural presence. Most Early-to-Middle Chalcolithic sites are associated with mid-to-late Ubaid traditions, suggesting a peak in settlement that is broadly contemporary, and shares strong connections with, Tell Abada Levels II-I, Tell Madhhur, Kani Shaie, and Gurga Chiya. Fifth millennium BCE lower Sirwan societies, thus, participated in an expansive cultural world, but shared especially in a more regional community of practice that stretched along the Diyala/Sirwan. Lithic surface assemblages from sites with Neolithic and Early-to-Middle Chalcolithic pottery also point to a shared regional chipped stone tradition that was subject to increased specialisation as indicated by the common off-site production of blades.

During the early fourth millennium BCE, communities in the lower Sirwan region participated in a piedmont-centred cultural world that had strong, but not exhaustive, connections to the LC2/3 of northern Mesopotamia. Shakhi Kora's cultural character changes significantly in Phase 5 (LC4/5), when a wide array of Uruk pottery types with southern technological characteristics dominates the assemblage. Some local vessel types, notably drinking cups, are also present. Phase 5 at Shakhi Kora also shows architectural similarities with south Mesopotamian and Uruk colony sites. They include the extensive underfloor drainage systems in the pillared hall, and a sizeable number of wall cones that have been collected both on the mound surface and from stratified contexts. Small finds too point to southern cultural practices, such as a stone figurine of a reclining ram that was found associated with a deliberate and likely ritual deposition, or a small cylinder seal that depicts a variation of a classic Uruk theme.

Differences, however, also exist. We have already discussed the likely importance of caprines to Shakhi Kora's institutional economies. This is further supported by the results of organic residue analysis on BRBs, which found remnants of ruminant adipose fats, while prevalent butchery techniques observed on animal bones in contexts associated with BRBs point to extensive grease and marrow extraction. Together they suggest BRBs were used to serve meaty stews and broths and not just the grain-based foods or rations traditionally envisaged. Culinary practices at Shakhi Kora as well as the subsistence economies that underwrote them, thus, seemingly differed from those reconstructed for LC lowland Mesopotamia. The chipped

11 Jasim *et al.* (2021).

stone industry indicates Shakhi Kora's participation in overlapping piedmont and highland communities of lithic practice and exchange in terms of both raw material preferences and production techniques. In contrast to Shakhi Kora and other sites along the course of the Sirwan, upland LC sites show limited cultural connections with Uruk Mesopotamia. This may suggest that the interaction networks, whose routes these sites may be framing, operated outside of the cultural influence and supervision of Uruk-related traders and administrators. Similarly, the comparatively large site of Mala Kunar I (SRP070), which controlled the narrow southern exit of the Bnkura plain towards the Alwand river, one of the main routes into Iran, yielded a substantial LC assemblage, but no Uruk-related materials.

At Shakhi Kora, the abandonment of the Phase 5 monumental structure is followed by a more ephemeral re-occupation in the late-fourth-to-early-third millennium BCE. The material culture of Phase 6 and that of surface finds at many newly established sites across the region, share strong connections with the ceramic repertories of the Hamrin and regions further to the south. However, some of the hallmarks of the early third millennium BCE such as painted Scarlet Ware are exceedingly rare in the SRP record. Also absent, with one exception from Shakhi Kora, are solid-footed goblets, which are a characteristic of the Early Dynastic (ED) in the lower Diyala region and in southern Mesopotamia more generally, where they are associated with feasting and drinking in increasingly stratified social contexts.

As mentioned above, surface finds that can be dated to the middle part of the third millennium BCE are comparatively rare in the SRP survey record. Where material is available, such as from Tepe Imam Mohammed (SRP017), comparisons can be drawn with the ED II-III to Akkadian period in the lower Diyala basin and elsewhere in lowland Mesopotamia. Further north along the Sirwan, a small surface scatter at Bardaswr Tapa (SRP009) produced ten chert artefacts that share strong technological similarities with south Mesopotamian lithic assemblages, such as those from Abu Salabikh, Larsa, and Abu Tbeirah, suggesting a southward realignment of local chipped stone practice during the third millennium BCE.

Identifiable cultural connections in the late third and early second millennium BCE also point to central and southern Mesopotamia. The ceramic assemblages of the excavated sites of SRP094 and SRP189, for instance, consist of a relatively restricted range of functional groups, whose morphological characteristics, however, match types known from both Final EB (Ur III) and MB I (Isin-Larsa) stratified assemblages in the Hamrin, the lower Diyala, and sites elsewhere in central and southern Mesopotamia. Fine-ware cylindrical beakers are widely attested across Mesopotamia and metal versions are found in MB graves in Lurestan and at Godin Tepe, pointing to shared commensal practices between transitional and highland communities. The burials on SRP189, moreover, find close parallels in the Hamrin basin.

The northern and upland parts of the SRP survey area also produced surface materials with close Mesopotamian parallels. A partial terracotta plaque with a nude goddess motif from Chia Raza Tepe (SRP171) may well indicate that at least some of the site's inhabitants participated in Mesopotamian religious and ritual practices. Late-third-to-early-second millennium BCE pottery assemblages in the north also include examples of a hybrid craft tradition that combines lowland shapes that are occasionally hand-made and have local, heavily tempered fabrics that are slipped red or orange, as well as fired in reduced conditions. Only one site, Tepe Dar (SRP178), produced a bowl fragment that shares strong similarities with MB I Shamlu ware attested mainly in the Shahrizor plain. Cultural differences are also notable at Tepe Kalan (SRP018) at the southern perimeter of the SRP research region. While there are some overlaps in the contemporaneous SRP094 and SRP018 ceramic assemblages, Tepe Kalan formed part of a cultural network oriented more towards the Hamrin and perhaps also the north Mesopotamian plains.

During the LB too, communities in the lower Sirwan region participated in a predominantly Mesopotamian cultural world, with similarities ranging from architecture and pottery to administrative technologies and burial practices, albeit with numerous local idiosyncrasies. The sequence of absolute dates obtained from stratigraphically secure contexts at Kani Masi, make Phase 1 contexts at the site the earliest absolute dated representative of what is generally referred to as Middle Babylonian or Kassite culture. Local potters, for instance, produced ceramics that are typologically virtually identical to examples from other Middle Babylonian sites, following very similar clay preparation and forming processes, and using kilns that find ready comparisons at LB sites in the Hamrin and elsewhere. Kani Masi's consumers, thus, had exacting and little changing expectations of what vessels they wanted to use to store, cook, brew, drink, and eat from. What limited changes did occur in the assemblage point to regular interactions of potters and consumers within a wider Babylonian cultural sphere. Drinking performance formed a central arena in which LB identity negotiations played out. The Babylonian style vessels used at Kani Masi differed significantly from those styles common in northern Mesopotamia, with the site's inhabitants evidently deciding not to participate in these alternative cultural traditions.

The foods and drinks that were produced and consumed at Kani Masi too broadly map onto the known diets of LB Babylonians, but significant differences also existed in terms of the frequencies with which different animals and their secondary products were consumed.

Much like in contemporary lowland cities, the preferred drink at Kani Masi was beer. Large quantities of beer were brewed in the Area I architectural complex, which appears to have been at the site's socio-political heart. The deliberate abandonment of this structure was marked by a closing ritual associated with the cult of the Babylonian goddess Gula, as indicated by the sacrificial deposition of an articulated dog leg and a neonatal jar burial.

This closing ceremony was an important social event that involved many participants, which were likely drawn not only from Kani Masi but the wider region. Participants drank flavoured barley beers from small and morphologically diverse cups as well as iconic footed (or Kassite) goblets. They also consumed stews produced in the food production Area II, using the grease and marrow extracted from mainly goat and sheep, whose crushed bones make up a large portion of the site's faunal assemblage. Meat from these animals may have accompanied the special dishes served at the closing ceremony and other ritual occasions, while more mundane meals would have only been flavoured with fat and marrow. Flatbreads baked in tannur ovens across the site, and other grain-based foods likely accompanied such meals. Additional sacrificial acts involving sheep may be indicated by a slight overrepresentation of sheep over goat in the Area I closing assemblage, and their more frequent exposure to fire. A collection of astragalus bones, and a short, open brick-lined drainage, whose purpose was most likely to receive libations, further underline the ritual nature of this context.

While evidence for food production in Phase 1 is dominated by caprine remains, pigs, which were subject to different butchery and cooking methods, dominate the Phase 2 food production in Area III. The pottery from Area III too differs from Phase 1 cooking and consumption contexts as it is coarser and more roughly produced. There are also fewer vessels associated with individual consumption, low frequencies of cooking pots, and only one beer brewing vat. Overall, the evidence points to some form of workers' canteen, which fed the craftspeople and workers who produced pottery nearby and engaged in other craft activities across the north-western part of the site. Kani Masi work-meals, seemingly similar to those at LC Shakhi Kora, contained some animal protein, in this case from pigs, which are generally associated with non-elite food consumption in Bronze Age Mesopotamia.

Parts of this industrial zone were deliberately closed. The end of Phase 2 in Area VII, for instance, involved the deposition of a cylindrical ceramic object, most likely a stand with fenestrations at the top, that has a prominent decorative relief showing three composite creatures, which are associated with the eastern mountains in Mesopotamian mythology. Kani Masi's inhabitants also commemorated buildings and other activity spaces in Phase 3; practices that are as yet unique to the site. They include the placement of offering sets consisting of two ceramic vessels and a faience bucket along the decaying walls of the abandoned Area I structure, the deposition of empty burial jars, and the placement of upright vessels and tube-like ceramic objects. Other departures from well-known Middle Babylonian cultural practices include, for instance, a small, chipped stone assemblage that finds its closest parallels on the Erbil plain, or Kani Masi's open settlement morphology, while trapezoidal building plans, prevalent masonry techniques, and brick sizes are all well attested.

Not originally from Babylonia, Kassite ethnic origins are generally sought in the Zagros highlands. Rīm-Sîn II of Larsa, for instance, describes them as "the enemy, the evildoer, the Kassites from the mountains, who cannot be driven back to the mountains".[12] Kassite personal names are first attested in early second-millennium BCE Babylonian sources,[13] where many served in the armies of Hammurabi (c. 1792-1750 BCE) and his successors. High-ranking Kassite officers often carried the title of 'head of the animal pen' in Old Babylonian texts, which some have interpreted to mean that Kassite society was a (mobile) pastoralist one.[14] We have already discussed the wide range of domesticated crops and animals present at Kani Masi, many of which, such as the pigs, formed an important part of local diet and are unsuited to a mobile life. There is also extensive evidence for the tight integration of agricultural and pastoral practices at the site, while stable isotope results suggest limited, regional levels of caprine mobility. In short, there is no evidence at all at Kani Masi, including its earliest phases, that its inhabitants, whose cultural traditions are almost invariably Middle Babylonian or Kassite in nature, were (mobile) pastoralists or that a portion of local society engaged in such practices.

Moving back to a regional scale, the majority of surface pottery from SRP survey sites shares characteristics with those from Kani Masi, thus pointing to a majority of settlements in the SRP region participating in a broadly similar cultural milieu. Surface collections from a handful of sites, however, also produced pottery that suggests connections with northern Mesopotamia. This is especially the case for Tepe Kalan (SRP018), where several Middle Assyrian shapes indicate a north Mesopotamian connection, which continues into the IA.

The settlement at Kani Masi continued to be occupied into the IA, potentially as late as c. 900 BCE. There is a clear change in architectural practice at the site, moving from the exclusive use of dried or sun-baked mudbrick and mudbrick packing for the construction of walls to baked

12 Paulus (2011, 2).

13 Paulus (2014); Brinkman (2017); van Koppen (2017).

14 Ibid., 51-52; Brinkman (2017).

brick structures in Phase 4. There is, however, no evidence for significant changes in material culture. Regionally we can constitute the development of greater cultural diversity in the course of the IA. Connections with the Shahrizor plain and western Iran are particularly strong at northern upland sites, while surface collections from sites in the southern plains also include Neo-Assyrian types. The largest collection of Neo-Assyrian pottery, including several palace ware pieces, comes from the high mound and lower town of Tepe Kalan (SRP018). What this might mean with regards to the region's political landscapes and their transformations over time we consider in the following section.

13.5 Political landscapes

In this section we draw on the above settlement and cultural data to sketch a bottom-up picture of how early communities in the lower Sirwan region organised themselves. What emerges from this data is a long-term regional sociality that is characterised by small-scale settlements and low spatial hierarchies, which we take to broadly correspond with limited political integration and stratification. The region did undergo several episodes of greater spatial hierarchisation between the fourth and first millennia BCE. However, at sites where we have detailed stratified information, local subsistence practices and political economies differed to varying degrees from Mesopotamian urban and state models. Local communities also repeatedly reversed developments towards greater centralisation and differentiation.

Well-defined size differences between settlements first develop in the fourth millennium BCE in the lower Sirwan region. Earlier settlements are all small and size differences between them insignificant. In the course of the fourth millennium BCE, two sites, Mala Kunar I (SRP070) and Shakhi Kora (SRP191), grew into substantial settlements at the same time as many new sites were established across the region. This was a local development rather than the result of south Mesopotamian interference. Mala Kunar I produced no southern surface finds, and Shakhi Kora appears to have been home to culturally local institutional households at least from the LC3. Only in Shakhi Kora Phase 5 do we see a clear reorientation towards southern Mesopotamia. What we do not as yet have an empirical understanding of is whether these centralising institutions in the lower Sirwan region were highly localised in their reach or exerted some form of authority also over surrounding villages and landscapes.

This first experiment with institutional centralisation did not last. As outlined in Section 13.2 above, around half of LC sites were abandoned sometime in the LC5 and seemingly before the 5.2 ka climate event, including the large, Uruk-related structure of Phase 5 at Shakhi Kora. Subsequent re-occupation is less extensive and set against a backdrop of an increase of sites in the wider region; all small and mostly newly founded. Social and political factors rather than environmental conditions must therefore be considered the primary catalysts for these developments. Our working hypothesis, which is being tested as part of ongoing regional and site-based work, is that lower Sirwan communities ultimately came to reject the centralising models of social organisation that developed locally and that later coalesced with southern Mesopotamian institutional practices. This aversion appears to have lasted throughout the third and well into the second millennium BCE in most parts of the SRP survey region.

This contrasts with developments downriver during the third millennium BCE, which saw the emergence of substantial cities in the lower Diyala basin and their subsequent incorporation into the heartland of Akkad.[15] Akkadian bureaucratic practices reached as far north as the Hamrin basin. A tablet archive from Tell el-Suleimah attests to the use of Akkadian cuneiform writing, administrative procedures, and metrology in the management of pastoral and agricultural activities in 40 local settlements.[16] Akkadian period burials, some of which are of elite character and include equids, were excavated at Tell Razuk[17] and at Tell Madhhur.[18]

Akkadian and later lowland sources also report of military campaigns further to the north and east, claiming sovereignty over several piedmont polities, especially Simurrum[19] and Lullubum.[20] The leaders of these political entities are attributed the title of $ENSI_2$, which in Akkadian tradition denotes a regional state ruled from an eponymous city.[21] Recent excavations at the c. 10 ha site of Tepe Kunara near Sulaymaniyah produced 116 cuneiform tablets, which were stored in a public building dating to between c. 2200-2000 BCE.[22] This archive charts the activities of the 'bureau de la farine', a central institution receiving and distributing different types of flour. Two texts mention a local $ENSI_2$ residing at the site, as well as a SUKKAL. Tepe Kunara, thus, may well present the centre of one of these piedmont polities.[23]

A series of landscape monuments provide an indigenous, if equally general, source of information about the political landscapes of the foothill zone during the late third and early second millennium BCE, as

15 Foster (2016, 31, 53).
16 Visicato (1999).
17 Gibson (1981, 73-74).
18 Killick and Roaf (1979).
19 Eidem and Læssøe (2001, Nos. 1, 2); Ziegler (2011).
20 Zaccagnini (1978, 23); Maidman (1987, 163).
21 Altaweel *et al.* (2012, 10).
22 Tenu *et al.* (2019, 61).
23 Ibid.

well as their contested nature.[24] A significant number of these monuments cluster along the mountainous fringes of the lower Sirwan region, especially along the Hawasan and Alwand rivers, on either side of the modern Iraq-Iran border.

A first set of monuments is located at Sarpol-e Zahab in western Iran, whose inscriptions claim patronage for Anzabazuna, son of Iddi(n)-Sîn and king of Simurrum,[25] and Anubanini, king of Lullubum.[26] Anubanini and Iddi(n)-Sîn were contemporaries according to the Haladiny inscription, which details the victories of Iddi(n)-Sîn over rebellious polities including the land of Halman,[27] which is often identified with Sarpol-e Zahab (see below). Iddi(n)-Sîn and Anzabazuna are also likely mentioned in texts from Tell Asmar.[28] This would make Iddi(n)-Sîn a contemporary of Nur-Ahum of Ešnunna, Anzabazuna a contemporary of Bilalama of Ešnunna, and both Simmurean kings contemporaries of Išbi-Erra of Isin (c. 2017-1985 BCE).[29] All this places the peak of piedmont landscape monument construction into the final years of the Ur III state at the turn of the second millennium BCE.[30] A cluster of landscape monuments in the Shakhi Bamu range presents a second phase of intense political posturing dating to the first centuries of the second millennium BCE. The best known of these is Darband-i Belula, which was carved high up on a vertical cliff near the entrance of a steep ravine in the Hawasan river valley.[31] In 2009, Iranian archaeologists surveying the eastern slopes of the Shakhi Bamu discovered a fragmentary limestone stele near the Sarab-e Sey Khan spring, whose iconography can be compared to Ur III and Old Babylonian glyptic.[32] Two further reliefs were discovered on a small outcrop overlooking the Hawasan near Darvan-i Duhol in 2019.[33] The new carvings are fragmentary and badly weathered, but seem to depict variations on the victorious warrior.

The Hawasan valley is dotted with sites dating to the later third and early second millennium BCE, whose inhabitants would have witnessed, and perhaps participated in, the carving of these monuments. All late-third-to-early-second millennium settlements in the region, however, are small to very small in size, with even the tallest multi-period mounds reaching only around one hectare in extent (although some may have undetected lower towns). In other words, there are as yet no indications in the SRP survey record that could be taken to signal political integration of the sort implied by Mesopotamian and local texts or documented at Tepe Kunara for the Shahrizor plain. This suggests that Hawasan and lower Sirwan communities' socio-political organisation in the late third and early second millennium BCE differed from that of the Shahrizor plain and lowland Mesopotamia, and may explain the difficulty faced by Iddi(n)-Sîn to hang onto the land of Halman, and why Anzabazuna, Anubanini, and later potentates entered into contests of landscape monument construction at Sarpol-e Zahab and in the Shakhi Bamu; a way to lay claim to resistant landscapes.[34]

From c. 1860 BCE onwards, the kingdom of Ešnunna, centred at Tell Asmar, attempted to extend its political reach upstream, taking control of the fortress of Me-Turan, likely Tell Haddad/Tell al-Sib in the Hamrin.[35] In 1771 BCE, Ešnunna is reported to have been attacked by Halman, and shortly thereafter it fell temporarily into Elamite hands. It seemingly reclaimed control over the Hamrin before it was defeated by Hammurabi of Babylon in 1762 BCE.[36] A series of letters also suggest that Iluni of Ešnunna may have ruled over the length of the Diyala/Sirwan valley.[37] It is difficult to gage through either textual or archaeological data whether or how these historical events and power-struggles affected the many small early second millennium BCE communities along the lower Sirwan, such as the one settled on SRP094. The answer is most likely not a great deal. A site that may have been more embroiled in such events is Tepe Kalan (SRP018), the largest MB site identified by the SRP, which is oriented geographically and culturally towards the Hamrin and other parts of Mesopotamia. We have already mentioned the intriguing differences in the ceramic assemblages of Tepe Kalan, which shows more pronounced influences from northern Mesopotamia and the Hamrin, than the materials recovered from the contemporary site of SRP094. Together with striking differences in the spatial organisation of settlement to the north and south of the Gumar and Mrwari hill ranges, these cultural differences likely signal the existence of distinct forms of social organisation, and perhaps also different political affiliations.

The overall socio-political character of the region appears to change drastically when from the sixteenth century BCE several spatially expansive sites develop. In addition to Tepe Kalan (SRP018), they include Kani Masi (SRP046), Tepe Bawa Mahmood (SRP184), and possibly also a LB settlement at Qala Sherwana (SRP001). These sites ranged between c. 40 and 8 hectares in size and point

24 Glatz (2014).
25 Shaffer *et al.* (2003).
26 Frayne (1990, E4.18.1).
27 Ahmed (2012, 256, 258, 286-293).
28 Whiting (1987, AS22, 37-38); Frayne (1990, 485, 707).
29 cf. Shaffer *et al.* (2003, 35, note 115).
30 De Graef (2022, 409-410).
31 Börker-Klähn (1982, No. 33; 139-140); Postgate and Roaf (1997).
32 Biglari *et al.* (2018).
33 Alibaigi *et al.* (2020).
34 Glatz (2020, 152-174).
35 Frayne (2008, 43 and map).
36 Charpin and Ziegler (2003, 227-228, 241); De Graef (2022, 429).
37 Guichard (2016).

to an unprecedented level of spatial differentiation in the lower Sirwan region developing in the second half of the second millennium BCE. They also all had strong cultural connections to the Middle Babylonian or Kassite cultural realm. As with preceding phases of seemingly greater centralisation or integration, this development is confined to the southern plains. In the northern valleys, only a few small sites were occupied during the LB.

Of the southern sites, Kani Masi (SRP046) has been explored most intensively, providing us with a detailed picture of life in the lower Sirwan region. We have already mentioned that the dispersed spatial layout of Kani Masi, which lacked any recognisable fortifications, differs from other local LB centres, as well as contemporary sites in Mesopotamia, which display a more tightly clustered settlement fabric. A strong focus in Phase 1 on the production and ritual consumption of food and drink, suggests that Kani Masi formed a social, and perhaps also a political focus for the wider region. There is, however, limited evidence for centralised, storable wealth and redistribution, either in the form of cereal storage or wool and textile production. Instead, much of the animal economy at Kani Masi was geared towards the production of meat, which is not a storable form of wealth. There is some indication that bureaucratic oversight existed at the site. Several sealings with seal impressions attest to administrative links to the Kassite realm, one of which at least was used to control access. However, the number of sealings is very limited in light of the excavated contexts and their public character. Thus, while Kani Masi's inhabitants participated intensively in LB Babylonia's cultural networks, there is no unequivocal evidence that the site stood under direct Kassite political control.

Following the fall of Hammurabi's dynasty and the capture by the Hittite great king, Muršili I, of Babylon in 1595 BCE, a Kassite dynasty took control of Babylon for the following c. 400 years. The Kassite ruler Agum II or Agum-kakrime (c. 1525 or 1500 BCE), seemingly staked a first political claim over the Diyala/Sirwan region, by asserting kingship over the "Land of Ešnunna, the Land of Padan and Alman, and the Land of the Gutians".[38] This inscription is not uncontroversial as, on the one hand, it is preserved in first-millennium BCE copies only and, on the other, some scholars have expressed doubts regarding its authenticity.[39] Fourteenth-century texts recount Kassite military activities in the region,[40] and a literary narrative indicates that horses, beer, wine, honey, ghee, and fruit were among the booty and tribute extracted from the region.[41]

Later Kassite rulers created three provinces (*pīḫātu*) along the river and adjacent regions: Tupliaš, Namar, and Halman. Tupliaš, the southernmost, received provincial status by the end of the fourteenth century BCE, while Namar and Halman, which can be broadly located in the Sirwan-Alwand region, are mentioned on the *kudurru* of Marduk-apla-iddina I (1171-1159 BCE). This land grant was found near Sarpol-e Zahab,[42] and forms part of a Late Kassite shift in political attention north and northeast.[43] Alman/Halman is generally equated with Sarpol-e Zahab on the basis of the Marduk-apla-iddina *kudurru*, which mentions both a settlement named Halman and a governor (*šaknu*), Šitti-Marduk, of the Land of Namar and Halman.[44] However, there is no reason why Halman could not reach further west and include the lower Sirwan valley.[45]

The archaeological evidence from Kani Masi certainly confirms a Middle Babylonian cultural presence in the wider region from the later sixteenth century BCE. It also presents a good candidate for one of the main toponyms mentioned in Kassite texts. The lack of unequivocal evidence for Kassite control at the site, rather than contradicting the Marduk-apla-iddin *kudurru,* likely reflects the reality of Kassite political influence in the region. Twelfth-century land-granting, much like earlier landscape monuments, were an attempt to gain a firmer grip over the region that formed only loosely part of a wider Babylonian/Kassite realm.[46]

Shortly after the carving of the Marduk-apla-iddin *kudurru*, Elamite king, Šilhak-Inšušinak (c. 1150-1120 BCE) claimed control over Halman and ended Kassite rule at Babylon.[47] Marduk-kabit-ahhešku established a new Babylonian dynasty in the city of Isin in 1153 BCE. The provinces of Halman and Namar continued to exist, although they were now ruled by local potentates rather than Kassite governors.[48]

The settlement at Kani Masi continued to be occupied into the final second and the early first millennium BCE. Many cultural practices of earlier occupation phases also continued, lending support to persistent close cultural relations with Kassite Babylonia, potentially as late as c. 900 BCE. Around this time, Neo-Assyrian textual sources begin to report on military expeditions in the Zagros piedmonts. These accounts include mentions of Kassite personal names, Kassite or Kassite-influenced toponyms,

38 Brinkman (1976, 95-97); for a recent translation, see van Koppen (2006, 135-139); Oshima (2012, 234 i.37-380).

39 Brinkman (2017, 9); Paulus (2018, 117).

40 Fuchs (2011, 232-236).

41 Legrain (1922, No. 69).

42 Borger (1970, 1-11); Seidl (1989, 222, Pl. 33).

43 Paulus (2013).

44 Borger (1970, 2).

45 For a discussion, see Glatz *et al.* (2019).

46 For a comparative scenario in LB Anatolia, see Glatz (2020, 77-83).

47 König (1965, 133, 54B).

48 Brinkman (1963, 234-236).

and the worship in Namri and Media of the Mesopotamian gods Marduk, Nergal, and Ishtar, underscoring enduring cultural connections between the western Zagros piedmont and Babylonia during the IA.[49] They also point to a Babylonian political presence of sorts in the middle and lower Diyala.

Shalmaneser III, for instance, reports how – in his eighth regnal year – he captured the city of Me-Turan in the Hamrin following internal unrest in the Kassite realm of Karduniaš. The following year, 850 BCE, Shalmaneser went back to what he referred to as Akkad, to besiege the city of Gananate. Gananate was located to the northeast of the Hamrin basin and the place from where Marduk-bēl-usâte, the rebellious brother of Babylonian king Marduk-zâkir-shumi (c. 855-819 BCE) and an ally of Shalmaneser and later Šamši Adad V (c. 824-811 BCE), fled with his army into the Yasubi mountains, only to be pursued and ultimately killed by the Assyrian king.[50]

Beyond this, Neo-Assyrian textual sources are not especially helpful in understanding the lower Sirwan region during the first half of the first millennium BCE. It appears to be partially covered by the toponyms of Hašmar in the north, the provinces of Arraphe and later Lahiru in the west, Hašimur in the south, and Halman in the east.[51] The area appears, from the point of view of Assyrian empire builders, to have acted mainly as a thoroughfare to regions further to the east such as Namri, Bīt-Hamban, Parsua, Harhar, and Media beyond, which held greater strategic and economic interest. Following the demise of the Neo-Assyrian empire at the hands of a Babylonian-Median coalition in 612 BCE, the Shahrizor plain and surrounding regions found themselves under the control of the Neo-Babylonian empire.[52] Babylon, however, soon thereafter was defeated at the Battle of Opis/Diyala in 539 BCE and incorporated into the Achaemenid realm, whence the Sirwan/Diyala formed the boundary between the satrapies of Media and Babylonia.

The IA was a peak period of settlement in the lower Sirwan region, the result of the foundation of many new settlements. For the first time in the settlement history of the lower Sirwan region, however, we also see significant continuity in occupation at all the largest sites. We take this to imply a measure of continuity in social and political organisation from the LB, which broadly matches contemporary textual accounts. In contrast to the second millennium BCE, when Babylonian cultural traditions dominate, IA surface assemblages are characterised by significant inter- as well as intra-site diversity. There is continuity in Babylonian practices, a more emphatic presence of north Mesopotamian/Neo-Assyrian types at some sites, and a new predominance of piedmont traditions. There may well be a difficult-to-discern chronological element to this diversity, given the long timespan covered by our IA label. Alternatively, or in part, the cultural diversity of IA surface assemblages and the varied regional spheres of cultural practice that they represent, may be evidence for a dynamic and increasingly heterogenous cultural environment. No doubt the region's geographical position played a part, as it was at once wedged between, but also seemingly of limited intrinsic interest to, the Neo-Assyrian, Neo-Babylonian, and Achaemenid empires. An overabundance of small sites, and their lack of persistence, by now a millennia-long practice of settlement in the region, suggests that lower Sirwan communities largely continued to make their own decisions, including about where they settled and when they moved away.

This long-term lack of settlement persistence particularly in the southern plains, in concert with a predominance of small sites, low levels of centralisation, and diversified agropastoral economies, presents not a proxy for local social instability or environmental fragility as has been argued in the past.[53] Rather, it registers a strategy of resilience and socio-economic sustainability in a zone of environmental and political uncertainty.

This resilience is not the result of urbanism and effective bureaucratic institutions that may allow some cities to persist over millennia,[54] but is rooted in the ability to abandon or reverse experiments with centralisation and varyingly hierarchal socio-political models.[55] Simultaneous centrality in terms of supra-regional connectivity, and marginality with regards to agricultural potential and other resources of interest to early political economies, seemingly provided the inhabitants of the lower Sirwan region with the possibility to retain over long periods, and to periodically return to, forms of social and economic organisation that limited the possibilities for centralised hierarchy and external control. The relatively greater persistence of settlements in the northern upland regions may also be read in social and ideological terms, showing perhaps a greater attachment or entanglement with place. A socio-political reading would suggest that northern socialities, which show limited signs of spatial hierarchy, were, at least initially, less affected by external imperialist pressures. Northerners, may, therefore, have had fewer reasons to opt out of repressive systems than their southern neighbours.

49 Fuchs (2017, 145-146).

50 Reade (1978, 137).

51 For different geographical reconstructions, see Levine (1973); Reade (1978, 139); Radner (2006, 57); Fuchs (2017).

52 Vanderhooft (1999, 92).

53 Adams (1965); Young and Killick (1988).

54 Smith *et al.* (2021); Lawrence *et al.* (2023).

55 Akin to what Graeber and Wengrow (2021) envisage.

Environmental risks, and from the fourth millennium BCE onwards also the social and political risks of losing self-determination in the face of ever larger and more powerful states and empires in the wider region, made early Sirwan communities economically and socially creative. To thrive in this zone of varied uncertainties, they maximised food procurement through diversified strategies that took advantage of a wide range of ecological niches available in the immediate and regional vicinity of sites. This appears to have resulted in limited technological entanglements with place such as irrigation infrastructure on the one hand, and likely patchy forms of land-use rights or ownership that may have discouraged the emergence of large-scale landholdings on the other. While lower Sirwan diets certainly encompassed a wide array of cereal-based foods, meat-based meals have emerged as a more-common-than-expected practice from stratified assemblages. This points to significant differences to lowland Mesopotamian socio-economic models, not only in terms of what people ate most of the time or how climatic variations may have been weathered by subsistence economies more heavily reliant on livestock, but also in the ways in which economic and social wealth might be accrued, stored, and translated into socio-political cohesion, authority, and power, and how these were locally negotiated, and, it seems, quite regularly challenged.

13.6 Conclusions

The SRP's integrated regional and site-based data and interdisciplinary methods have produced a detailed picture of long-term settlement, cultural, and social histories in the lower Sirwan region from prehistory to the first millennium BCE. As we have discussed above, the patterns emerging from these datasets provide a basis from which to challenge and refine text-derived macro-histories with detailed local insights on the one hand, and to rethink what resilience and sustainability look like in different environmental and historical contexts on the other.

A decade of SRP research has also generated a series of individual discoveries and analytical results that are of regional and supra-regional significance. The project has extended our knowledge of human presence in the lower Sirwan region to c. 13,000 BCE, and identified numerous previously unknown Neolithic settlements. Ongoing excavations at the large and newly discovered LC settlement of Shakhi Kora have to date uncovered a series of consecutive institutional households, the last of which featured a columned hall and material culture that is almost completely south Mesopotamian in character, paving the way to the development of detailed new insights into a piedmont pathway towards centralised forms of social organisation, Uruk colonialism, as well as their rejection. While fieldwork and analyses are still ongoing, research at Shakhi Kora has already shown that BRBs, widely thought to have served as grain-based ration containers, were locally employed to distribute meat-based meals. Livestock was intensively managed in the close surroundings of the site, with tooth enamel isotope results offering the earliest evidence to date for the manipulation of caprine breeding seasons in Iraq. Excavations at the mound-cluster of Kani Masi produced the earliest absolute dates for a wide range of Middle Babylonian or Kassite cultural practices and materials so far, as well as for a new, open and dispersed LB settlement model that shows limited evidence for the accumulation of wealth and for the exercise of bureaucratic oversight. The site also produced one of the earliest archaeobotanical identifications of millet grain in the region. SRP survey results, which point to a thriving IA settlement landscape with culturally diverse communities, moreover, revise previous hypotheses that the wider Sirwan/Diyala region was largely devoid of settlement during the later second and first millennia BCE. Over the past years, the SRP, the Garmian Department of Antiquities, and the Garmian Civilizations Museum also closely collaborated to implement a locally-driven programme of archaeological site monitoring and protection, and co-developed several initiatives to engage members of local communities.

We continue to build on, and expand, these collaborations in the context of ongoing archaeological survey and excavations, the preparation for publication of data pertaining to the later first millennium BCE until the modern period, and in the development of new approaches to community-centred cultural heritage practices.

Appendix I
Catalogue of Prehistoric, Bronze, and Iron Age Sites

Site No.	Site name	Site type	Topography	Height (m)	Size (ha)	Elevation (m)
SRP002	Tepe Charmu	Settlement (ancient)	Low mound	2.0	0.49	173
SRP006	Tepe Qalah (Imam Shekh Langar)	Settlement (ancient) Cemetery (modern) Shrine (modern)	Low mound	3.0	0.97	187
SRP007	Shekh Langar	Artefact scatter	Low mound	2.5	0.72	186
SRP008	Pira Faqira	Artefact scatter	High mound	5.0	1.44	179
SRP009	Bardaswr Tapa	Artefact scatter	River terrace	-	3.17	245
SRP010	Grde Gozina	Settlement (ancient)	High mound	4.0	1.39	204
SRP011	Tepe Gawr	Settlement (ancient)	High mound	4.0	5.28	202
SRP017	Tepe Imam Mohammed	Settlement (ancient) Shrine (modern)	High mound	18.0	3.14	193
SRP018	Tepe Kalan	Citadel (ancient) Lower town (ancient) Standing remains	High mound	19.0	21.26	151
SRP019	Binah Bakh	Settlement (ancient)	Low mound	3.0	13.24	151
SRP021	Qala Kon	Settlement (ancient)	High mound	13.0	2.19	337
SRP022	Falah	Settlement (ancient)	Low mound	4.0	1.64	193
SRP023	Tapa Kalay Mira I	Artefact scatter	Plainland	-	0.09	188
SRP024		Settlement (ancient)	Low mound	1.5	1.59	195
SRP025	Tepe Sawz	Citadel (ancient) Lower town (ancient)	High mound	7.4	1.46	186
SRP026	Sayid Sikhi I	Settlement (ancient)	Low mound	3.0	0.23	189
SRP027	Sayid Sikhi II	Settlement (ancient)	Low mound	2.0	1.4	192
SRP028	Mrwari (Sayid Sikhi III)	Settlement (ancient)	Low mound	3.0	2.06	193
SRP031	Tapa Musa Osman I	Settlement (ancient)	River terrace	-	4.07	195
SRP032	Tapa Musa Osman II	Settlement (ancient)	Low mound	3.5	2.43	204
SRP034	Tapa Ghaydan	Settlement (ancient)	High mound	6.5	1.51	197
SRP035		Settlement (ancient)	Low mound	2.5	1	194
SRP036	Tepe Sirwan	Settlement (ancient)	High mound	5.0	0.89	200
SRP039	Tell Majid I (Kani Masi cluster)	Settlement (ancient)	High mound	17.0	3.18	188
SRP042	Kani Masi cluster	Settlement (ancient)	Low mound	3.0	2.31	185
SRP043	Kani Masi cluster	Settlement (ancient)	Low mound	4.0	0.3	185

Site No.	Site name	Site type	Topography	Height (m)	Size (ha)	Elevation (m)
SRP044	Kani Masi cluster	Settlement (ancient)	High mound	5.0	0.51	185
SRP046	Kani Masi cluster	Settlement (ancient)	Low mound	1.5	3.55	185
SRP047	Tapa Yahudi	Settlement (ancient) Cemetery (modern)	Low mound	4.0	0.41	193
SRP048	Tapa Arab	Citadel (ancient) Lower town (ancient) Cemetery (modern)	High mound	8.0	2.28	195
SRP054	Tepe Ali Pasha	Settlement (ancient)	Low mound	3.0	0.8	193
SRP057	Gakul	Settlement (ancient) Settlement (modern, abandoned)	Low mound	3.5	1.36	201
SRP060		Artefact scatter	Plateau	-	0.88	304
SRP061	Qala Gawri	Settlement (ancient)	High mound	6.0	1.41	264
SRP069	Kalay Mira II	Settlement (ancient)	Low mound	4.0	0.48	188
SRP070	Mala Kunar I	Settlement (ancient)	High mound	15.0	3.98	173
SRP071	Mala Kunar II	Settlement (ancient)	High mound	11.5	1.07	169
SRP072		Settlement (ancient)	Low mound	1.0	0.29	173
SRP074	Tapa Sawz Bulagh	Artefact scatter	Low mound	2.0	0.66	195
SRP079	Gakol Kale	Settlement (ancient) Standing remains	Low mound	0.5	0.36	199
SRP084	Taza Shar	Settlement (ancient)	Low mound	0.3	0.76	193
SRP086		Artefact scatter	Low mound	0.5	0.25	196
SRP087	Gakul Tapa II	Artefact scatter	Low mound	0.5	0.2	200
SRP089		Artefact scatter	Low mound	1.5	1.63	194
SRP090		Settlement (ancient)	High mound	5.0	0.99	194
SRP092		Settlement (ancient)	Low mound	3.0	1.63	185
SRP093		Settlement (ancient)	Low mound	1.0	0.77	184
SRP094		Settlement (ancient)	Low mound	1.0	2.03	183
SRP095		Artefact scatter	Low mound	3.0	0.77	185
SRP096		Settlement (ancient)	Low mound	4.0	0.44	190
SRP101	War Qatar I	Settlement (ancient)	Low mound	1.8	0.82	189
SRP102	War Qatar II	Settlement (ancient)	High mound	19.3	3.08	190
SRP103	Away Gawra	Settlement (ancient) Settlement (modern, abandoned)	Low mound	3.0	0.29	192
SRP104	Qaburstan Away Gawra	Settlement (ancient) Cemetery (modern)	Low mound	0.5	0.7	194
SRP106	Tepe Shaho	Settlement (ancient)	High mound	25.0	1.15	398
SRP107		Settlement (ancient)	Low mound	0.5	1.19	408
SRP108		Settlement (ancient)	Low mound	3.5	1.6	189
SRP109		Settlement (ancient)	Low mound	1.5	0.31	189
SRP111	Tapa Awayi Gawra	Settlement (ancient) Standing remains	Plateau	-	7.37	405
SRP112	Qala Horen	Settlement (ancient) Standing remains	Hillside	-	5.78	508
SRP113	Tepe Ama Husen	Settlement (ancient)	High mound		0.64	373
SRP117		Settlement (ancient)	Low mound	2.0	0.22	188
SRP119		Settlement (ancient)	Low mound	2.5	0.3	187
SRP121		Settlement (ancient)	Low mound	1.5	4.01	183

Site No.	Site name	Site type	Topography	Height (m)	Size (ha)	Elevation (m)
SRP127		Settlement (ancient)	Low mound	1.5	0.11	189
SRP129		Settlement (ancient)	Low mound	2.5	0.26	201
SRP132		Settlement (ancient)	Low mound	2.5	0.59	200
SRP138		Standing remains	Plateau	-	1.65	497
SRP142		Settlement (ancient)	High mound	25.0	2.17	198
SRP143	Tepe Qalandari	Citadel (ancient) Lower town (ancient)	High mound	18.0	2.99	364
SRP144		Settlement (ancient)	Low mound	3.5	0.61	353
SRP149	Qubba Qala	Settlement (ancient)	High mound	8.0	5.03	145
SRP150	Qubba Tepe	Settlement (ancient) Citadel (ancient)	High mound	5.0	9.56	142
SRP151		Artefact scatter	Low mound	2.5	0.8	189
SRP152	Bawa Plawi	Artefact scatter	Low mound	4.0	0.83	171
SRP154		Settlement (ancient)	High mound	6.0	1.54	168
SRP155	Qala Mahmoud Aziz	Settlement (ancient) Settlement (modern, abandoned)	Plateau	-	2.27	524
SRP159		Artefact scatter Cemetery (modern)	Low mound	2.0	0.49	169
SRP160		Settlement (ancient)	High mound	5.0	0.27	170
SRP164	Tell Nergz	Citadel (ancient) Lower town (ancient)	High mound	7.0	19.51	144
SRP165	Quba	Settlement (ancient)	Low mound	4.0	0.58	145
SRP166		Settlement (ancient)	Low mound	2.5	0.41	146
SRP170	Girdi Maskut	Settlement (ancient) Cemetery (ancient)	High mound	12.0	1.08	459
SRP171	Chia Raza Tepe	Settlement (ancient)	High mound	14.0	0.73	489
SRP172	Tepe Asyaw	Settlement (ancient)	High mound	12.0	0.56	172
SRP175		Artefact scatter	Low mound	1.0	0.96	169
SRP176		Cemetery (ancient)	Plainland	-	0.01	245
SRP177		Artefact scatter	River terrace	-	0.29	232
SRP178	Tepe Dar	Settlement (ancient) Cemetery (ancient) Cemetery (modern)	High mound	20.0	0.24	507
SRP179		Settlement (ancient)	Plateau	-	1.51	328
SRP180	Tepe Qaburstan	Settlement (ancient) Cemetery (modern)	Low mound	4.0	0.83	489
SRP181 (SRP190)	Ashkawti Manga Wakal	Standing remains Artefact scatter	Cave (surroundings)	-	0.31	645
SRP182	Tepe Rahim	Settlement (ancient)	Low mound	3.5	3.27	271
SRP183	Tepe Gezhakan	Settlement (ancient)	Low mound	4.0	0.26	188
SRP184	Tepe Bawa Mahmood	Settlement (ancient) Settlement (modern, abandoned) Cemetery (modern) Shrine (modern)	High mound	30.0	8.48	166
SRP187	Tepe Gumar I	Settlement (ancient)	Low mound	3.5	2.69	182
SRP189		Cemetery (ancient)	Plainland	-	0.54	183
SRP191	Shakhi Kora	Settlement (ancient)	High mound	6.0	6.49	176
SRP195		Artefact scatter	Low mound	1.0	0.93	180
SRP196	Tepe Gumar II	Settlement (ancient)	High mound	7.0	1.59	186

Site No.	Site name	Site type	Topography	Height (m)	Size (ha)	Elevation (m)
SRP197		Settlement (ancient) Settlement (modern, abandoned)	Low mound	3.0	17.31	191
SRP198	Yalanci Tepe	Settlement (ancient)	Low mound	4.5	2.87	185
SRP199		Artefact scatter	Low mound	3.5	0.51	183
SRP200		Settlement (ancient)	Low mound	1.5	0.9	182
SRP201		Settlement (ancient)	Low mound	1.0	2.64	179
SRP202	Tepe Majid	Settlement (ancient)	Low mound	4.5	0.49	188
SRP205	Ezadin Tepe	Settlement (ancient)	Low mound	2.0	1.07	180
SRP206		Artefact scatter	River terrace	-	0.17	188
SRP208		Settlement (ancient)	Low mound	3.0	3.58	189
SRP211		Settlement (ancient) Standing remains	Hillside		1.05	466
SRP215	Tepe Chalah Razay	Settlement (ancient)	High mound	5.0	0.31	387

Following consultation with the General Directorate of Antiquities in Erbil, site coordinates are not provided in this volume. For access to this information please contact the lead author or the Garmian Department of Antiquities.

Appendix II
Absolute Dates

II.1 Radiocarbon dates

Site	Trench	Locus	Lot	Lab No.	Material	Uncal. BP	Lab cal. Date	2 Sigma Date (IntCal20 Curve)	$\delta^{13}C$ ‰
Ashkawti Manga Wakal									
SRP181				AA113261/X34917	Charcoal	12631±88	13348-12557	13371-12847 BCE	-25.0 ‰
Shakhi Kora									
SRP191	TT1	15	1	AA112459/X3414	Charcoal	5074±24	3956-3798	3956-3796 BCE	-25.50
SRP191	TT1	16	1	AA112460/X34147	Charcoal	5069±22	3953-3798	3953-3797 BCE	-25.30
SRP191	TT1	17		AA112461/X34148	Charcoal	5067±22	3951-3798	3953-3796 BCE	-26.30
SRP191	TT1	8		AA112457/X34144	Charcoal	4992±28	3932-3701	3936-3655 BCE	-27.20
SRP191	TT1	1	1	AA112455/X34142	Charcoal	4925±21	3763-3651	3766-3644 BCE	-26.20
SRP191	AA21	9	1	AA114848/X36453	Charcoal	4946±29	3780-3648	3780-3648 BCE	-25.60
SRP191	AA21	20		AA114849/X36454R	Charcoal	4893±29	3761-3633	3761-3633 BCE	-24.70
SRP191	AA21	8	1	AA114847/X36452	Charcoal	4884±30	3760-3541	3760-3541 BCE	-25.30
SRP191	TT1	2		AA112456/X34143	Charcoal	4767±45	3645-3379	3642-3378 BCE	-26.00
SRP191	AA21	2	5	AA114846/X36451	Charcoal	4732±29	3631-3377	3631-3377 BCE	-24.50
SRP191	Z19	110	6	AA116084/X37686	Charcoal	4824±14	3646-3532	3646-3532 BCE	-24.69
SRP191	AA21	203		AA116085/X37687	Charcoal	5022 ±13	3941-3713	3941-3713 BCE	-27.03
Pira Faqira									
SRP008	TT1	3	4	AA112452/X34139	Charcoal	5050±30	3952-3777	3955-3770 BCE	-26.1 ‰
Kani Masi									
SRP094	K136	115	3	AA113264/X34920R	Charcoal	3625±27	2119-1903	2122-1897 BCE	-23.30
SRP094	K136	108	2	AA114863/X36468	Seed (lentil)	3577±28	2025-1781	2025-1781 BCE	-25.30
SRP094	K136	117	1	AA114864/X36469	Seed (barley)	3568±28	2021-1778	2021-1778 BCE	-24.20
SRP094	K136	6	3	SUERC76927/GU46587	Charcoal	3576±24	2020-1880	2022-1826 BCE	-26.90
SRP094	K136	111	1	AA113266/X34922	Charcoal	3533±25	1941-1771	1946-1768 BCE	-27.50
Kani Masi									
SRP046	Z88	17	2	AA114862/X36467	Charcoal	3165±35	1506-1319	1506-1319 BCE	-25.70
SRP046	V85	175	2	SUERC77188/GU46930	Charcoal	3189±27	1505-1416	1505-1418 BCE	-25.40
SRP046	Z88	36	1	AA115759/X377359	Bone	3134±24	1500-1300	1495-1305 BCE	-17.40

Site	Trench	Locus	Lot	Lab No.	Material	Uncal. BP	Lab cal. Date	2 Sigma Date (IntCal20 Curve)	$\delta^{13}C$ ‰
SRP046	Y82	18	2	AA114856/X36461	Charcoal	3150±27	1499-1320	1499-1320 BCE	-27.80
SRP046	Z88	16	1	AA113267/X34923	Charcoal	3145±24	1496-1318	1497-1317 BCE	-26.70
SRP046	Y82	20	4	AA114857/X36462	Charcoal	3118±29	1488-1292	1488-1292 BCE	-26.70
SRP046	Y82	9	2	AA114853/X36458	Charcoal	3113±30	1446-1285	1446-1285 BCE	-26.20
SRP046	Z88	9	1	AA114859/X36464	Charcoal	3104±27	1433-1288	1433-1288 BCE	-24.50
SRP046	DD89	9	1	AA111951/X33631	Charcoal	3103±24	1430-1296	1430-1291 BCE	-26.40
SRP046	Y82	9	6	AA114854/X36459	Charcoal	3087±27	1421-1272	1421-1272 BCE	-25.50
SRP046	Y82	9	3	AA114866/X36471	Charcoal	3077±30	1421-1261	1421-1261 BCE	-27.10
SRP046	Y82	9	1	AA114852/X36457	Charcoal	3041±50	1421-1127	1421-1127 BCE	-27.20
SRP046	Y82	13	5	AA114855/X36460R	Charcoal	3082±27	1418-1270	1418-1270 BCE	-26.00
SRP046	Y82	7	3	AA114851/X36456	Charcoal	3043±41	1416-1133	1416-1133 BCE	-26.30
SRP046	Y88	20	30	AA109181/X31274	Charcoal	3088±20	1415-1290	1417-1289 BCE	-26.80
SRP046	Z88	10	1	AA114860/X36465	Charcoal	3063±27	1411-1234	1411-1234 BCE	-27.10
SRP046	TT2			SUERC53433/GU34603	Charcoal	3058±27	1408-1233	1410-1228 BCE	-27.20
SRP046	Z88	14	4	AA114861/X36466	Charcoal	3022±27	1391-1132	1391-1132 BCE	-26.00
SRP046	V85	164	4	AA111949/X33629R2	Charcoal	3017±30	1389-1131	1391-1128 BCE	-25.70
SRP046	Z88	14	4a	AA114865/X36470	Charcoal	2968±27	1277-1056	1277-1056 BCE	-26.90
SRP046	Y82	3	3	AA114850/X36455	Charcoal	2872±57	1220-903	1220-903 BCE	-26.90
Tepe Qalandari									
SRP143	TT1			AA114881/X36486	Charcoal	2448±26	751-413	751-413 BCE	-24.8

II.2 Geoluminescence dating

Sample	Lab. No	Aliquots$_a$	Particle Size (μm)	Eq. Dose (Gray)$_b$	Overdispersion (%)$_c$	U (ppm)$_d$	Th (ppm)$_d$	K(%)$_d$	Cosmic dose rate (mGray/yr)$_e$	Dose rate (mGray/yr)	OSL age (yr)$_f$
SRP036	BG4080	29/35	355-250	14.82 ± 0.80	23 ± 3	1.64 ± 0.01	3.75 ± 0.01	1.30 ± 0.01	0.20 ± 0.02	1.92 ± 0.10	7700 ± 600

Optically stimulated luminescence (OSL) dating of quartz grains from a sample taken from a section of the test sounding at Tepe Sirwan (SRP036, see Chapter 2) was carried out by the Geoluminescence Dating Research Laboratory at Baylor University.

a. Aliquots used in equivalent dose calculations versus original aliquots measured.
b. Equivalent dose calculated on a pure quartz fraction with about 40-100 grains/aliquot and analyzed under blue-light excitation (470 ± 20 nm) by single aliquot regeneration protocols (Murray and Wintle, 2003). The Central Age Model of Galbraith *et al.* (1999) was used to calculated equivalent dose with overdispersion % < 20%; whereas if overdispersion was >20% a finite mixture model was used to determine the lowest significant equivalent dose population. Central age model is applicable with overdispersion values of < 20% (at 2 sigma error).
c. Values reflects precision beyond instrumental errors; values of ≤ 20% (at 2 sigma error) indicate low dispersion in equivalent dose values and an unimodal distribution.
d. U, Th and K content analysed by inductively-coupled plasma-mass spectrometry analysed by ALS Laboratories, Reno, NV; U content includes Rb equivalent.
e. Includes a cosmic dose rate calculated from parameters in Prescott and Hutton (1994).
f. Systematic and random errors calculated in a quadrature at one standard deviation. Datum year is AD 2010.

Appendix III
Chipped Stone Surface Assemblages

Daniele Moscone

Site	Blade cores	Flake cores	Flakes	Blades	Retouched artefacts	Total	Date
SRP002							n/i
SRP006			2	1		3	n/d
SRP007		1		6	1	8	NEO-CHA
SRP008	1		12	8		21	LC
SRP009	1		8			9	EB
SRP010	4		6	20	1	31	PPN
SRP017							LC-EB
SRP019							n/i
SRP021							LC-BA
SRP022			6		1	7	n/d
SRP023							n/i
SRP025				1		1	n/d
SRP028							NEO-IA
SRP031							n/i
SRP034							n/i
SRP035							n/i
SRP036							NEO-IA
SRP044							BA onwards
SRP047			2			2	n/d
SRP056							n/i
SRP057							BA onwards
SRP061							n/i
SRP069		1	8	2	3	14	NEO-BA
SRP070		2	17	11	2	32	LC
SRP071			16	1	5	22	EB
SRP072							n/i
SRP073							n/i

Site	Blade cores	Flake cores	Flakes	Blades	Retouched artefacts	Total	Date
SRP079							LC-EB
SRP080							n/i
SRP087							n/i
SRP093							n/i
SRP095							n/i
SRP100							n/i
SRP101	1		1	1		3	NEO-CHA?
SRP102							CHA-BA
SRP103							BA?
SRP106			1			1	n/d
SRP108							n/i
SRP111		1	4		4	9	CHA-BA
SRP112	1	1			4	6	NEO-BA
SRP117		1		1		2	n/d
SRP121			1		1	2	n/d
SRP125							n/i
SRP138			2	1		3	n/d
SRP143							n/i
SRP144							n/i
SRP150	1		12	3		16	LC-EB
SRP151		1	8			9	EB
SRP152			4		2	6	EB-MB-LB
SRP153			2			2	n/d
SRP155							n/i
SRP158					1	1	n/d
SRP159							n/i
SRP160			3			3	n/d
SRP161			2		1	3	n/d
SRP164		2	7	6	7	22	LC-EB
SRP165			4	1		5	EB
SRP166					2	2	n/d
SRP170			4		4	8	EB
SRP171			6	1	2	9	EB
SRP174			1			1	n/d
SRP177	2	1		4	7	14	PPN
SRP182							n/i
SRP187		2	10	2		14	NEO-BA
SRP193			1			1	n/d
SRP196				8		8	NEO-LC
SRP198			12	11	6	29	NEO-LC
SRP199					1	1	n/d
SRP201							n/i
SRP202							n/i
SRP205							NEO-BA
SRP206							n/i

Abbreviations

n/i	Chipped stones are present, but preservation is poor making identification difficult.
n/d	Chipped stones are present and identifiable, but no definitive date can be assigned.
PPN	Pre-Pottery Neolithic
NEO	Neolithic
CHA	Chalcolithic
LC	Late Chalcolithic
BA	Bronze Age
EB	Early Bronze Age
MB	Middle Bronze Age
LB	Late Bronze Age
IA	Iron Age

Appendix IV
Archaeobotanical Data

Mette Marie Hald

IV.1 Tepe Sirwan (SRP036) test trench

Archaeobotanical sample no.	**C3/C4/CAM**	**No.**
Pulses		
cf. *Lens culinaris*	C3	2
Totals per sample		2

IV.2 Shakhi Kora (SRP191)

Archaeobotanical sample no.	**C3/C4/CAM**	**2019.17**	**2019.21**	**2019.30**	**2019.39**	**2022.ex38**	**2022.ex41**
Trench		Z19/AA19	AA21	Z19/AA19	Z19/AA19	Z19	Z19
Locus		14	9	14		111	110
Lot		2	3	2		2	5
Bag no.		45	22	45			
Context		jar, same as 30	jar	jar, same as 17	vessel		
Volume (litres)		18	12	20	1		
Density (plant items per litre)		0.1	1.5	0.6	2.0		
Cereal grains							
Hordeum vulgare, hulled						2	
Triticum dicoccum	C3			1		4	
Triticum cf. *dicoccum*							1
Triticum monococcum	C3					1	
Triticum cf. *monococcum*						2	
Triticum, cf. free-threshing						2	
Triticum sp., indet.						18	
Cereal grain indet.			9		1	17	5

Archaeobotanical sample no.	C3/C4/CAM	2019.17	2019.21	2019.30	2019.39	2022.ex38	2022.ex41
Cereal chaff							
Triticum dicoccum glume base			1				
Triticum dicoccum/monococcum glume base						2	
Other crops							
Ficus carica	C3					1	
Wild taxa							
cf. *Carex* sp.				1			
Trigonella sp.	C3	1					
cf. *Melilotus* sp.	C3	1					
Malva sp.				1			
Aegilops sp., grain	C3					1	
Grass seed indet.			8	8	1	9	
Potentially identifiable						3	1
Totals per sample		2	18	11	2	62	7

IV.3 SRP117 test trench

Archaeobotanical sample no.	**C3/C4/CAM**	**2019.45**
Trench		TT2
Locus		4
Lot		3
Bag no.		11
Context		
Volume (litres)		18
Density (plant items per litre)		5.5
Cereal grains		
Hordeum vulgare, hulled		2
Triticum dicoccum	C3	1
Triticum cf. *dicoccum*		2
Triticum sp., free-threshing		1
Triticum sp., indet.		3
Cereal grain indet.		9
Cereal chaff		
Triticum aestivum rachis internode		12
Triticum sp., free-threshing, rachis internode		25
Culm node		2
Top of culm		4
Other crops		
Ficus carica	C3	1
Wild taxa		
Centaurea sp.	C3	1
Asteraceae	8 out of 1500 genera are C4	1
Chenopodium murale	C3	30
Medicago sp.	C3	1
Medicago/Melilotus/Trifolium sp.	C3	2
Grass seed indet.		2
Totals per sample		99

IV.4 Kani Masi (SRP094)

Archaeobotanical sample no.	C3/C4/CAM		54	47
Site		SRP094	SRP094	SRP094
Trench		K136	K136	K136
Locus		4	108	117
Lot		2	2	1
Bag no.		1	134	138
Context				
Volume (litres)				
Density (plant items per litre)				
Cereal grains				
Hordeum vulgare, hulled				5
Cereal chaff				
Triticum cf. *monococcum* glume base		3		
Triticum dicoccum/monococcum glume base		1		
Pulses				
Lens culinaris	C3	3	5	
Large legume indet.		1		
Wild taxa				
Small legume indet.		26		
Malva sp.				
Plantago sp.	C3	1		
Grass seed indet.		22		
Galium sp.	C3	1		
Totals per sample		58	5	5

IV.5 Kani Masi (SRP189)

Archaeobotanical sample no.	C3/C4/CAM	2019.3	2019.36	2019.47
Trench		I 113	I 113	I 113
Locus		8	9	4
Lot		36	15	18
Bag no.		36		
Context			large pot	jar
Volume (litres)		36	12	11
Density (plant items per litre)		0.0	0.3	0.2
Wild taxa				
Chenopodium album	C3		1	
cf. *Melilotus* sp.	C3			1
Medicago/Melilotus/Trifolium sp.	C3		1	
Grass seed indet.		1		1
cf. grass seed			1	
Totals per sample		1	3	2

IV.6 Kani Masi (SRP046)

Archaeobotanical sample no.	C3/C4/CAM	2019.6	2019.10	2019.12	2019.14	2019.20	2019.23	2019.26	2019.32	2019.33	2019.34	2019.35	2019.37	2019.38	2019.41	2019.58	2019.1	2019.59	2019.50
Trench		Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82 E	Y82W	Y82W
Locus		9	12	3	7	5	13	7	9	4	7	9	9	4	12	12	17	16	22
Lot		4	2	3	1	1	5	1?	1	3	2	1	3	4	1	3	1	6	3
Bag no.		93	99	38	58	25	114	59	42	11	62	47	79	13	75	102	135	152	203
Context		around hearth	hearth	floor					floor		ash	floors	floors		hearth	hearth		ash pit	
Volume (litres)		18	30	24	33	20	35	18	25	27	30	25	25	18	18	7	30	3	5
Density (plant items per litre)		2.4	2.7	0.7	5.4	0.7	1.1	11.2	0.6	1.0	19.1	1.0	2.1	0.6	8.7	1.4	2.7	1.0	0.4
Cereal grains																			
Hordeum vulgare, hulled, straight	C3							1											
Hordeum vulgare, hulled			1			1									2		2		
cf. *Hordeum vulgare*					2			1		1					1				
Triticum dicoccum	C3						1												
Triticum cf. *dicoccum*															1				
Triticum cf. *monococcum*			2												1				
Triticum sp., free-threshing					1						1			1					
Triticum, cf. free-threshing															1				
Triticum sp., indet.		3	2		4						3		1		3				
cf. *Triticum* sp.								3											
Cereal grain indet.		8	13		12	1	5	5	2	2	3	3	4	1	3	2			
Cereal/*Aegilops* indet.	C3														2				
Panicum miliaceum	C4						1								1				
Cereal chaff																			
Triticum dicoccum glume base											3								
Triticum dicoccum/ monococcum glume base							1												
cf. *Triticum* sp., rachis internode				1															
Hordeum sp., rachis internode					1							1	1						
Culm node								5			3		1				3		
Top of culm					2						1								
Pulses																			
Lens culinaris	C3														4				
cf. *Lens culinaris*	C3	1																	
Vicia ervilia	C3												1						
Vicia/Lathyrus sp.	C3				2														
Large legume indet.					1	2	1	4			2				5				
Other crops																			
Ficus carica	C3														1				

Archaeobotanical sample no.	C3/C4/ CAM	2019.6	2019.10	2019.12	2019.14	2019.20	2019.23	2019.26	2019.32	2019.33	2019.34	2019.35	2019.37	2019.38	2019.41	2019.58	2019.1	2019.59	2019.50
Trench		Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82	Y82 E	Y82W	Y82W
Locus		9	12	3	7	5	13	7	9	4	7	9	9	4	12	12	17	16	22
Lot		4	2	3	1	1	5	1?	1	3	2	1	3	4	1	3	1	6	3
Bag no.		93	99	38	58	25	114	59	42	11	62	47	79	13	75	102	135	152	203
Context		hearth	hearth	floor					floor		ash	floors	floors		hearth	hearth		ash pit	
Wild Taxa																			
Ammi sp.	Family usually C3			1															
Apiaceae	Family usually C3				1														
Bellevalia/Muscari sp.	C3		2								1								
Centaurea sp.	C3					1													
cf. Asteraceae	C3				1														
Carex sp.										1			1	2		1			
cf. *Carex* sp.				1															
Cyperaceae indet.	28 of 131 genera are C4		2																
Prosopis cf. *farcta*							2				2								
cf. *Prosopis* sp.		1									1								
Astragalus sp.	C3	2	1		1	1	1	1		2	1			1	8				
cf. *Astragalus* sp.																		2	
Trigonella sp.	C3			3					2	2	1	5	2		3		2	1	1
Astragalus/ Trigonella sp.															2				
Medicago sp.	C3	2					2			1			2		1	1			
Melilotus cf. *albus* utricle								5			16								
Medicago/ Melilotus/Trifolium sp.	C3	8	10		3		3				6		3	1	28				
Small legume indet.		3		3	3	6	2	2		1	2	5	3		15	1			
Malva sp.			2	1	5			9	1	5	20		2		4		2		
cf. *Malva* sp.	C3	1																	
cf. *Plantago*					1			1											
Aegilops sp., grain	C3		2		1			1											
Aegilops sp., glume base					2														
Bromus sp.	C3		1								2				1				
cf. *Eremopyrum* sp.	C3										2				1				
Lolium sp.	C3		5		2						3				7				
cf. *Lolium* sp.			3		8			12			46				9		1		
Grass seed indet.		13	30		98		15	117	5	8	363	7	21	2	41	4			1
cf. grass seed					23			15			29						65		
Grass rachis internode								1			14						1		
Rumex sp.	C3				2						2		5	1	1				

Archaeobotanical sample no.	C3/C4/CAM	2019.6	2019.10	2019.12	2019.14	2019.20	2019.23	2019.26	2019.32	2019.33	2019.34	2019.35	2019.37	2019.38	2019.41	2019.58	2019.1	2019.59	2019.50
cf. *Rumex* sp.		1		1							1				3				
Galium sp.	C3						2							1					
Type 1					1			8		1	19		2				1		
Type 2				1													3		
Flower bud?								1											
Potentially identifiable		1	4	5	1	1	4	9	4	3	26	3	3		7	1			
Totals per sample		44	80	17	178	13	40	201	14	27	573	24	52	10	156	10	80	3	2

Archaeobotanical sample no.	**midden**										**2019.13**	**2019.5**	**2019.8**	**2019.48**	**2019.49**	**2019.46**	**2019.55**	**2019.56**	**2017.17**
Trench	CC89	DD89	DD89	DD89	DD89	V85	V85	V85	V85	V85	Y88	Z88	Z88	Z88	Z88	Z88	Z88	Z88	L80C
Locus	4	8	9	9	4	167	119	119	116	155	125	32	32	14	14	14	17	29	9
Lot	1	2	1	3	3	1	2	2	4	1	2	1	1	5	4	4	2	1	1
Bag no.		51	62	64	36	281	84	113	182	149	9	53	54	154	160	153	196	45	
Context													ash						
Volume (litres)											30	30	27	7	16	6	5	5	
Density (plant items per litre)											0.1	0.8	0.7	0.7	0.2	0.8	0.2	0.4	
Cereal grains																			
Hordeum vulgare, hulled	4				7														
cf. *Hordeum vulgare*			1		4														
Triticum monococcum				1	1														
Glume wheat indet.				2															
Triticum sp., indet.		1																	
cf. *Triticum* sp.									2										
Cereal grain indet.				1	3	2			3			4	3			1			2
Cereal chaff																			
Triticum cf. *monococcum* glume base					1														
Triticum dicoccum glume base														4					
Triticum cf. *dicoccum* glume base														1					
Triticum dicoccum/monococcum glume base													1		1				
Culm node						1													
Pulses																			
Lens culinaris							1	1		1									
Vicia/Lathyrus sp.						1													
Large legume indet.		1					1												1

Archaeobotanical sample no.	midden									2019.13	2019.5	2019.8	2019.48	2019.49	2019.46	2019.55	2019.56	2017.17
Other crops																		
cf. *Linum usitatissimum*								1										
Wild taxa																		
Bellevalia/Muscari sp.					1									1			1	
Centaurea sp.																		1
Chenopodium album															1			
cf. *Carex* sp.								1										
Prosopis cf. *farcta*					1													
Astragalus sp.									1									
Trigonella sp.		1																
Medicago sp.														1			1	
Medicago/ Melilotus/Trifolium sp.				4			1				8							
Small legume indet.		3	3		2			3			11	13			1			1
cf. *Malva* sp.									1									
Plantago sp.							1											
Aegilops sp., grain								3										
cf. *Aegilops* sp., grain							1											
Aegilops sp., glume base			3			2		9										
Lolium sp.																1		
Grass seed indet.	1	1		2	2	1	4	4	1		2		1					
Rumex sp.													2					
Type 2											1							
Potentially identifiable															2			
Totals per sample	5	7	7	10	22	7	9	22	8	1	3	23	20	5	3	5	1	2	5

Appendix V
Stone Tools

Andrea Squitieri

V.1 Shakhi Kora (SRP191)

Site	Area	T/L/L	Type	Description	Activities	Raw material
SRP191	Area I	AA21/4/3	handstone	Ovoid stone with a flat and wide side, smoothed from use.	food prep.	basalt (?)
SRP191	Area I	AA21/9/4	handstone	Ovoid stone with a flat and wide side, smoothed from use.	food prep.	basalt?
SRP191	Area I	AA21/2/3	pestle	Elongated tool with rounded extremities. Possibly used as a pestle or a handstone.	food prep.	igneous or meta-morphic rock
SRP191	Area I	AA21/2/4	pestle	Elongated tool, squarish in plan view. Possibly used as a pestle.	food prep.	limestone
SRP191	Area I	AA21/5/3	polisher	Rounded pebble with a flat face. Likely used as a polisher.	craft	basalt
SRP191	Area I	Z19/12/5	1) loom-weight 2) weight	1) doughnut shape tool, with a smooth surface. Possibly used as a loom weight but other uses are possible as for example fishnet weight; 2) rounded tool with a polished surface; may be a spherical weight.	unclear	limestone
SRP191	Area II	G19/5/26	weight?	ovoid pebble with a smooth surface. It may have been used as a weight.	administrative?	limestone

V.2 Kani Masi (SRP094)

Site	T/L/L	Type	Description	Activities	Raw material
SRP094	K136/8/1	grinding slab	Fragment of a grinding slab with a slightly concave working surface. The opposite side is left rough as the tool was likely fixed into the ground.	food prep.	conglomerate
SRP094	K136/7/1	whestone (?)	Pointed tool with a wider extremity that has a rectangular section. It is possible that it was used as a whetstone even if it has a less regular shape than the other whetstones.	craft (?)	reddish limestone
SRP094	K136/6/2	pointed tool	Pointed tool (broken) with a wedge shape, function unclear.	unclear	shale (?)
SRP094	K136/4/2	grinding slab	Fragment of an object with a flat surface, possibly part of grinding slab.	food prep.	conglomerate
SRP094	K136/3/2	grinding slab	Fragment of a grinding slab with a slightly tapering profile, flat working surface.	food prep.	conglomerate
SRP094	K136/3/1	grinding slab	Fragment of a grinding slab with flattish working surface.	food prep.	conglomerate
SRP094	K136/3/1	grinding slab	Fragment of a grinding slab with a flat working surface and a rounded dorsal side.	food prep.	conglomerate

V.3 Kani Masi (SRP046)

Site	Area	T/L/L	Type	Description	Activities	Raw material
SRP046	Area I	Y88/102/2	whetstone	Elongated tool with a rectangular section.	craft	limestone
SRP046	Area I	Y88/103/2	whetstone	Pointed tool, with rounded extremity.	craft	limestone
SRP046	Area I	Y88/5/2	polisher	Rounded tool with a flat face.	craft	volcanic rock
SRP046	Area I	Y88/8/2	pounder	Spherical tool, possible pounder.	craft	quarzitic rock
SRP046	Area I	Y88/113/1	pestle	Rectangular in plan view with a slightly pointed extremity, while the opposite end is more straight.	food prep.	limestone
SRP046	Area I	Y88/114/1	pestle	Conical tool with a rounded extremity. Broken on the opposite extremity.	food prep.	limestone
SRP046	Area I	Y88/121/2	pestle	Conical tool with a rounded extremity. Broken on the opposite extremity.	food prep.	limestone
SRP046	Area I	Y88/121/2	polisher	Rounded tool with two flat and shiny faces.	craft	basalt
SRP046	Area I	Y88/41/48	grinding tool	Broken tool with a curved, wider extremity.	food prep.	limestone
SRP046	Area I	Y88/16/24	perforated stone	Fragment of perforated stone, possibly used as a weight for example for a fishing net.	unclear	limestone (?)
SRP046	Area I	Y88/21/36	whetstone	Elongated tool with rounded extremities and slightly pointed edges.	craft	limestone
SRP046	Area I	Y88/35/40	whetstone	Elongated tool with a rounded extremity, opposite end is thicker possibly to facilitate the grip.	craft	limestone
SRP046	Area I	Y88/45/51	anvil	Fragment of a flat object with a rounded extremity.	craft	limestone
SRP046	Area I	Y88/20/35	anvil	Flat, square object, rather thick. Both sides are flat, with some battering noticeable on one side.	craft	limestone
SRP046	Area I	Y89/5/2	polisher	Rounded tool with a flat face.	craft	serpentinite (?)
SRP046	Area I	Y89/106/1	1 handstone 1 pounder 1 grinding slab	1) Elongated handstone with curbed extremities and a flat working surface, 2) rounded pounder possibly used as a grinder or to crush small quantities of material, 3) triangular grinding slab with a slightly concave working surface (saddle quern).	food prep.	1) red limestone, 2) limestone, 3) breccia/ conglomerate
SRP046	Area I	Z90/10/2	1 whetstone 1 unclear	1) Elongated tool with a rounded extremity and somewhat pointed edges, 2) fragment with an irregular shape and sharp edges, possibly part of a tool.	1) craft 2) unclear	1) black limestone (?)
SRP046	Area I	Z90/9/1	loom weight	Small disc-shaped tool, with a perforation in the centre. The edges are roughly worked and the surface is corrugated. The perforation has a biconic section. Similar small perforated discs (often in ceramics) are normally used as loom weights.	craft (textiles)	limestone (?)
SRP046	Area II	Y82/13/5	handstone (?)	Rectangular object, broken. The original shape is difficult to reconstruct but it has a smoothened side so it is possibly the fragment of a simple handstone.	food prep.	breccia/ conglomerate
SRP046	Area II	Y82/13/4	whetstone	Broken elongated object with square section and a rounded extremity.	craft	shale or limestone
SRP046	Area III	V85/175/1	1 whetstone 1 abrader (?)	1) Elongated, flat tool with a curved extremity and slightly pointed edges, 2) elongated tool, with a dome shaped extremity while the opposite side is flat and smoothed.	craft	1) limestone. 2) grey shale (?)
SRP046	Area III	V85/175/1	polisher	Rounded tool with two flat faces.	craft	basalt (?)
SRP046	Area III	V85/127/4	whetstone	Elongated, flat object, with rounded extremities and slightly pointed edges. On one flat side tiny striations are visible.	craft	shale or limestone
SRP046	Area III	V85/117/2	1 polisher 2 handstone	1 Rounded tool with two flat faces, 2) elongated tool with curved extremities and a flat longitudinal face.	1) craft 2) food prep.	1) basalt 2) limestone (?)
SRP046	Area III	V85/116/3	handstone	Rectangular tool with a curved side, a slightly pointed dorsal side and a flat back side, which also looks smoothed.	food prep.	limestone (?)
SRP046	Area III	V85/115/8	pestle (?)	Pointed tool with a broken side. The surface looks smooth.	unclear	siltstone or shale
SRP046	Area IV	CC89/5/1	weight (?)	Rounded pebble with smooth surface. Because of its size and absence of visible wear marks it may have been used as a weight.	administrative (?)	limestone (?)
SRP046	Area IV	DD89/6/1	weight (?)	Rounded pebble with smooth surface. Because of its size and absence of visible wear marks it may have been used as a weight.	administrative (?)	limestone (?)
SRP046	Area VII	L80C/6/5	whetstone	Elongated, flat object with rounded extremities and slightly pointed edges.	craft	shale or limestone
SRP046	Area VII	L80C/6/5	whetstone	Flat elongated object with rounded extremity. One side is straight, while the opposite side has two curves.	craft	limestone
SRP046	Area VII	L80C/4/2	unclear	Triangular shaped object with a rectangular angle. The surface is polished and shiny, edges are rounded.	unclear	metamorphic (?)
SRP046	Area VII	L80C/4/1	grinding slab	Broken grinding slab, rectangular, with a wide flat and smoothed working surface. The dorsal side has a slight triangular section that may have facilitated the fixing of the tool into the ground	food prep.	conglomerate (?)
SRP046	Area VII	L80D/5/3	macehead (?)	Fragmentary rounded object with perforation across the centre.	ceremonial (?)	limestone
SRP046	Area VII	L80D/5/2	whetstone	Elongated, flat object with rounded extremities and slightly pointed edges.	craft	shale or limestone
SRP046	Area VII	L80D/2/1	unclear	Small spherical object with a perforation.	unclear	limestone (?)

Appendix VI Zooarchaeology Methods and Data

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VI.1 Introduction

This appendix presents the zooarchaeological recording and analytical methodology and summary results of the materials excavated from Shakhi Kora (SRP191) and Kani Masi (SRP094 and SRP046). Summary data tables and visualisations are presented to support the discussions in Chapters 3, 5, 8, and 9.

VI.2 Methods

VI.2.1 Identification

All specimens were identified to species, genus, or class if possible. Due to the highly fragmented nature of the assemblage, however, specimens that could be attributed to specific skeletal elements – but could not positively be identified – were assigned a size class. An adapted version of Russell and Martin's animal-size classes was used.[1] For the purposes of this analysis, pig-sized and sheep-sized have been combined, as the SRP pig specimens were relatively small and broadly comparable in size with sheep-sized specimens. The size classes utilised are as follows:

- Large Mammal – cattle, red deer, horse
- Medium Mammal – sheep, goat, gazelle, roe deer, fallow deer, canids, pig, small equids
- Small Mammal – hare, fox, mustelid

Alongside standard published protocols,[2] all identifications were made utilising the zooarchaeological reference collection stored at the osteoarchaeological laboratory at the University of Edinburgh. Where necessary, identifications were further verified using the extensive comparative zoological collections at the National Museum of Scotland, Edinburgh. Ribs and vertebrae, except for the atlas and axis, were not individually identified due to time constraints. Although, their presence was noted in the sample summary.

1 Russell and Martin (2005).

2 Boessneck (1969); Schmid (1972); Johnson (1985); Lister (1996); Hillson (2005); Zeder and Lapham (2010); Zeder and Pilaar (2010); Hanot and Bochaton (2018).

To support the morphological identification of sheep and goat remains, Zooarchaeology by Mass Spectrometry (ZooMS) analyses[3] have been applied to selected specimens. This is primarily focused on specimens where detailed qualitative stable isotope analyses and interpretations are being made (Appendix VII). All morphological identifications and quantification data tabulated below incorporate updates according to the ZooMS analyses (see Appendix VII, Table VII.1).

VI.2.2 Recording strategy

The assemblages were recorded at two levels; by 'sample' (bag of bones as exported to the lab), and by individual specimens. This meant that heavily fragmented bone fragments, which could not be identified to species/genus, could contribute to broader taphonomic analyses.

Individual specimens were further recorded following an adapted version of Dobney and Rielly's diagnostic zones,[4] in which each skeletal element is divided into a series of defined zones based on characteristic morphology. For a given specimen, zones were recorded as present where greater than 50% of the zone was preserved. Dobney and Rielly include the most common skeletal elements.[5] To maximise the output of the SRP material, additional elements were added. Tarsals and carpals were given one zone each, except for the cubo-navicular which was divided into two distinctive zones. The skull was divided into its major components: occipital bone (Z1); para mastoid (Z2); bulla ossea (Z3); zygomatic bone (Z4); malar bone (Z5); occipital bone (Z6); parietal bone (Z7); frontal bone (Z8); lacrimal bone (Z9); premaxilla (Z10); nasal bone (Z11); and the temporal bone (Z12).

VI.2.3 Quantification

The primary method of quantification used in this analysis is Number of Identified Specimens (NISP). The term 'specimen' refers to the archaeological object, in this case a bone fragment, that has been recovered and studied.[6] Any bone fragment from the SRP assemblages which could be identified to a specific skeletal element, and subsequently to species, genus, or animal-size class, was counted as NISP = 1. This count was further utilised to determine the Minimum Number of Elements (MNE), which can then be used to derive the %survivorship of each skeletal element by taxon. MNE was derived using Dobney and Rielly's diagnostic zones.[7] The most frequently recorded zone for each element by taxon represents the minimum number of individual elements that would have had to be present to result in all the fragmentary specimens in the assemblage. The naturalised MNE (NMNE) was calculated by dividing the MNE by the number of times the anatomical element occurs in a skeleton.

Following Russell and Martin,[8] the %survivorship of each skeletal element was calculated, a method by which each element is divided by the number expected in each number of intact carcasses represented by the most frequent body part. This then helps to illustrate the various levels of preservation at the site, and can indicate different cultural and natural processes impacting various skeletal elements and comparing these between different taxa.

Minimum Number of Individuals (MNI) is a common derivative of NISP, often used in order to gain a more "accurate" understanding of the live population at a site.[9] Although MNI is efficient at coping with some of the problems inherent to NISP, there are numerous issues when MNI is used to measure relative abundance within or between sites.[10] For this reason, the method will not be utilised here.

VI.2.4 Taphonomy

VI.2.4.1 Preservation and bone angularity

For each recorded sample, the overall condition of the bone fragments was recorded using a method proposed by O'Connor.[11] Preservation is taken to mean the "state of decay or otherwise of the bone tissue", assessing loss of mineral or organic components in terms of the degree of surface porosity and exfoliation and the transition from the waxy gloss of fresh bone to the chalky appearance often seen in ancient material. The material was scored using a six-point scale (variable; very poor; poor; fair; good; excellent). In addition to tissue preservation, fragment angularity was also assessed. This entails making an overall judgement for the samples as to whether the bone fragments retained sharply angular margins of old breaks and cut surfaces, or if they presented with a rolled or abraded appearance. This follows O'Connor's four-point scale (battered; rounded; spikey; variable).[12]

VI.2.4.2 Human modification

For the purposes of the faunal analysis, three butchery techniques were identified: skinning, dismemberment, and filleting. Noe-Nygaard's description of cut marks was used to aid the identification.[13] Skinning is usually identified by shallow cuts along bone where the skin is

3 Buckley *et al.* (2010).
4 Dobney and Rielly (1988).
5 Ibid.
6 Gifford-Gonzalez (2018, 197).
7 Dobney and Rielly (1988).
8 Russell and Martin (2005).
9 Payne (1975, 14); Jochim (1976, 167).
10 Grayson (1984).
11 O'Connor (1991, 233-236).
12 Ibid., 234.
13 Noe-Nygaard (1989).

tightly attached to the underlying element, such as the metapodials and phalanges, on the skull near the snout and around the mandible, and at the base of the antler and ears. Cutmarks caused by dismemberment are similar to those left by skinning, but can be distinguished by their location. These marks are found around joints, where a knife has been used to cut the tendons and to pry the bones apart. Filleting is characterised by small shallow cuts or scrape marks running down the surface of the bone.

Bones are one of the most reliable sources of fat in the body.[14] Evidence for breaking bone to access the fatty marrow inside the medullary cavity has long been recognised archaeologically. This is usually identified by the presence of fresh helical fractures, produced when the fresh bone is forcefully hit with a blunt object, such as a stone. Marrow is not the only source of fat in bones; grease can be extracted by boiling comminuted cancellous bone from appendicular epiphyses and axial elements. Fat rises to the top of the cooking container and can be skimmed off the surface of the water. This is how bone broth is made, a staple dietary component in Mesopotamian cooking.[15] Bone fat does not only have a dietary purpose, however, and is also attested in many crafts and industries as well as for fuel and candlewax. Despite its importance, little methodological work has been conducted on marrow and grease extraction.[16] Any shaft fragments or proximal and distal ends with still-attached shaft elements bearing fresh helical fracture were identified as evidence for grease and marrow extraction.

Depending on its anatomical location and other characteristics, the presence of burnt bone can be interpreted as evidence for roasting. However, as Reitz and Wing point out, people rarely want to eat "burnt" meat and burning food during the cooking process is likely accidental rather than deliberate.[17] In fact, bone which has been exposed to an open flame does not necessarily display burning. Théry-Parisot has demonstrated that bones can also be used as fuel in turn producing burnt bone.[18]

The method adopted for recording burning follows the guidelines set out by Nicholson.[19] The level of burning was separated into two broad categories: carbonation and calcination. The former consists of bones that have been burned black, indicating that they reached a temperature of at least 300°C for approximately 2-5 hours. This is more likely to represent purposeful burning as the result of cooking processes. The latter consists of bones burned to white, indicating they have been exposed to temperatures over 700°C for the same period of time. If burning occurred on individual specimens, the location and degree of burning was recorded. The occurrence of burned bones within a sample was also determined on a semi-quantitative four-point scale (none; few; some; and many).

VI.2.4.3 Peri- and post-depositional processes

The occurrence and severity of both rodent and carnivore gnawing was recorded for each sample according to a semi-quantitative two-point scale for both animal categories (light rodent; heavy rodent; light carnivore; heavy carnivore). Rodent gnawing leaves characteristic closely-spaced parallel grooves which are flat at the bottom, mirroring the animal's incisor morphology.[20] Carnivores are also known to leave teeth marks on bone in archaeological contexts. They utilise carnassials, canines, and incisors when they gnaw bone, leaving irregular, broad grooves and pit-like features.[21] Unlike rodents, which generally gnaw along the edges of skeletal elements, carnivores focus on the cancellous ends of long bones, thus leaving 'ragged' ends. The presence of gnawed bone within an assemblage can inform upon cultural depositional practices, as it suggests the material might not have been buried promptly after use.[22] Furthermore, it implies the presence of scavengers and predators, who might have introduced, removed, or destroyed faunal material.

VI.2.5 Body size and shape and population demography

VI.2.5.1 Biometrics

All fused bones were measured following the standard measurement scheme set out by von den Driesch.[23] In order to maximise analytical potential from a small dataset and interpret the relative size of the animals, the Log Standard Index (LSI) method was employed.[24] Following this method, the difference between the log of measurements from archaeological specimens and the log of measurements of a standard animal, or population, is calculated resulting in a measure of difference in size from the standard. For sheep, the standard animal used for comparison is a modern wild female *Ovis orientalis* from Iran.[25] For goats, the average measurement of modern wild male and female *Capra aegagrus* from the Taurus Mountain forms the standard.[26] The standard used for the pigs comes from modern female *Sus scrofa libycus* from Türkiye.[27] Comparative measurements for wild cattle are taken from Neolithic Jarmo.[28]

14 Outram (2002, 51).
15 Bottéro (1995, 36-38).
16 See Outram (2002) for a critique.
17 Reitz and Wing (2008, 132).
18 Théry-Parisot (2002).
19 Nicholson (1993).

20 Lyman (1994).
21 Ibid.
22 Reitz and Wing (2008, 136).
23 von den Driesch (1976).
24 Meadow (1999).
25 Uerpmann and Uerpmann (1994).
26 Ibid.
27 Payne and Bull (1988).
28 Stampfli (1983).

VI.2.5.2 Age at death

Both long bone fusion and tooth wear were used to construct mortality profiles. Tooth wear was recorded for all mandibles with cheek teeth, as well as loose mandibular dP4, P4, and molars. The wear stage was scored using the method presented by Payne for caprines.[29] They were separated into age classes following Zeder,[30] which were used to construct the mortality profile of the culled sheep and goat population. The epiphyseal fusion stage for all long bones were recorded as either distal/proximal unfused (dU/pU), distal/proximal fusing (d*f*/p*f*), or distal/proximal fused (dF/pF). For pigs, all long bones were subsequently separated into age classes following Lemoine *et al.*,[31] while for cattle Chaplin was used.[32]

VI.3 Shakhi Kora (SRP191)

VI.3.1 Assemblage overview

This section presents a summary of the preliminary analysis of the Shakhi Kora faunal assemblage excavated in the 2019 field season; data from later seasons is currently being studied. In total, 18 samples were analysed (Table VI.1) and 87 individual specimens were identified. Most of the identified specimens come from Area I (AA21). These data are contextualised, discussed, and interpreted in Chapter 3.

VI.3.2 Taphonomy

Bone preservation is variable across the site (Table VI.2 and Table VI.3). The best preserved material is from the specimen-rich Area I (AA21), where most samples are recorded as 'good'. In Area I (Z19) the material is 'variable', and in Area II (G19) both samples are recorded as having 'poor' preservation. The angularity shows a similar pattern, with the highest proportion of 'spikey' material from Area I (AA21), and a higher proportion of rolled and variable material from Area I (Z19) and Area II (G19). This suggests differential taphonomic processes impacting the material from the different trenches.

Few samples contained any burnt material. The exception to this is Area I (Z19) where four samples have 'few' carbonised fragments (L2, L9, L11, L12), and one sample with calcined material (L2). There is also one sample from Area I (AA21) with 'some' carbonised fragments (L4).

Only three of the individually identified specimens show any evidence of burning. Two of these specimens come from Area I (Z19): a small part of a caprine humerus (L9) and a cattle metacarpal (L12) with burning at the distal end. The cattle humerus could represent evidence of grilling meat on the bone if the burning was associated with food preparation.

VI.3.3 Relative proportion of taxa

The relative representation of taxa recovered are presented in Table VI.4. Domestic animals dominate, with one fragment of deer also present. Within the domestic taxa, the bones of caprines – goats and sheep – are the most numerous.

VI.3.4 Taphonomy

VI.3.4.1 Biometrical measurements

Table VI.5 and Table VI.6 present the metrical data recovered from sheep and goat remains respectively.

29 Payne (1973, 87).
30 Zeder (2006b).
31 Lemoine *et al.* (2014).
32 Chaplin (1971).

Trench	Number of Samples		Number of Identified Specimen		Mass (g)	
	N	%	N	%	N	%
AA21	6	35.0	69	79.3	1004.0	77.3
Z19	10	55.0	17	19.5	52.2	4.0
G19	2	10.0	1	1.1	243.3	18.7
SRP191 Total	18	100	87	100	1299.5	100

Table VI.1 Summary of the distribution of samples and specimens, as well as the mass of faunal material from SRP191 by trench.

Preservation	AA21		Z19		G19		Total	
	N	%	N	%	N	%	N	%
Good	5	83.3	4	40	-	-	9	50
Fair	1	16.6	2	20	-	-	3	16.6
Poor	-	-	4	40	2	100	6	33.3

Table VI.2 Summary of bone preservation by number and percentage of samples from SRP191 by trench. The material was scored using a six-point scale (variable; very poor; poor; fair; good; excellent).

Angularity	AA21		Z19		G19		Total	
	N	%	N	%	N	%	N	%
Spikey	5	83.3	4	40	-	-	9	50
Rounded	-	-	-	-	1	100	1	5.5
Varied	1	16.6	6	60	1	-	8	44.4

Table VI.3 Summary of the fragment angularity by number and percentage of samples from SRP191 by trench. This follows O'Connor's (1991, 234) four-point scale (battered; rounded; spikey; variable).

	AA21				Z19				G19				Total			
	NISP		%NISP		NISP		%NISP		NISP		%NISP		NISP		%NISP	
Ovis aries	8		11.6		-		-		-		-		8		9.2	
Capra hircus	14	54	20.3	78.3	-	12	-	70.6	-	1	-	100	14	67	16.1	77.0
Caprine	32		46.4		12		70.6		1		100		45		51.7	
Sus scrofa	1		1.4		1		5.9		-		-		2		2.3	
Bos spp.	7		10.1		3		17.6		-		-		10		11.5	
Canis familiaris	2		2.9		-		-		-		-		2		2.3	
Deer	-		-		1		5.9		-		-		1		1.1	
Indeterminate Medium	5		7.2		-		-		-		-		5		5.7	
Total	**69**		**79.3**		**17**		**19.5**		**1**		**1.1**		**87**		**100**	

Table VI.4 Number and relative proportion of identified taxa (NISP), in near ascending order from most to least frequent, across all areas at SRP191.

Scapula											
Sample	Area	Fusion*	GLP	LG	BG	SLC	LSI GLP	LSI LG	LSI BG	LSI SLC	Mean
260	AA21	F	35.6	25.4	22.1	22.0	0.0333	-0.0105	0.0020	0.0516	0.0191
Humerus											
Sample	Area	Fusion	SD	Bd	BT	LSI SD	LSI Bd	LSI BT	Mean		
258	AA21	dF		26.9	27.2		-0.0892	-0.0356	-0.0624		
260	AA21	dF		33.5	32.7		0.0060	0.0445	0.0252		
Metacarpal											
Sample	Area	Fusion	Bp	SD	Bfd	LSI Bp	LSI SD	LSI Bfd	Mean		
259	AA21	pF	25.5			0.2860			0.2860		
Astragalus											
Sample	Area	Fusion	GLI	GLm	DI	LSI GLI	LSI GLm	LSI DI	Mean		
258	AA21	F	32.3	31.4	18.4	0.0138	0.0299	0.0240	0.0226		

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.5 Post-cranial measurements of sheep from SRP191 following von den Driesch (1976). LSI calculated using modern wild sheep (*Ovis orientalis*) from Iran (Uerpmann and Uerpmann 1994). All measurements in mm.

Humerus											
Sample	Area	Fusion*	SD	Bd	BT	LSI SD	LSI Bd	LSI BT	Mean		
260	AA21	dF		31.5			-0.0456		-0.0456		
260	AA21	dF		30.4	37.2		-0.0612	0.0348	-0.0132		
Tibia											
Sample	Area	Fusion	Bp	SD	Bd	Dd	LSI Bp	LSI SD	LIS Bd	LSI Dd	Mean
260	AA21	dF			26.5	19.8			-0.0241	-0.0353	-0.0297
Metacarpal											
Sample	Area	Fusion	Bp	SD	Bfd	LSI Bp	LSI SD	LSI Bfd	Mean		
259	AA21	dF			24.93			-0.0876	-0.0876		
Astragalus											
Sample	Area	Fusion	GLI	GLm	DI	LSI GLI	LSI GLm	LSI DI	Mean		
258	AA21	F	31.2	29.4		-0.0110	0.0007		-0.0051		

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.6 Post-cranial measurements of goats from SRP191 following von den Driesch (1976). LSI calculated using modern wild goat (*Capra aegagrus*) from the Taurus mountains (Uerpmann and Uerpmann 1994). All measurements in mm.

VI.4. Kani Masi (SRP094)

This section presents summary data on the early second millennium BCE Kani Masi (SRP094) faunal assemblage. In total, eight samples were analysed and 50 specimens were identified (Table VI.7). The relative representation of taxa recovered are presented in Table VI.8, with the distribution by locus. Within this small assemblage, domestic animals dominate, with one fragment of gazelle also identified. Amongst the domestic taxa, the bones of caprines are the most numerous. These data are contextualised, discussed, and interpreted in Chapter 5.

Locus	Sample		Number of identified specimens		Mass (g)	
	N	%	N	%	N	%
Locus 2	1	12.5	4	8.0	74.2	8.6
Locus 3	1	12.5	1	2.0	2.3	0.3
Locus 4	3	37.5	41	82.0	767.9	88.9
Locus 5	2	25.0	3	6.0	14.8	1.7
Locus 6	1	12.5	1	2.0	4.3	0.5
SRP094	8	100	50	100	863.5	100

Table VI.7 Summary of the frequency of samples and specimens, as well as mass of faunal material from SRP094.

	Locus 2				Locus 3				Locus 4				Locus 5		Locus 6		Total			
	NISP		%NISP		NISP		%NISP		NISP		%NISP		NISP	%NISP	NISP	%NISP	NISP		%NISP	
Domestic																				
Ovis aries	-		-		-		-		5		12.2		-	-	-	-	5		10.0	
Capra hircus	-	2	-	50.0	-	1	-	100	1	30	2.4	73.1	-	-	-	-	1	33	2.0	66.0
Caprine	2		50.0		1		100		24		58.5		-	-	-	-	27		54.0	
Sus scrofa	-		-		-		-		3		7.3		1	33.3	-	-	4		8.0	
Bos spp.	-		-		-		-		2		4.9		-	-	-	-	2		4.0	
Total	2		50.0		1		100		35		85.3		1	33.3	-	-	39		78.0	
Wild																				
Gazella spp.	1		25.0		-		-		-		-		-	-	-	-	1		2.0	
Rat sized	1		25.0		-		-		-		-		-	-	-	-	1		2.0	
Total	2		50.0		-		-		-		-		-	-	-	-	2		4.0	
Indeterminate																				
Medium	-		-		-		-		5		12.2		1	33.3	1	100	7		14.0	
Unidentified	-		-		-		-		1		2.4		1	33.3	-	-	2		4.0	
Total	**4**		**8.0**		**1**		**2.0**		**41**		**82.0**		**3**	**6.0**	**1**	**2.0**	**50**		**100**	

Table VI.8 Number of relative proportions of identified taxa (NISP) in near ascending order across all areas at SRP094.

VI.5. Kani Masi (SRP046)

VI.5.1 Assemblage overview

This section presents summary data on the Kani Masi (SRP046) faunal assemblage. In total, 237 samples were analysed and 1083 individual specimens were identified. The distribution of material recovered by trench is illustrated below in Table VI.9. These data are contextualised, discussed, and interpreted in Chapters 8 and 9.

VI.5.2 Taphonomy

VI.5.2.1 Preservation and bone angularity

The data in Table VI.10 demonstrate that the overall preservation of the faunal assemblage is predominantly 'good' (n=200; 73%) or 'fair' (n=66; 24%). Very few samples are 'excellent' (n=5; 2%), and even fewer are 'poor' (n=2; 2%). Area II is overall the best preserved, with the highest proportion of' 'good' (n=46; 84%) and 'excellent' (n=3; 5%) samples. Samples from Area III, V, and VII are also on average better preserved than the overall site, the two latter areas, however, only consist of 10 and 19 samples respectively. The faunal material from Area I is the worst preserved. Although the majority of the assemblage is still 'good' (n=56; 63%) it has the highest number of 'fair' (n=30; 34%) and 'poor' (n=3; 3%) samples. The varying levels of preservation could well be linked to the different uses of the various areas.

The assessment of specimen angularity appears to align well with that of the overall preservation (Table VI.11). The samples from Area II and III are also on average more 'spikey' (n=42; 76%, and n=60; 72%, respectively) than the overall site (n=149; 63%). This is indicative of not only better-preserved bone, but also says something about post-depositional forces, suggesting the remains were less disturbed after their final deposition than the overall site. Meanwhile, Area I has more evenly

Area	Sample		Number of identified specimens		Mass (g)	
	N	%	N	%	N	%
I	88	31.4	437	34.5	12525.9	39.3
II	57	20.4	345	27.2	9243	29.0
III	84	30.0	299	23.6	6515.5	20.4
IV	22	7.9	105	8.3	2368.2	7.4
V	10	3.6	18	1.4	368	1.2
VI	-	-	-	-	-	-
VII	19	6.8	64	5.0	844.9	2.7
VIII	-	-	-	-	-	-
Total	280	100.0	1268	100.0	31865.5	100.0

Table VI.9 Summary of the distribution of samples and specimens as well as the mass of faunal material from SRP046 by excavation area.

Preservation	Area I		Area II		Area III		Area IV		Area V		Area VII		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Excellent	-	-	3	5.4	2	2.4	-	-	-	-	-	-	5	1.8
Good	56	62.9	46	83.6	67	80.7	14	66.7	8	88.9	9	50.0	200	72.7
Fair	30	33.7	6	10.9	14	16.9	7	33.3	1	11.1	8	44.4	66	24.0
Poor	3	3.4	-	-	-	-	-	-	-	-	1	5.6	4	1.5

Table VI.10 Summary of bone preservation by number and percentage of samples from SRP046 by area. The material was scored using a six-point scale (variable; very poor; poor; fair; good; excellent).

Angularity	Area I		Area II		Area III		Area IV		Area V		Area VII		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Spikey	40	44.9	42	76.3	60	72.3	13	61.9	7	77.7	6	33.3	149	62.9
Rounded	14	15.7	1	1.8	5	6.0	3	14.3	2	22.2	1	5.6	26	11.0
Battered	2	2.2	-	-	-	-	-	-	-	-	3	16.7	2	0.8
Variable	33	37.1	12	21.8	18	21.7	5	23.8	-	-	8	44.4	60	25.3

Table VI.11 Summary of the fragment angularity by number and percentage of samples from SRP046 by area. This follows O'Connor's (1991, 234) four-point scale (battered; rounded; spikey; variable).

distributed samples, with below average 'spikey' (n=40; 45%) samples, and above average 'rounded' (n=14; 21%) and 'variable' (n=33; 37%) samples. It is also one of two areas with any 'battered' (n=2; 2%) samples. Unlike material in Areas II-III, Area I remains may have been subject to strong post-depositional forces like trampling, soil pressure, or other biotic effects.

VI.5.2.2 Burning

88 of 270 (33%) samples contained burnt bone. Most of this bone was in the form of small fragments that could not be identified (Table VI.12). Only 50 (4%) identified specimens showed any sign of burning. Of these, 18 (1%) were calcined and 32 (3%) were carbonised (Table VI.13).

Level of Burning	Area I		Area II		Area III		Area IV		Area V		Area VII		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Carbonised	23	26.1	14	24.6	13	15.5	6	27.3	-	-	4	21.1	60	22.2
Calcined	5	5.7	9	15.8	6	7.1	3	13.6	-	-	5	26.3	28	10.4
No burning	60	68.2	34	59.6	65	77.4	13	59.1	9	100	10	52.6	182	67.4
Total	88	100.0	57	100.0	84	100.0	22	100.0	9	100	19	100.0	270	100.0

Table VI.12 Number of samples with evidence of burning. Note that one sample can contain both carbonised and calcined material. The percentages express the number of samples with burnt material out of the total number of samples in that area as expressed in Table VI.9.

Level of Burning	Area I		Area II		Area III		Area IV		Area V		Area VII		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Carbonised	7	1.6	9	2.6	4	1.3	2	1.9	-	-	10	22.7	32	2.6
Calcined	4	0.9	-	-	3	1.0	1	1.0	-	-	10	22.7	18	1.4
No burning	426	97.5	336	97.4	292	97.7	102	97.1	18	100.0	24	54.5	1198	96.0
Total	437	100.0	345	100.0	299	100.0	105	100.0	18	100.0	44	100.0	1248	100.0

Table VI.13 Number of identified specimens with evidence of burning. The percentages express the number of identified specimens with evidence of burning out of the total number of identified specimens in that area as expressed in Table VI.9.

VI.5.3 Relative proportion of taxa

The number and relative proportion of identified taxa from SRP046 are presented by area in Table VI.14. This is further broken down by loci in Tables VI.15 to VI.23. Within the SRP046 assemblage, domestic animals dominate, with smaller numbers of wild taxa. Smaller taxa are likely under-represented due to recovery bias. Recorded taxa are presented by taxonomic group below.

Taxon	Area I				Area II				Area III				Area IV				Area V				Area VII				Total			
	NISP		%NISP		NISP		%NISP		NISP		%NISP		NISP		%NISP		NISP		%NISP		NISP		%NISP		NISP		%NISP	
Domestic																												
Ovis aries	27		6.2		35		10.1		18		6.0		6		5.7		2		10.5		7		9.7		95		7.4	
Capra hircus	17	182	3.9	41.6	26	175	7.5	50.6	17	134	5.7	45.0	3	47	2.9	44.8	-	12		63.2	2	54	2.8	62.5	65	595	5.1	46.6
Caprine	138		31.6		114		33.0		99		33.2		38		36.2		10		52.6		36		50.0		435		34.1	
Sus scrofa	53		12.1		43		12.5		93		31.2		13		12.4		-		-		3		4.2		205		16.1	
Bos spp.	46		10.5		38		11.0		31		10.4		13		12.4		3		15.8		1		1.4		133		10.4	
Equus caballus					14		4.1		1		0.3		-		-		-		-		-		-		15		1.2	
Equus asinus	14	43	3.2	9.8	-	18	-	5.2	1	7	0.3	2.3	-	2		1.9	-		-		-	7	-	9.7	15	77	1.2	6.0
Equus c+a					-		-		1		0.3		1		1.0		-		-		-		-		1		0.1	
Equus spp.	29		6.6		4		1.2		4		1.3		1		1.0		-		-		7		9.7		46		3.6	
Camelus dromedarius	1		0.2		-		-		-		-		-		-		-		-		-		-		1		0.1	
Canis familiaris	11		2.5		5		1.4		1		0.3		-		-		-		-		-		-		17		1.3	
Canids	1		0.2		-		-		1		0.3		-		-		-		-		-		-		2		0.2	
Total	337		77.1		279		80.8		267		89.6		75		71.4		15		78.9		56		77.8		1030		80.7	
Wild																												
Cervus elaphus					-		-		1		0.3		-		-		-		-		-		-		1		0.1	
Dama spp.	1		0.2		-		-		1		0.3		-		-		-		-		-		-		2		0.2	
Capreolus capreolus	2	4	0.5	0.9	1	2	0.3	0.6	3	5	1.0	1.7	1	1	1.0	1.0	-		-		-		-		7	12	0.5	0.9
Deer	1		0.2		1		0.3		-		-		-		-		-		-		-		-		2		0.2	
Gazella spp.	6		1.4		17		4.9		3		1.0		5		4.8		1		5.3		1		1.4		33		2.6	
Lepus spp.	1		0.2		-		-		-		-		-		-		-		-		-		-		1		0.1	
Total	11		2.5		19		5.5		7		2.3		6		5.7		1		5.3		1		1.4		46		3.6	
Micromammal																												
Mouse Sized	-		-		-		-		-		-		-		-		-		-		1		1.4		1		0.1	
Rattus sp.	-		-		-		-		-		-		-		-		-		-		-		-		3		0.2	
Rat Sized	5		1.1		2		0.6		-		-		-		-		2		10.5		-		-		6		0.5	
Total	5		1.1		2		0.6		-		-		-		-		2		10.5		1		1.4		10		0.8	
Non-Mammal																												
Amphibian	-		-		-		-		-		-		1		1.0		-		-		-		-		1		0.1	
Bird	7		1.6		1		0.3		-		-		4		3.8		-		-		-		-		12		0.9	
Fish	10		2.3		1		0.3		-		-		-		-		-		-		-		-		11		0.9	
Crab	1		0.2		1		0.3		-		-		-		-		-		-		-		-		2		0.2	
Tortoise	-		-		-		-		-		-		-		-		1		5.3		-		-		1		0.1	
Total	18		4.1		3		0.9		-		-		5		4.8		1		5.3				-		27		2.0	
Indeterminate																												
Small	-		-		1		0.3		-		-		1		1.0		-		-		1		1.4		3		0.2	
Medium	52		11.9		35		10.1		19		6.4		14		13.3		-		-		13		18.1		133		10.4	
Large	12		2.7		6		1.7		4		1.3		4		3.8		-		-						26		2.0	
Total	64		14.6		42		12.2		23		7.7		19		18.1		-		-		14		19.4		162		12.7	
Unidentified	2		0.5		-		-		-		-		-		-		-		-		-		-		2		0.2	
Total	**437**		**34.2**		**345**		**27.0**		**298**		**23.4**		**105**		**8.2**		**19**		**1.5**		**72**		**5.6**		**1277**		**100**	

Table VI.14 Number and relative proportion of identified taxa (NISP), in near ascending order from most to least frequent, across all areas with zooarchaeological remains (Areas I-V; VII) at SRP046.

Taxon\Loci	2	3	4	8	15	16	18	20	21	22	33	42	45	102	108	112	113	114	115	121	125	126	Blank*	Grand Total	
Domestic																									
Ovis aries	-	-	-	1	-	-	-	2	-	3	-	1	-	-	-	-	-	-	-	1	-	-	-	7	5.8%
Capra hircus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	2	1	-	-	3	2.5%
Caprine	1	1	-	7	4	3	2	2	8	-	1	-	1	-	3	-	-	2	-	2	1	5	2	43	35.8%
Sus scrofa	-	-	2	1	1	1	-	-	-	3	-	-	-	-	-	-	-	1	1	-	-	1	4	15	12.5%
Bos spp.	-	-	-	3	-	-	-	1	2	-	-	1	-	-	1	-	1	1	-	-	1	-	1	12	10.0%
Equus asinus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	3	2.5%
Equus spp.	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	4	3.3%
Canis familiaris	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3	2.5%
Total	1	1	2	12	5	5	3	8	10	6	1	2	1	-	5	3	1	9	1	5	3	7	7	98	81.7%
Wild																									
Dama spp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.8%
Capreolus capreolus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	0.8%
Deer	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.8%
Gazella spp.	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1.7%
Lepus sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.8%
Total	-	-	1	1	-	-	-	1	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	6	5.0%
Non-Mammal																									
Crab	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.8%
Total	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.8%
Indeterminate																									
Medium	-	-	-	1	-	-	2	1	-	1	2	-	-	-	-	-	-	1	-	-	1	-	-	9	7.5%
Large	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	5	4.2%
Total	-	-	-	1	-	-	3	2	-	1	2	-	-	1	-	-	-	1	-	-	2	-	1	14	11.7%
Unidentified	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1		1	0.8%
Grand Total	**1**	**1**	**3**	**14**	**5**	**5**	**6**	**12**	**12**	**7**	**3**	**2**	**1**	**1**	**5**	**3**	**1**	**11**	**1**	**5**	**5**	**8**	**8**	**120**	**100%**

*No Loci given

Table VI.15 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area I, Trench Y88 at SRP046.

Taxon\Loci	20	Grand Total	
Indeterminate			
Medium	1	1	100%
Grand Total	**1**	**1**	**100%**

Table VI.16 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area I, Trench Y88 at SRP046.

Taxon\Loci	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**18**	**22**	**24**	**25**	**26**	**27**	**29**	**31**	**33**	**34**	**35**	**36**	**37**	**Grand Total**	
Domestic																														
Ovis aries	-	-	-	-	-	1	4	-	-	-	-	2	-	-	-	-	-	1	-	-	1	-	-	1	-	-	8	-	18	6.1%
Capra hircus	-	1	-	-	-	1	-	-	-		1	-	2	-	-	-	-	-	-	-	1	-	-	1	2	-	1	2	12	4.1%
Caprine	5	-	-	3	-	-	3	1	-	2	-	12	6	7	1	-	10	1	5	6	1	4	-	2	1	1	8	1	80	27.0%
Sus scrofa	2	-	-	-	2	-	3	1	1	-	-	5	5	1	-	-	8	-	-	-	2	1	-	1	-	-	5	-	37	12.5%
Bos spp.	4	-	-	-	1	-	4	1	-	1	-	2	8	3	-	-	2	-	1	-	-	-	1	-	-	1	3	1	33	11.1%
Equus asinus	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	3.7%
Equus spp.	11	-	-	-	-	-	3	-	-	-	-	-	4	-	-	1	-	1	-	-	-	-	-	-	-	3	-	1	24	8.1%
Camelus dromedarius	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Canis familiaris	1	-	-	-	1	-	1	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	1.7%
Canid	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Total	35	1	0	3	4	2	18	3	1	3	1	21	27	12	1	1	20	3	6	6	5	5	1	5	3	5	25	5	222	75.0%
Wild																														
Capreolus capreolus	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Gazella spp.	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	1	4	1.4%
Total	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	1	5	1.7%
Micromammal																														
Rat Sized	-	-	-	1	-	-	-	-	1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	2.0%
Total	-	-	-	1	-	-	-	-	1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	2.0%
Non-Mammal																														
Bird	-	-	4	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	2.4%
Fish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	1	-	-	-	-	-	-	-	-	10	3.4%
Total	-	-	4	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	9	1	-	-	-	-	-	-	-	-	17	5.7%
Indeterminate																														
Medium	2	-	-	-	-	1	9	2	2	3	-	3	2	-	-	-	-	-	1	1	-	2	-	-	3	3	4	-	38	12.8%
Large	1	-	-	-	1	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	7	2.4%
Total	3	-	-	-	1	1	11	2	2	3	-	3	3	-	-	-	-	-	1	1	-	2	-	1	3	3	4	1	45	15.2%
Unidentified	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Grand Total	**40**	**1**	**4**	**4**	**5**	**3**	**29**	**6**	**4**	**6**	**1**	**30**	**31**	**13**	**1**	**1**	**20**	**3**	**16**	**8**	**5**	**8**	**1**	**6**	**6**	**8**	**29**	**7**	**296**	**100%**

Table VI.17 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area I, Trench Z88 at SRP046.

Taxon\Loci	1	2	3	4	5	6	7	8	9	10	12	13	14	16	17	18	19	20	21	22	Blank*	Grand Total	
Domestic																							
Ovis aries	-	-	-	1	-	2	-	-	3	-	-	3	-	3	2	2	3	10	2	4	-	35	10.1%
Capra hircus	-	-	-	-	-	1	2	-	4	-	-	1	-	3	3	1	2	-	4	4	-	26	7.5%
Caprine	-	1	1	1	1	3	1	4	9	2	2	10	1	14	3	5	18	10	16	12	-	114	33.0%
Sus scrofa	-	2	-	2	-	5	-	-	4	2	-	2	2	10	2	1	-	7	4	-	-	43	12.5%
Bos spp.	3	2	1	1	-	-	-	-	3	1	-	2	1	10	-	2	2	3	2	5	-	38	11.0%
Equus caballus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	1	14	4.1%
Equus spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	3	-	4	1.2%
Canis familiaris	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	1	-	-	1	-	-	5	1.4%
Total	3	5	3	5	1	11	3	4	23	5	2	19	6	40	10	12	26	30	30	40	1	279	80.8%
Wild																							
Capreolus capreolus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Deer	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	0.3%
Gazella spp.	-	1	-	-	-	4	-	-	2	-	-	-	-	1	1	-	1	1	4	1	1	17	4.9%
Total	-	1	-	-	-	4	-	-	3	-	-	-	-	2	1	-	1	1	4	1	1	19	5.5%
Micromammal																							
Rat sized	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	0.3%
Spermophilius sp.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Total	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	2	0.6%
Non-Mammal																							
Bird	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	0.3%
Fish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	0.3%
Crab	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	0.3%
Total	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	3	0.9%
Indeterminate																							
Small	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Medium	1	1	1	1	-	3	1	1	3	-	-	2	1	9	-	3	1	2	2	3	-	35	10.1%
Large	-	-	-	-	-	1	-	2	1	-	-	1	-	-	-	-	-	-	-	1	-	6	1.7%
Total	1	1	1	1	-	4	1	3	5	-	-	3	1	9	-	3	1	2	2	4	-	42	12.1%
Grand Total	**4**	**7**	**4**	**6**	**1**	**19**	**4**	**8**	**31**	**5**	**2**	**23**	**7**	**51**	**11**	**15**	**28**	**33**	**36**	**48**	**2**	**345**	**100%**

*No Loci given

Table VI.18 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area II, Trench Y82 at SRP046.

Taxon\Loci	**2**	**3**	**4**	**6**	**7**	**8**	**9**	**102**	**104**	**105**	**109**	**110**	**115**	**116**	**117**	**127**	**132**	**143**	**145**	**156**	**157**	**158**	**164**	**168**	**169**	**174**	**175**	**176**	**179**	**N/A***	**Grand Total**	
Domestic																																
Ovis aries	-	-	-	-	-	-	-	1	1	-	1	1	4	2	-	-	-	3	-	-	-	-	3	-	1	-	-	-	1	-	18	6.0%
Capra hircus	-	-	-	1	-	2	-	1	-	-	-	-	3	2	1	-	-	2	-	-	-	-	5	-	-	-	1	1	-	-	19	6.4%
Caprine	3	3	1	1	1	-	2	4	2	1	1	-	20	11	5	3	-	19	1	-	-	-	5	2	4	-	5	-	2	1	97	32.6%
Sus scrofa	-	-	*1*	-	-	*1*	-	*1*	*8*	*3*	*3*	-	*7*	*3*	*2*	*3*	-	*2*	-	-	*1*	*5*	*15*	-	*1*	*1*	-	-	*36*	-	*93*	*31.2%*
Bos spp.	-	-	-	1	-	-	-	-	1	-	-	1	7	3	-	3	-	5	-	1	1	-	2	1	2	1	-	-	2	-	31	10.4%
Equus caballus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1*	-	-	-	-	-	-	-	-	-	-	-	-	*1*	*0.3%*
Equus asinus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1*	-	-	-	-	-	-	-	*1*	*0.3%*
Equus c+a**	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Equus spp.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	4	1.3%
Canis familiaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*1*	-	-	-	-	-	-	-	*1*	*0.3%*
Canid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	0.3%
Total	3	3	3	3	1	3	2	7	12	4	5	2	41	22	8	9	0	34	1	1	2	5	33	3	8	2	7	1	41	1	267	89.6%
Wild																																
Cervus elaphus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Dama spp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3%
Capreolus capreolus	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	1.0%
Gazella spp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	3	1.0%
Total		-	1	-	-	-	-	-	1	-	-	-	1	1	-	-	-	2	-	-	-	-	1	1	-	-	-	-	-	-	8	2.7%
Indeterminate																																
Medium	-	-	-	-	-	1	-	-	-	-	-	-	1	3	2	-	1	1	-	-	-	-	7	1	-	1	-	-	1	-	19	6.4%
Large	-	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4	1.3%
Total	-	-	1	-	-	1	-	-	-	-	-	-	2	4	2	-	1	1	-	-	-	-	7	1	-	1	1	-	1	-	23	7.7%
Grand Total	**3**	**3**	**5**	**3**	**1**	**4**	**2**	**7**	**13**	**4**	**5**	**2**	**44**	**27**	**10**	**9**	**1**	**37**	**1**	**1**	**2**	**5**	**41**	**5**	**8**	**3**	**8**	**1**	**42**	**1**	**298**	**100%**

*No Loci given
***Equus caballus+asinus* = mule.

Table VI.19 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area III, Trench V85 SRP046.

Taxon\Loci	2	4	5	6	7	8	9	Grand Total	
Domestic									
Ovis aries	1	-	-	-	4	1	-	6	5.7%
Capra hircus	-	1	-	-	-	2	-	3	2.9%
Caprine	6	12	-	3	5	11	1	38	36.2%
Sus scrofa	-	5	-	-	5	2	1	13	12.4%
Bos spp.	-	3	1	2	3	4	-	13	12.4%
Equus spp.	1	-	-	-	-	1	-	2	1.9%
Total	8	21	1	5	17	21	2	75	71.4
Wild									
Capreolus capreolus	1	-	-	-	-	-	-	1	1.0%
Gazella spp.	3	-	2	-	-	-	-	5	4.8%
Total	4	-	2	-	-	-	-	6	5.7%
Non-Mammal									
Bird	2	-	1	1	-	-	-	4	3.8%
Amphibian	-	1	-	-	-	-	-	1	1.0%
Total	2	1	1	1	-	-	-	5	4.8%
Indeterminate									
Small	1	-	-	-	-	-	-	1	1.0%
Medium	6	3	-	1	1	3	-	14	13.3%
Large	1	1	-	-	1	1	-	4	3.8%
Total	8	4	-	1	2	4	-	19	18.1%
Grand Total	**22**	**26**	**4**	**7**	**19**	**25**	**2**	**105**	**100%**

Table VI.20 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area IV, Trench CC89/DD89 at SRP046.

Taxon\Loci	2	3	4	9	10	Blank*	Grand Total	
Domestic								
Ovis aries	-	1	-	-	-	1	2	10.5%
Caprine	-	2	3	4	1	-	10	56.6%
Bos spp.	-	2	-	-	-	1	3	15.8%
Total	-	5	3	4	1	2	15	78.9%
Wild								
Gazella spp.	-	1	-	-	-	-	1	5.3%
Total	-	1	-	-	-	-	1	5.3%
Non-Mammal								
Tortoise	1	-	-	-	-	-	1	5.3%
Total	1	-	-	-	-	-	1	5.3%
m. Mammal								
Rat sized	-	2	-	-	-	-	2	10.5%
Total	-	2	-	-	-	-	2	10.5%
Grand Total	**1**	**8**	**3**	**4**	**1**	**2**	**19**	**100%**

*No Loci given

Table VI.21 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area V, Trench Z90D at SRP046.

Taxon\Loci	2	3	6	8	9	10	11	12	13	14	Grand Total	
Domestic												
Ovis aries	1	-	2	-	-	4	-	-	-	-	7	9.7%
Capra hircus	-	-	2	-	-	7	-	-	-	-	9	12.5%
Caprine	5	5	3	10	1		2	-	1	2	29	40.3%
Sus scrofa	1	-	-	-	-		1	-	1	-	3	4.2%
Bos spp.	-	-	-	-	-		-	-	1	-	1	1.4%
Equus spp.	4	-	1	-	-	2	-	-	-	-	7	9.7%
Total	11	5	8	10	1	13	3	-	3	2	56	77.8%
Wild												
Gazelle spp.	-	-	1	-	-	-	-	-	-	-	1	1.4%
Total	-	-	1	-	-	-	-	-	-	-	1	1.4%
Micromammal												
Mouse sized	-	-	-	-	1	-	-	-	-	-	1	1.4%
Total	-	-	-	-	1	-	-	-	-	-	1	1.4%
Indeterminate												
Small	-	-	-	1	-	-	-	-	-	-	1	1.4%
Medium	6	-	1	3	-	-	-	1	2	-	13	18.1%
Total	6	-	1	4	-	-	-	1	2	-	14	19.4%
Grand Total	**17**	**5**	**10**	**14**	**2**	**13**	**3**	**1**	**5**	**2**	**72**	**100%**

Table VI.22 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area VII, Trenches L80 and M81 at SRP046.

Taxon\Loci	3	4	5	6	Grand Total	
Domestic						
Ovis aries	-	-	-	1	1	5.0%
Capra hircus	-	-	2	-	2	10.0%
Caprine	-	1	9	-	10	50.0%
Sus scrofa	1	-	-	-	1	5.0%
Bos spp.	-	-	1	-	1	5.0%
Equus spp	1	-	-	-	1	5.0%
Total	2	1	12	1	16	80.0%
Indeterminate						
Medium	-	-	4	-	4	20.0%
Total	-		4	-	4	20.0%
Grand Total	**2**	**1**	**16**	**1**	**20**	**100%**

Table VI.23 Number and relative proportion of identified taxa (NISP) across all loci with zooarchaeological remains from Area I, Trench Y87 at SRP046.

VI.5.4 Taxa

The following section discusses the taxa in descending order of abundance.

VI.5.4.1 Caprines

Sheep and goat are by far the most numerous species at SRP046. The recovered remains are consistent with deriving from the skeletons of domestic sheep (*Ovis aries*) and domestic goat (*Capra hircus*). The presence of wild animals cannot be completely disregarded; however, none were identified based on morphological characteristics. Where possible, data on the two species will be considered separately, however some features of the material will be considered together as 'caprine', as many specimens could only be identified as sheep or goat.

The proportion of caprine specimens which could be securely identified as either sheep or goat is relatively low (Table IV.14). This is typical of sites in the region and is due to only certain elements being separable and the high degree of fragmentation of the material hinders the observation of many of the criteria necessary to distinguish these species.[33] The potential for identification, however, is approximately equal in both sheep and goat and it is therefore considered that the separation of the species is meaningful.

Overall, sheep bones are more numerous than those of goat, at an approximate ratio of 19:13. Sheep consistently outnumber goats across the larger, species-rich area assemblages (Figure VI.1). The exceptions to this are Area V, where no goat was identified. However, as shown in Tables VI.24-26, this sample size is relatively small and interpretations must be made with caution.

VI.5.4.1.1 Body parts

Figure VI.2 shows the distribution of caprine body parts based on the MNE of each element divided by the number of expected elements in a complete carcass represented by the most frequent element, in this instance the humerus. Most elements are present, meaning the animals were likely culled on site. Based on the bones which could be identified as sheep or goat, there appears to be little difference based on species. Besides the sturdy mandible, the most common elements are all associated with the fore and hind limbs. Examination of the ratios of recorded diagnostic zones

33 Zeder and Lapham (2010); Zeder and Pilaar (2010).

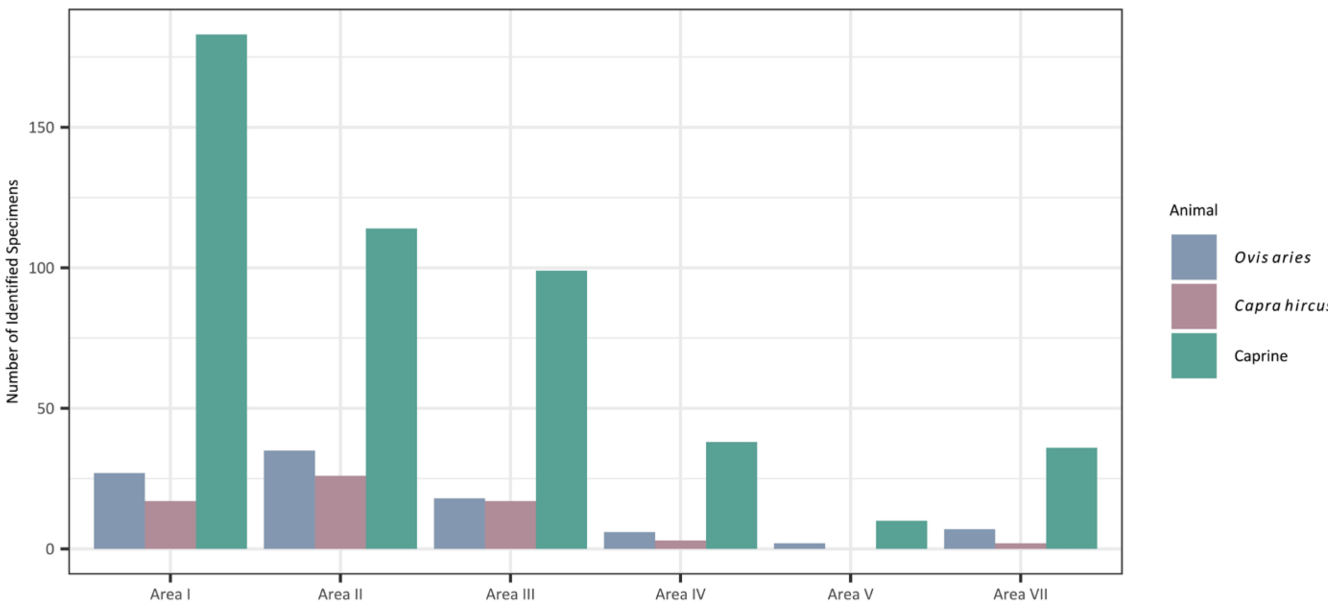

Figure VI.1 Number of identified specimens of *Ovis*, *Capra*, and caprine by excavation area.

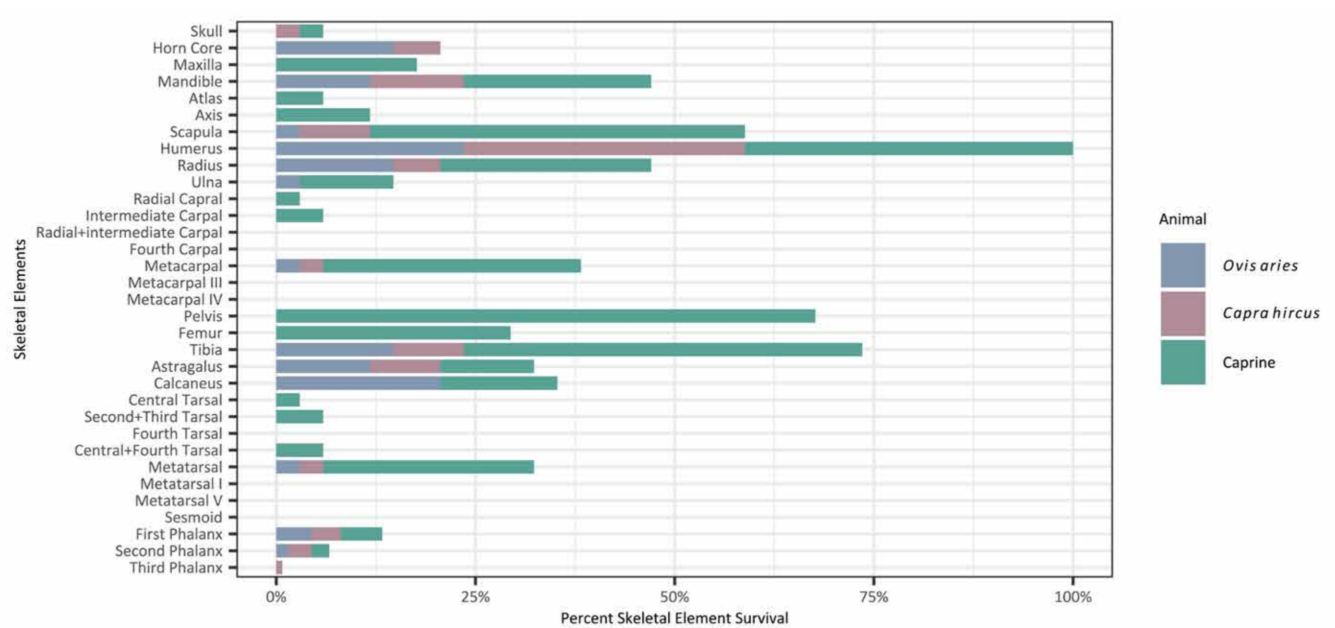

Figure VI.2 Caprine body parts as a percentage of expected for intact carcases based on naturalised MNE. Data from Tables VI.24-26.

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Horn Core	5																	
Mandible	4	6			1													
Scapula	1	1																
Humerus			6	4	7	8	4	3										
Radius	4	5	3	3	4	1	1		3	3								
Ulna																	1	
Metacarpal	2	1	2	1	1	1	2	1										
Tibia					5	5		1	2	2								
Astragalus	3	4	4	4														
Calcaneus	5	7	4	7	7													
Metatarsal			1	1			1	1										
First Phalanx	6	4	4															
Second Phalanx	2	2	2															

Table VI.24 Number of non-replicable zones recorded for each skeletal element for sheep at SRP046, following Dobney and Rielly (1988).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Skull							1	1										
Horn Core	2																	
Mandible	4	4																
Scapula	2	3	3		3													
Humerus			10	10	12	12	8	8										
Radius	2	2	2	1	1		1	1	2									
Ulna										1	1	1						
Metacarpal			1	1														
Tibia					3	3				3								
Astragalus	3	3	3	3														
Metatarsal			1	1														
First Phalanx	4	5	5															
Second Phalanx	3	4	4															
Third Phalanx	1	1																

Table VI.25 Number of non-replicable zones recorded for each skeletal element for goat at SRP046, following Dobney and Rielly (1988).

(Table VI.24-26) indicates that less dense portions of the bones are underrepresented, notably the proximal humerus, distal radius, and proximal tibia. This suggests that the skeletal representation reflects taphonomic attrition impacting the survival of the smaller and less dense elements.[34]

VI.5.4.1.2 Age at death

Demographic data on the sheep and goat populations are presented in Tables VI.27 to VI.30. Figure VI.3 illustrates demographic survivorship profiles of sheep, goat, and the combined total caprine (sheep and goat) populations at SRP046 based on tooth eruption and wear, compared to Payne's meat, milk, and wool comparative profiles.[35]

A range of age groups are represented in the SRP046 sheep and goat populations, indicating that husbandry practices targeted a diversity of uses of the animals, including for meat, milk, and fleeces. The kill-off between 2-3 years could be indicative of Helmer, Gourichon, and Vila's 'type B' milk production[36] where ewes with decreasing milk yield or lamb production are culled. Also, those animals culled at the slightly earlier age of 1-2 years may represent the deliberate slaughter of those animals reaching their maximum weight when the

34 Lyman (1994).

35 Payne (1973).

36 Helmer *et al.* (2007).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Skull					1	1												
Maxilla	6																	
Mandible	8	2	5	4	7	1												
Atlas	1	1																
Axis	2	2	2															
Scapula	12	13	12	5	16	2			1									
Humerus		1		4	3	8	13	14	2	2	1							
Radius	3	2	1		9	7	9	9	4	4								
Ulna										1	3	4	3	2				
Radial Capral	1																	
Intermediate Carpal	2																	
Metapodial			1	1	1	1	1	1										
Metacarpal	2	7	1	2	7	11	9	9										
Pelvis	19	23	5	8	13	7	1	1	1	1								
Femur	1	3	2	4	1	10	5	4	1	2								
Tibia	3	3	3	2	5	2	5	9	8	17								
Astragalus	3	3	3	4														
Calcaneus	4	5	2	1	1													
Central Tarsal	1																	
Second+Third Tarsal	2	2																
Central+Fourth Tarsal	2	2																
Metatarsal	7	5			8	9	3	2										
First Phalanx	3	4	7															
Second Phalanx	3	2	1															

Table VI.26 Number of non-replicable zones recorded for each skeletal element for caprines at SRP046, following Dobney and Rielly (1988).

meat is tender. Animals retained into older age classes may have been kept for both their fleece and milk, though interpretations must be made cautiously considering the limited dataset. The post-cranial fusion data indicate that approximately 4 out of 5 animals were living beyond the age of 30-48 months (Table VI.30). Discrepancy between the dental and post-cranial datasets may be linked to the small sample sizes and differential survival of skeletal elements.

A single sheep/goat (caprine) perinatal metacarpal was identified and was found in Area III (V85/L127, Figure VI.4). Following Prummel,[37] the age of the foetus was calculated at between 112 and 136 days. This is significant, as it suggests that the foetus died close to or during its birth, placing at least some of the female caprine population at SRP046 during the spring lambing season.

37 Prummel (1988).

Sample	Element	dp4	P2	P3	P4	M1	M2	M3	Zeder's Revised Group
26	LTO						4A		IV
243	LTO				4A				V
26	MAN						8A		VI
39	LTO						9A		VI
103	LTO						9A		VI
195	LTO						9A		VI
243	LTO							5A	VI
39	LTO					9A			VII
39	LTO							9G	VII
39	LTO				12S				VII
116	LTO							9G	VII
182	LTO							9G	VII
227	MAN		1	1	12S				VII
243	LTO						9A		VII
324	LTO						9A		VII
424	LTO						9A		VII
424	LTO					10A			VII
424	LTO				12S				VII
14	LTO						10A		IX
35	MAN				12S	14A	9A		IX
56	MAN			1	15A	15A	15A	14G	X
103	LTO							11G	X
424	LTO							11G	X

Table VI.27 The dental wear stage data for sheep at SRP046 following Payne (1973; 1978), age calculated using Zeder's revised age groups (2006b).

Sample	Element	dp4	P2	P3	P4	M1	M2	M3	Zeder's Revised Group
18	MAN	17L				6A			III
320	MAN	22L				9A	8A		IV
214	LTO						5A		V
344	MAN		1		4A	9A	9A	2A	V
3	LTO						8A		VI
17	LTO						9A		VI
36	LTO						9A		VI
36	LTO					9A			VI
45	LTO							4A	VI
116	LTO						8A		VI
118	MAN		1	1	9A	9A	9A		VI
149	MAN				1	9A			VI
236	LTO						9A		VI
341	MAN			1		9A			VI
11	LTO						10A		VII

Table VI.28 The dental wear stage data for goats at SRP046 following Payne (1973), age calculated using Zeder's revised age groups (2006b).

Sample	Area	Element	dp4	P1	P2	P3	P4	M1	M2	M3	Zeder's Revised Group
139	III	LTO							9A		VIII
142	III	LTO							4A		IV
197	I	LTO							9A		VIII
109	II	MN								11G	IX
201	III	MN							9A		VIII

Table VI.29 The dental wear stage data for caprines at SRP046 following Payne (1973), age calculated using Zeder's revised age groups (2006b).

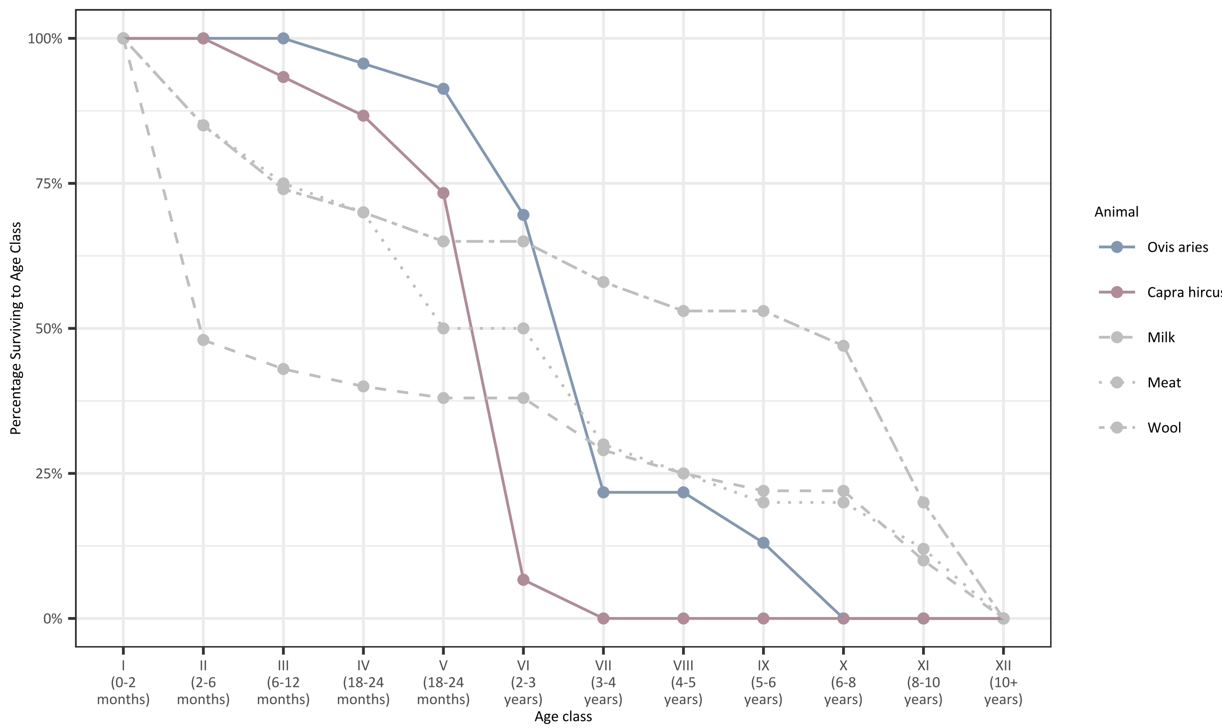

Figure VI.3 Demographic profiles indicating survivorship of sheep, goat and the combined total caprine (sheep and goat) populations at SRP046, based on tooth eruption and wear (Tables VI.27-30), compared to Payne's (1973) meat, milk and wool comparative profiles.

Figure VI.4 A longitudinally unfused perinatal caprine (sheep/goat) metacarpal from Area III (V85/L127).

Age Class	Element	Sheep		Goat		Sheep+Goat+Caprine	
		Unfused	Fused	Unfused	Fused	Unfused	Fused
A 0-6 months	P. Radius	0	6	0	2	0	11
		100%		100%		100%	
B 6-12 months	D. Humerus	0	8	0	12	5	28
	Pelvis	0	0	0	0	1	19
	Scapula	0	1	0	3	1	15
		100%		100%		90%	
C 12-18 months	2 Phalanx	0	1	1	2	1	6
	1 Phalanx	0	6	1	3	1	13
		100%		71%		90%	
D 18-30 months	D. Tibia	0	5	0	3	1	12
	D. Metacarpal	0	3	0	1	1	7
	D. Metatarsal	0	1	0	0	1	6
		100%		100%		90%	
E 30-48 months	Calcaneus	1	5	0	0	1	5
	P. Femur	0	0	0	0	3	2
	D. Femur	0	0	0	0	1	2
	P. Ulna	0	0	0	1	0	1
	D. Radius	0	3	1	1	2	6
	P. Tibia	0	0	0	0	2	0
		89%		66%		64%	
F 48+ months	P. Humerus	0	0	0	0	1	0
		N/A		N/A		0%	
G 48++ months	P. Humerus	0	0	0	0	0	0
		N/A		N/A		N/A	
Total		1	39	3	28	22	113

Table VI.30 Sheep, goat, and combined sheep+goat+caprine epiphyseal fusion data from SRP046 following Zeder's (2006b) revised fusion stages.

Humerus

Sample	Area	Fusion*	SD	Bd	BT	LSI SD	LSI Bd	LSI BT	Mean
132	II	dF		29.30	29.31		-0.0516	-0.0028	-0.0272
57	IV	dF	12.25		27.30	-0.1022		-0.0337	-0.0679
11	V	dF		30.12	28.23		-0.0397	-0.0191	-0.0294

Radius

Sample	Area	Fusion	Bp	BFp	SD	Bd	LSI Bp	LSI Bfp	LSI SD	LSI Bd	Mean
135	III	dF				32.30				0.0178	0.0178
136	III	pF	32.09	28.32			-0.0187	-0.0322			-0.0254
239	I	pF	35.93	31.70			0.0304	0.0168			0.0236
243	I	dF	30.50				-0.0407				-0.0407
243	I	dF	34.30				0.0102				0.0102

Metacarpal

Sample	Area	Fusion	Bp	SD	Bfd	LSI Bp	LSI SD	LSI Bfd	Mean
77	IV	dF			23.71			-0.0483	-0.0483

Tibia

Sample	Are	Fusion	Bp	SD	Bd	Dd	LSI Bp	LSI SD	LIS Bd	LSI Dd	Mean
34	II	d*f*			28.10	22.10			0.0015	0.0120	0.0068
44	II	dF			21.03				-0.1004		-0.1004
157	III	dF			25.98	19.91			-0.0086	-0.0127	-0.0106
160	III	dF			28.56	21.34			0.0325	0.0174	0.0250

Astragalus

Sample	Area	Fusion	GLI	GLm	DI	LSI GLI	LSI GLm	LSI DI	Mean
26	II	F	28.20			-0.0453			-0.0453
84	II	F	31.36	28.99	16.64	0.0008	-0.0046	-0.0194	-0.0077
204	II	F	29.33	23.33	15.99	-0.0378	-0.0990	-0.0633	-0.0667

Calcaneus

Sample	Area	Fusion	GL	GB	LSI GL	LSI GB	Mean
35	II	F	59.40	20.10	-0.0324	-0.0086	-0.0205
78	IV	F	60.72	21.74	-0.0228	0.0255	0.0013
155	III	F	67.70	23.61	0.0244	0.0613	0.0429

Metatarsal

Sample	Area	Fusion	Bp	SD	Bfd	LSI Bp	LSI SD	LSI Bfd	Mean
31	I	dF			27.02			0.0167	0.0167

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.31 Post-cranial measurements of sheep from SRP046 following von den Driesch (1976). LSI calculated using modern wild sheep (*Ovis orientalis*) from Iran (Uerpmann and Uerpmann 1994). All measurements in mm.

VI.5.4.1.3 Biometrical analysis

For sheep (*Ovis aries*), the data shown in Table VI.31, and expressed in Figure VI.5, show that most skeletal elements plot closely to, but slightly below the modern wild standard with an average LSI value of -0.0173. Animals of similar sizes are found in the comparative Nippur assemblage,[38] as well as Old Babylonian Tell ed-Der.[39] The SRP046 data are consistent with deriving from a domestic population. Although the presence of wild animals cannot be completely excluded, it is unlikely they made a significant contribution to the sheep population on the site.

For goats (*Capra hircus*), as with the sheep, most skeletal elements at SRP046 plot close to, but slightly below the modern wild standard, with an average LSI value of -0.0465 (Table VI.32, Figure VI.5). The Kani Masi data are again consistent with deriving from a domestic population.

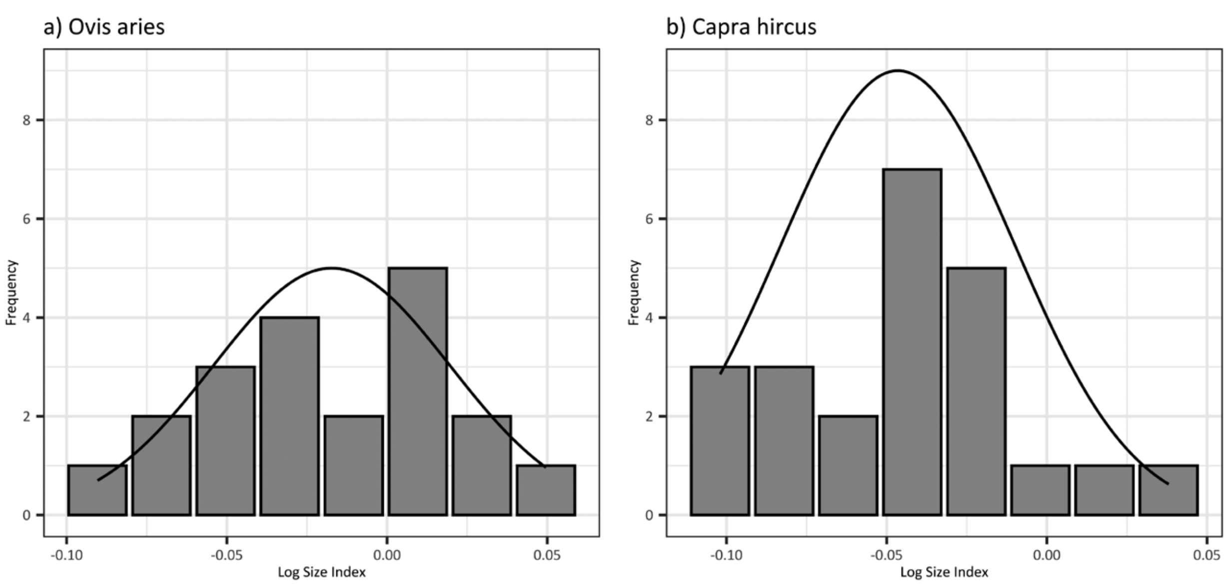

Figure VI.5 Histogram expressing the biometrical data (Tables VI.31-32) for goat (left) and sheep (right) from SRP046.

38 Boessneck (1978, 156).

39 Bökönyi (1978).

Scapula											
Sample	Area	Fusion*	GLP	LG	BG	SLC	LSI GLP	LSI LG	LSI BG	LSI SLC	Mean
137	III	dF	30.76		21.02	20.99	-0.0647		-0.0718	0.0210	-0.0385
146	III	dF	28.03	23.36		19.25	-0.1050	-0.0864		-0.0166	-0.0693
167	III	dF				19.96				-0.0009	-0.0009
Humerus											
Sample	Area	Fusion	SD	Bd	BT	LSI SD	LSI Bd	LSI BT	Mean		
35	II	dF			26.50			-0.1120	-0.1120		
40	II	dF		32.77	32.68		-0.0286	-0.0210	-0.0248		
62	III	dF		32.49	32.69		-0.0323	-0.0209	-0.0266		
100	II	dF		36.12	34.92		0.0137	0.0078	0.0107		
116	II	dF		31.44	30.46		-0.0466	-0.0516	-0.0491		
116	II	df		32.26			-0.0354		-0.0354		
135	III	dF		32.30	32.33		-0.0349	-0.0257	-0.0303		
142	III	dF		31.62	31.81		-0.0441	-0.0327	-0.0384		
235	I	dF		31.50			-0.0458		-0.0458		
244	I	dF			31.21			-0.0410	-0.0410		
362	I	dF		29.67	28.06		-0.0718	-0.0872	-0.0795		
342	I	dF		29.23			-0.0782		-0.0782		
Radius											
Sample	Area	Fusion	Bp	BFp	SD	Bd	LSI Bp	LSI Bfp	LSI SD	LSI Bd	Mean
35	II	pF	27.60	28.60			-0.1093	-0.0802			-0.0948
35	II	pF	27.50	27.60			-0.1109	-0.0956			-0.1033
Metacarpal											
Sample	Area	Fusion	Bp	SD	Bfd	LSI Bp	LSI SD	LSI Bfd	Mean		
34	II	dF			25.26			-0.0819	-0.0819		
Tibia											
Sample	Are	Fusion	Bp	SD	Bd	Dd	LSI Bp	LSI SD	LIS Bd	LSI Dd	Mean
100	II	dF			26.19	19.99			-0.0290	-0.0316	-0.0303
136	III	dF			24.31	18.02			-0.0614	-0.0767	-0.0690
148	III	df			29.60	24.27			0.0241	0.0526	0.0384
Astragalus											
Sample	Area	Fusion	GLI	GLm	DI	LSI GLI	LSI GLm	LSI DI	Mean		
113	I	F	30.14	28.33	15.77	-0.0260	-0.0146	-0.0693	-0.0367		
196	III	F	26.35	24.42	15.10	-0.0844	-0.0791	-0.0882	-0.0839		
239	I	F	29.94	28.86	16.76	-0.0289	-0.0066	-0.0429	-0.0261		
Metatarsal											
Sample	Area	Fusion	Bp	SD	Bfd	LSI Bp	LSI SD	LSI Bfd	Mean		
78	IV	dF			23.66			-0.0808	-0.0808		

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.32 Post-cranial measurements of goats from SRP046 following von den Driesch (1976). LSI calculated using modern wild goat (*Capra aegagrus*) from the Taurus mountains (Uerpmann and Uerpmann 1994). All measurements in mm.

VI.5.4.2 *Sus scrofa*

Pigs are the second most abundant species, appearing in all larger, species-rich area assemblages in broadly consistent proportions. The only exception to this is in Area III, where they appear at a much higher frequency. This area, however, contained a high proportion of cranial elements, which is significant in of itself, and loose teeth were counted individually. Considering the environmental context of SRP046 in the 'zone of uncertainty' (see Chapter 1), the high proportion of pigs is noteworthy (for further discussion see Chapter 8).

VI.5.4.2.1 Body parts

Data in Table VI.33, expressed in Figure VI.6, show the survival of individual pig skeletal elements. Most elements are present, suggesting the animals were butchered on site. There is, however, an emphasis on cranial and forelimbs. The skull, primarily represented by frontal and parietal bones, as well as the maxilla and mandible, are dense bones, and therefore survive well. Several of the skulls (n=6) have cleave marks consistent with an intention to access the brain. Butchery practices are discussed further in Chapter 8.

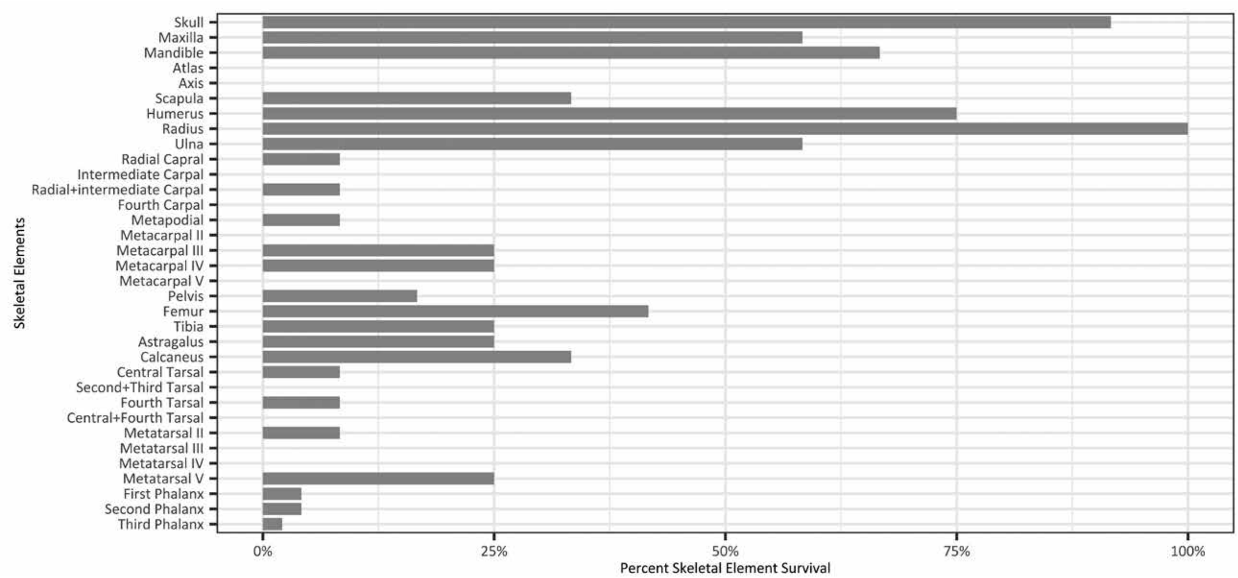

Figure VI.6 Pig body parts as a percentage of expected for intact carcases based on Table VI.33.

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Skull		1		2		5	6	11	1	4	1	7						
Maxilla	7																	
Mandible	7		1	1	2	8												
Scapula	3	4	3	2	3													
Humerus			3	4	5	7	9	9										
Radius	11	12	1	2	11	3	2	2	2	3								
Ulna											6	7	6	3	1			
Radial Capral	1																	
Radial+intermediate Carpal	1	1																
Metapodial	1	1																
Metacarpal III	2	2	3		1	1	1	1										
Metacarpal IV	1	1	3			1												
Pelvis	1	1	1	2	2			1										
Femur	2		1	2	3	1	1	1	5	5	4							
Tibia			1		1	1	2	2	2	3								
Astragalus	2	3	2	2														
Calcaneus		4	3	4	4													
Patella	1																	
Central Tarsal	1																	
Fourth Tarsal	1																	
Metatarsal		1																
Metatarsal II	1		1															
Metatarsal V	3	2	1															
Sesmoid	1																	
First Phalanx	1	2	2															
Second Phalanx	2	2	2															
Third Phalanx	1	1																

Table VI.33 Number of non-replicable zones recorded for each skeletal element for pig at SRP046, following Dobney and Rielly (1988).

VI.5.4.2.2 Age at death

The data in Tables VI.34 and VI.35 show that pigs were culled at a young age, and very few animals possibly lived beyond the fourth year of life.

Sample	Area	Element	dp4	P1	P2	P3	P4	M1	M2	M3	Simplified A system
36	II	LTO								7	
55	III	LTO								7	
55	III	LTO							10		
55	III	LTO						12			
55	III	LTO						12			
55	III	LTO					8				
55	III	LTO					8				
76	IV	LTO								7	
102	II	LTO						9			
102	II	LTO							7		
55	III	MN								9	
77	IV	MN	12					7			C
97	II	MN					7				
116	II	MN	12				7	11	7		D

Table VI.34 The dental wear stage for pigs from SRP046 following Lemoine *et al.* (2014).

<table>
<tr><th>Age Class</th><th>Element</th><th>Unfused</th><th>Fused</th></tr>
<tr><td rowspan="3">C
6-7 Months</td><td>Axis</td><td>0</td><td>0</td></tr>
<tr><td>Atlas</td><td>0</td><td>0</td></tr>
<tr><td></td><td colspan="2">NA</td></tr>
<tr><td rowspan="4">D
7-8 Months</td><td>Pelvis</td><td>0</td><td>1</td></tr>
<tr><td>Scapula</td><td>2</td><td>3</td></tr>
<tr><td>P. Radius</td><td>0</td><td>11</td></tr>
<tr><td></td><td colspan="2">88%</td></tr>
<tr><td rowspan="3">E
8-18 Months</td><td>2nd Phalanx</td><td>0</td><td>2</td></tr>
<tr><td>D. Humerus</td><td>5</td><td>8</td></tr>
<tr><td></td><td colspan="2">67%</td></tr>
<tr><td rowspan="3">F
18-24 Months</td><td>1st Phalanx</td><td>0</td><td>1</td></tr>
<tr><td>D. Tibia</td><td>3</td><td>2</td></tr>
<tr><td></td><td colspan="2">50%</td></tr>
<tr><td rowspan="4">G
24-36 Months</td><td>D. Metacarpal</td><td>0</td><td>1</td></tr>
<tr><td>D. Metatarsal</td><td>1</td><td>2</td></tr>
<tr><td>D. Metapodial</td><td>4</td><td>0</td></tr>
<tr><td></td><td colspan="2">38%</td></tr>
<tr><td rowspan="3">H
36-48 Months</td><td>D. Calcaneum</td><td>2</td><td>1</td></tr>
<tr><td>P. Femur</td><td>4</td><td>0</td></tr>
<tr><td></td><td colspan="2">14%</td></tr>
</table>

Table VI.35 Pig epiphyseal fusion data from SRP046 following Lemoine *et al.* (2014) revised fusion stages.

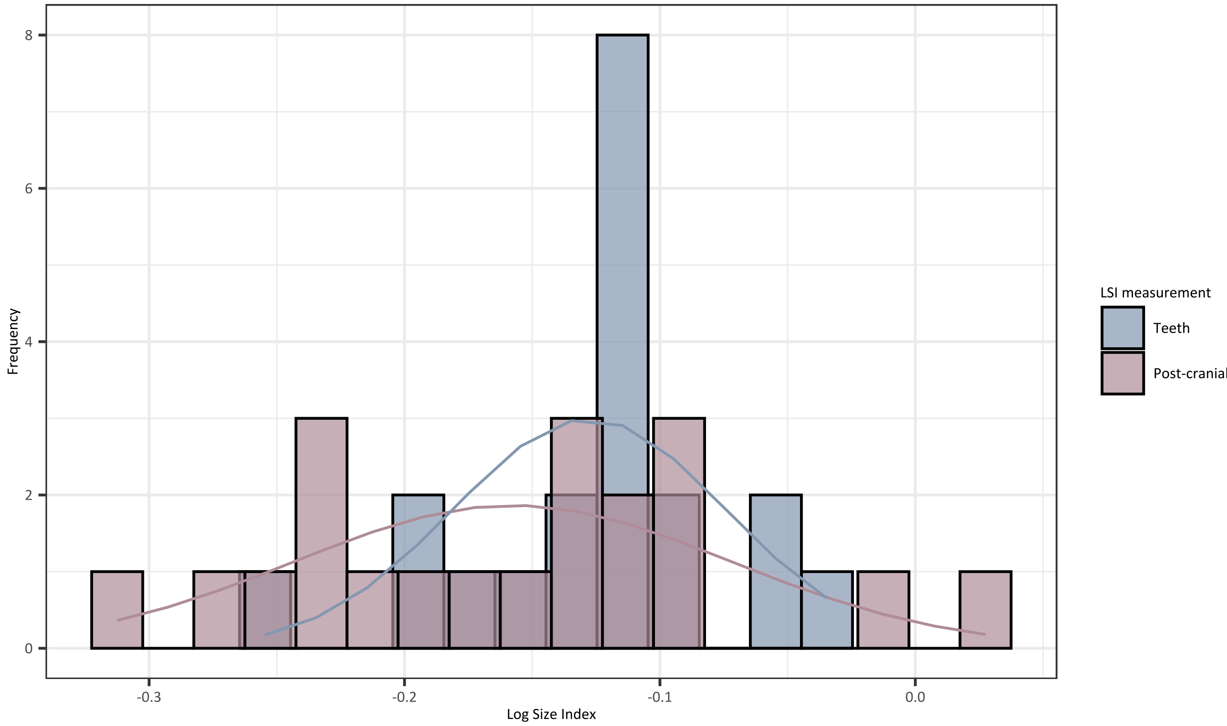

Figure VI.7 Histogram expressing the biometric data (Tables VI.36-37) for pig teeth (red) and post-cranial (blue) measurements from SRP046. LSI calculated using modern wild boar (*Sus scrofa libycus*) from Turkey (Payne and Bull 1988).

VI.5.4.2.3 Biometrical analysis

The data in Tables VI.36 and VI.37, expressed in Figure VI.7, show that the mean measurements of most elements plot well below the modern wild standard, suggesting a primarily domestic population. As with the sheep and goat, we cannot completely disregard the possibility of wild boar within the population. Wild boar has been known to appear in the reeds and thickets along the Diyala.[40] Earlier textual evidence also suggest that some pig farmers kept small numbers of 'wild pigs' for breeding.[41] Compared to the Turkish wild boar[42] used to calculate the Log Size Index (LSI) values, the teeth of the SRP046 pigs are slightly larger compared to the post-cranial elements (Figure VI.7).

40 Hatt (1959).
41 Price (2016, 82).
42 Payne and Bull (1988).

Scapula

Sample	Area	Fusion*	GLP	SLC	LIS GLP	LSI SLC	Mean
86	IV	dU	24.61	15.12	-0.2383	-0.2947	-0.2665
152	III	dF		18.51		-0.2068	-0.2068
243	I	dF	29.78	16.90	-0.1555	-0.2463	-0.2009

Humerus

Sample	Area	Fusion	Bd	BT	HTC	LSI Bd	LSI BT	LSI HTC	Mean
13	II	dF	40.30			-0.0937			-0.0937
136	III	dF			17.81			-0.1015	-0.1015
142	III	dF	28.16	21.23		-0.2493	-0.2171		-0.2332
243	I	df			23.95			0.0271	0.0271

Radius

Sample	Area	Fusion	BFp	Bd	LSI Bfp	LSI Bd	Mean
39	II	pF	27.43		-0.0958		-0.0958
50	I	pF	24.15		-0.1511		-0.1511
55	III	dU	25.48		-0.1278		-0.1278
86	IV	pf	19.15		-0.2519		-0.2519
86	IV	pF	23.52		-0.1626		-0.1626
109	II	pF	26.02		-0.1187		-0.1187
117	II	pF	26.23		-0.1152		-0.1152
136	III	pf		24.34		-0.2296	-0.2296
155	III	pF	25.33		-0.1304		-0.1304
190	I	dF	32.52	40.38	-0.0219	-0.0098	-0.0158

Ulna

Sample	Area	Fusion	DPA	LSI DPA	Mean
86	IV	pU	22.51	-0.3225	-0.3225
109	II		35.21	-0.1282	-0.1282
136	III		28.04	-0.2271	-0.2271
139	III		31.50	-0.1766	-0.1766
141	III	pU	30.34	-0.1928	-0.1928
168	III	pU	31.55	-0.1759	-0.1759
199	I		47.30	-0.3225	-0.3225

Calcaneum

Sample	Area	Fusion	GL	LSI GL	Mean
2	I	U	58.10	-0.2145	-0.2145
5	II	U	57.50	-0.2190	-0.2190

Astragalus

Sample	Area	Fusion	GLl	LSI GLl	Mean
55	III	F	34.50	-0.1497	-0.1497

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.36 Post-cranial measurements of pig from SRP046 following von den Driesch (1976). LSI calculated using modern wild boar (*Sus scrofa libycus*) from Turkey (Payne and Bull 1988). All measurements in mm.

Sample	Area	Tooth	L	WA	WP	LSI L	LSI WA	LSI L	Mean
77	IV	Low.dp4	16.43		6.63	-0.1404		-0.1828	-0.1616
116	I	Low.dp4	17.33		7.63	-0.1172		-0.1218	-0.1195
55	III	Low.M1	14.81	8.62	9.79	-0.1391	-0.1400	-0.1232	-0.1341
55	III	Low.M1			9.98			-0.1148	-0.1148
77	IV	Low.M1	14.11	7.15	8.24	-0.1601	-0.2212	-0.1980	-0.1931
116	II	Low.M1	15.76	8.71	10.02	-0.1121	-0.1355	-0.1131	-0.1202
55	III	Low.M2	20.61		12.53	-0.0908		-0.1195	-0.1051
102	II	Low.M2	24.03	14.94	15.39	-0.0241	-0.0215	-0.0302	-0.0253
116	II	Low.M2	20.02	12.20	12.85	-0.1034	-0.1095	-0.1086	-0.1072
36	II	Low.M3	31.90		17.70	-0.1143		-0.0145	-0.0644
55	III	Low.M3	26.67		12.41	-0.1920		-0.1687	-0.1804
55	III	Low.M3	29.33		14.64	-0.1507		-0.0969	-0.1238
76	IV	Low.M3	32.77		13.57	-0.1026		-0.1299	-0.1162
38	II	Upp.M1		13.90			-0.0584		-0.0584
159	IV	Upp.M1	12.37	13.99	12.93	-0.2151	-0.0556	-0.0979	-0.1229
55	III	Upp.M2	19.66	15.45	15.50	-0.1078		-0.0997	-0.1038
55	III	Upp.M2	15.72	12.21	12.51	-0.2049		-0.1928	-0.1989
38	II	Upp.M3	30.30		14.97	-0.1074		-0.1612	-0.1343
55	IV	Upp.M3	30.52		17.09	-0.1042		-0.1037	-0.1040
141	IV	Upp.M3			11.80			-0.2646	-0.2646

Table VI.37 Teeth measurements of pig from SRP046 following von den Driesch (1976). LSI calculated using modern wild boar (*Sus scrofa libycus*) from Turkey (Payne and Bull 1988). All measurements in mm.

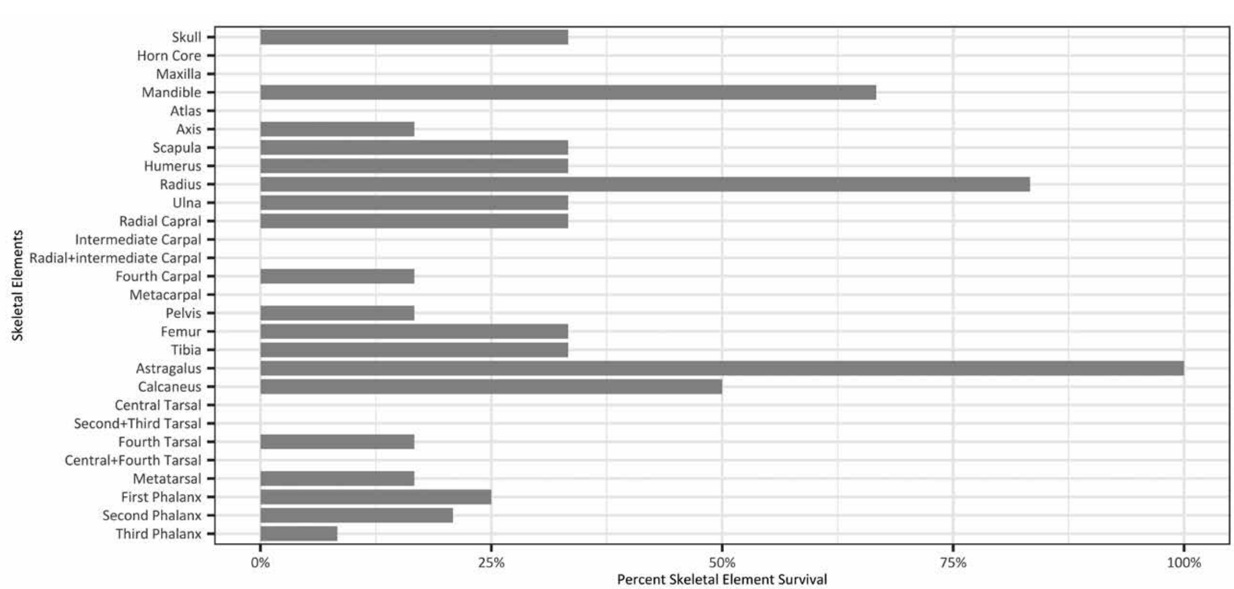

Figure VI.8 Cattle body parts as a percentage of expected for intact carcases based on naturalised MNE. Data from Table VI.38.

VI.5.4.3 *Bos* spp.

Cattle appear throughout all larger, species-rich area assemblages in roughly consistent proportions. It is assumed all animals are *Bos taurus* (domestic cattle), although *Bos indicus* (zebu), *Bison bonasus* (European bison) and *Bubalus* spp. (water buffalo) are thought to be present in the region and could also therefore be represented.

VI.5.4.3.1 Body parts

Data in Table VI.38, expressed in Figure VI.8, show the survival of individual cattle skeletal elements. A wide range of elements are present, which suggest that the animals were butchered on site. Most elements yield a survival rate between 20-40% as calculated by naturalised MNE, with the radius, astragalus, and to a smaller degree, the mandible, representing more frequent outliers. These are denser bones which generally survive well. The skeletal part representation probably represents a range of taphonomic processes, as noted for the caprine and pig remains above. For instance, cattle post-cranial elements also show evidence of grease and marrow extraction.

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Skull				1				2										
Mandible	1				4		1											
Axis	1																	
Scapula	1		2															
Humerus	1	2	2	1	1	1	2	1	1	2	1							
Radius	4	2	3	5	4	1	1	1	4	5								
Ulna												2	1	1				
Radial Capral	2	1																
Fourth Carpal	1																	
Metapodial	1																	
Pelvis	1	1	1	1	1													
Femur	1	2			2	1												
Tibia			1		1	2		1		1								
Fibula			1		1	2		1		1								
Astragalus	5	7	6	5														
Calcaneus		2	1	3	3	1												
Fourth Tarsal	1																	
Metatarsal	1	1			3	3	1	1										
First Phalanx	6	5	6															
Second Phalanx	5	5	5															
Third Phalanx	2	1																

Table VI.38 Number of non-replicable zones recorded for each skeletal element for cattle at SRP046, following Dobney and Rielly (1988).

Age Class	Element	Unfused	Fused
1-2 years	D. Humerus	1	2
	P. Radius	0	3
		83%	
2-3 years	D. Metacarpal	1	2
	D. Tibia	0	1
	D. Metatarsal	1	0
		60%	
3-4 years	P. Femur	1	0
	Calcaneum	1	0
	P. Humerus	0	1
	D. Radius	5	2
	D. Femur	0	0
	P. Tibia	0	2
		42%	

Table VI.39 Cattle epiphyseal fusion data from SRP046 following Chaplin (1971).

Humerus

Sample	Area	Fusion*	SD	BT
98	II	F	30.5	64.9

Astragalus

Sample	Area	Fusion	GLl	GLm	Dl	Dm	Bd	LSI GLl
45	I	F	65.7	60.4	36.1	37.1	41.4	-0.1040
75	IV	F		56.3		33.4		
143	III	F	61.5	58.2	35.5	35.1	38.7	-0.1328
326	I	F					41.4	

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.40 Post-cranial measurements of cattle from SRP046 following von den Driesch (1976). Astragalus LSI calculated using Neolithic wild cattle (*Bos taurus primigenius*) from Jarmo in the western piedmont of the Zagros Mountains (Stampfli 1983). All measurements in mm.

VI.5.4.3.2 Age at death

Minimal age-at death data for cattle were available: few teeth were present in the assemblage, so the best insight is gained from epiphyseal fusion, expressed in Table VI.39. From this small dataset, there appears to be a steady decline in population with the increase in age, and 42% of animals survived beyond the 3-4 years age class.

VI.5.4.3.3 Biometrical analysis

Due to the low frequency and fragmented nature of the cattle remains, few elements produced any measurements (Table VI.40). A statistically viable metrical analysis is therefore not possible. Two astragali did, however, produce comparable measurements. In order to give an indication of cattle size, these were plotted against Neolithic wild cattle from Jarmo.[43] This resulted in an average LSI value of -0.1184, plotting well below comparable wild cattle and further reinforcing that the cattle at SRP046 were domestic.

VI.5.4.3.4 Notable deposit

A complete cattle humerus was found in Area II (Y82/L22, Figure VI.9). This is unusual, as all other cattle long bones are fully broken down. Both proximal and distal epiphyses of the humerus are fully fused, indicating an animal > 4 years of age (Table VI.39), but with heavy gnawing at the proximal end, effectively removing parts of the lateral tuberosity and head. Gnawing is also found on the shaft. This deposition is likely to be part of a purposeful event, which is discussed in detail in Chapter 9. A full equid mandible was also recorded within the same locus, discussed below.

43 Stampfli (1983, Table 28).

Figure VI.9 Complete right cattle humerus from Area II (Y82/L22).

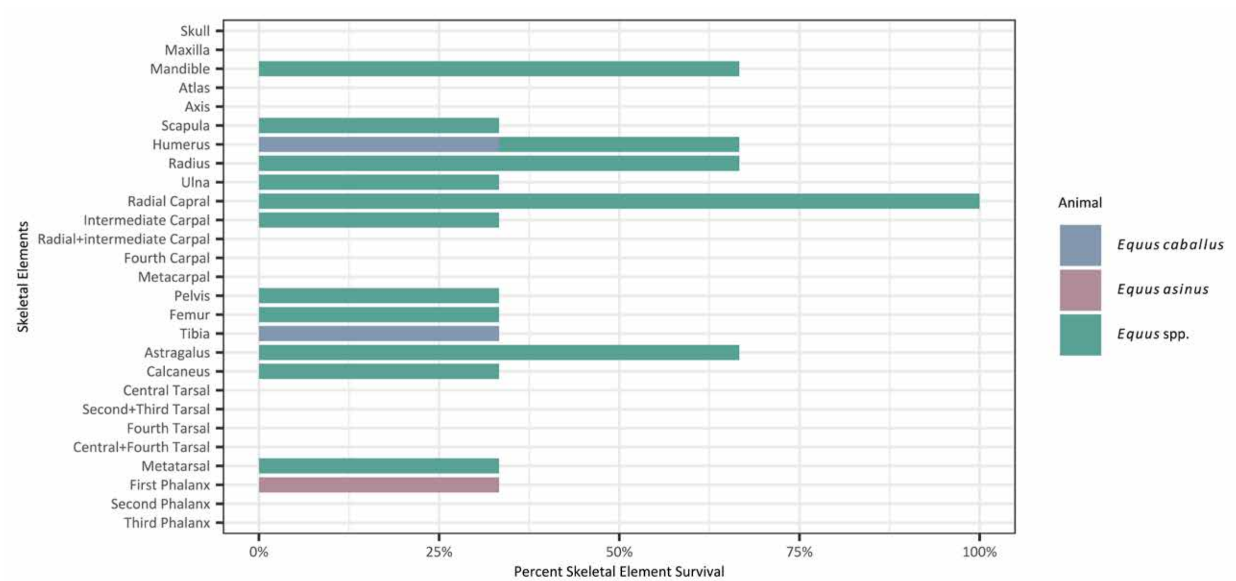

Figure VI.10 *Equus* spp. body parts as a percentage of expected for intact carcases based on naturalised MNE. Data from Tables VI.41-43.

VI.5.4.4 *Equus* spp.

Equids appear in small numbers across the site, and are absent only in Area V. Both domestic horse (*Equus caballus*) and domestic donkey (*Equus asinus*) are positively identified. Based on dental morphology, a likely hybrid has also been identified (Area III, V85/L116). Throughout this Appendix, hybrids have been referred to as *Equus asinus*+*Equus caballus* (mule), abbreviated to *Equus* a+c. The presence of *Equus caballus*+*Equus asinus* (hinnies) should not be ruled out, but are typically a rarer occurrence. Mules are notorious for their energy and drive, and since their first occurrences have been employed for long distance transport of both people and goods.[44] Hinnies on the other hand, are rarely used, and have been described as of low working interest.[45] *Equus hydruntinus* (European wild ass) and *Equus hemionus* (onager) could also be present, but have not been positively identified.

VI.5.4.4.1 Body parts

Most equid specimens represent cranial material, meaning the post cranial sample size is small. Figure VI.10 presents the survival of *Equus* spp. body parts based on MNE. The most common element is the radial carpal. This is a small dense bone which sits above the radius, and, alongside the mandible and astragalus, generally preserves well. Considering the number of teeth, and despite the restricted sample size, a relatively wide range of elements are present, suggesting the animals were culled on site.

44 Armitage and Chapman (1979); Mitchell (2018).

45 Clutton-Brock (1992).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Humerus	1	1									1							
Tibia						1												

Table VI.41. Number of non-replicable zones recorded for each skeletal element for horse at SRP046, following Dobney and Rielly (1988).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
First Phalanx	2	2	2															

Table VI.42 Number of non-replicable zones recorded for each skeletal element for donkey at SRP046, following Dobney and Rielly (1988).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Mandible	2	2				2	2											
Scapula	1	1	1		1	1												
Humerus	1		1			1	1	1										
Radius	1	2	1	2	1	1			1	2								
Ulna											1	2						
Radial Carpal	3																	
Intermediate Carpal	1																	
Pelvis	1				1													
Femur		1		1	1						1							
Tibia								1										
Astragalus	2	1	2	2														
Calcaneus			1	1	1													
Metatarsal	1	1			2	3	1	1										
First Phalanx	1	3	2															
Third Phalanx	1	1																

Table VI.43 Number of non-replicable zones recorded for each skeletal element for *Equus* spp. at SRP046, following Dobney and Rielly (1988).

VI.5.4.4.2 Notable deposits

A complete equid mandible, with associated left P2, P3, M1 and right P2, P3, P4, and M2 teeth, was found in Area II (Y82/L22). The mandible lacked a well-developed lower canine, suggesting that the animal was female.[46] The dental morphology is consistent with that of a horse; the lingual fold is U-shaped and deep, while the shape of the 'double knot' is asymmetrical, with the posterior side appearing pointed with the anterior rounded.[47] The buccal fold only partially penetrated the 'neck' created by the ento- and metaflexids (Figure VI.11). Based on the crown height, the mare was between 13-15 years at the time of death (Levine 1982). There is also evidence of skinning on the left lateral base of the mandible (Figure VI.12). On the anterior site of both P2s, the centum and enamel have worn away exposing the dentine within the tooth (Figure VI.13). The degree and morphology of wear is indicative of heavy bit wear and, following Bendrey,[48] suggests the horse was ridden or driven during its life.

46 Nistelberger *et al.* (2019).

47 Johnstone (2004).

48 Bendrey (2007).

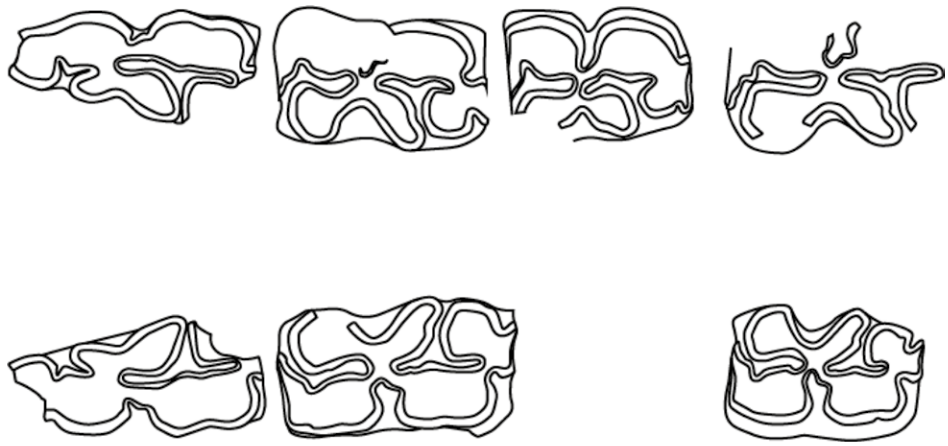

Figure VI.11 Illustration of the teeth from the mandible in Area II (Y82/L22). Not to scale.

Figure VI.12. Fine parallel cutmarks associated with skinning on the left lateral base of the horse mandible from Area II (Y82/L22). Not to scale.

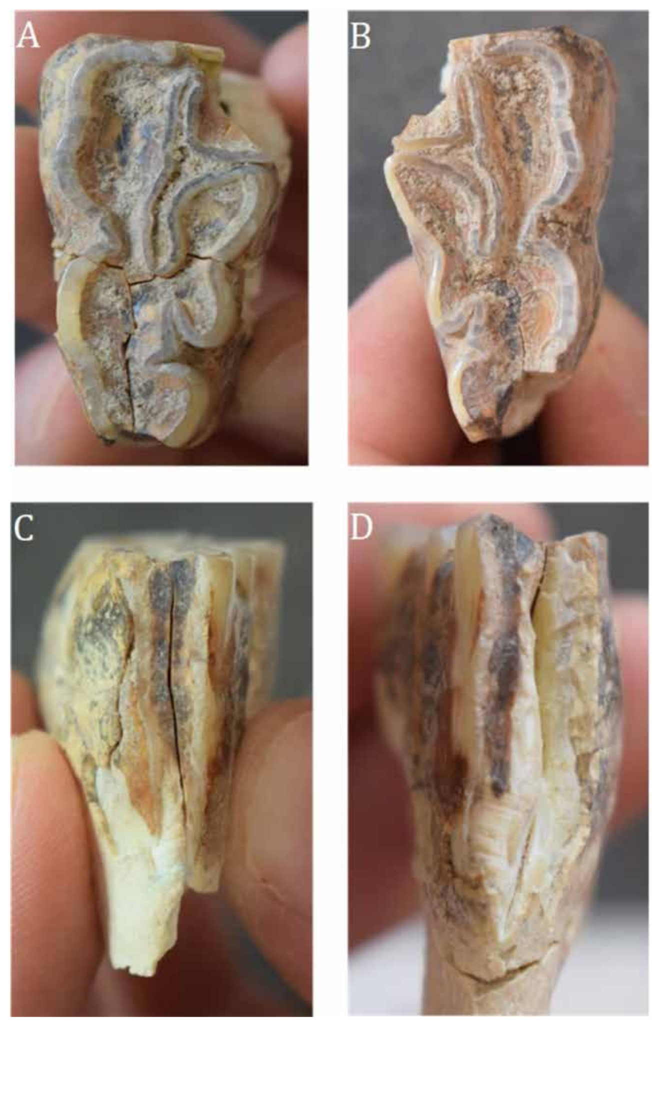

Figure VI.13. Evidence of bit wear on the anterior side of both second premolars from Area II (Y82/L22). A) (top-down) of right lower P2 (note recent breaks in the tooth crown), B) (top-down) of left lower P2, C) anterior view of right lower P2, note the worn surface exposing the dentine, with parallel-sided enamel 'bands' (see Bendrey 2007), D) anterior view of left lower P2, again, note the worn surface exposing the dentine. Not to scale.

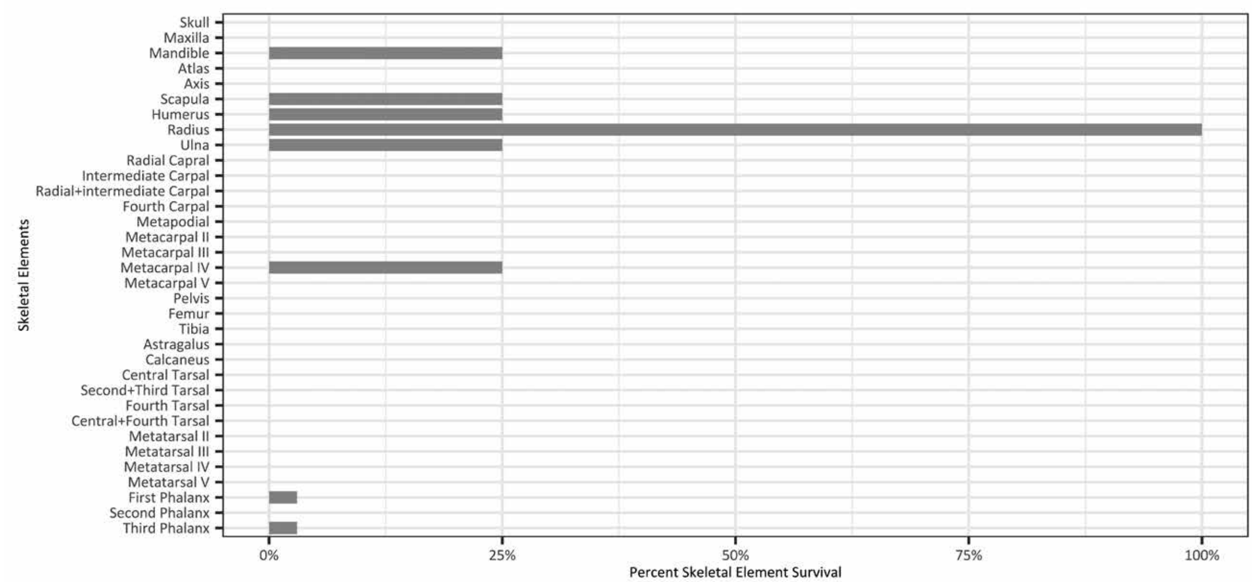

Figure VI.14 Dog body parts as a percentage of expected for intact carcases based on naturalised MNE. Data from Table VI.44.

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Mandible	1		1			1												
Scapula			1	1	1	1												
Humerus	1	1		1		1		1	1	1	1							
Radius	3	4	1	1	3	1	2	2	1	1								
Ulna											1	1	1	1	1			
Metacarpal IV	1																	
First Phalanx	1	1	1															
Third Phalanx	1	1																

Table VI.44 Number of non-replicable zones recorded for each skeletal element for dog at SRP046, following Dobney and Rielly (1988).

VI.5.4.5 *Canis familiaris*

Dog bones are rare at the site and only appear in Areas I-III. All specimens have been identified as domestic dog (*Canis familiaris*). SRP046 is within the biogeographical range of the grey wolf (*Canis lupus*) and the golden jackal (*Canis aureus*),[49] which could also have been present, though none were positively identified.

VI.5.4.5.1 Body parts

The data in Table VI.44, expressed in Figure VI.14, show that a limited range of skeletal elements are present in the assemblage. Given this, it seems unlikely that the inhabitants of SRP046 were systematically butchering dogs for food at the site. However, some opportunistic or ritualistic butchering may have occurred as evidenced by a dog radius with cutmarks consistent with dismembering discussed in more detail in Chapter 9.

49 Hatt (1959).

VI.5.4.5.2 Biometrical analysis

The limited dog metrical data recovered are presented in Table VI.45.

Radius				
Sample	Area	Fusion*	Bp	SD
8	I	pF	16.5	
221	I	dF		13.3
Ulna				
Sample	Area	Fusion	DPA	BPC
7	II	pF	24.3	17.0

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.45 Post-cranial measurements of dog from SRP046 following von den Driesch (1976).

Element/Zone	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	**XV**	**XVI**	**XVII**	**XVIII**
Horn Core	2																	
Mandible	1	1	1		1	1												
Scapula		1	1		1													
Humerus			1	1	1	1	1											
Radius	2	2	1	1	2	1	1			1					1			
Metacarpal	2	2	3	3	2	2	2	2										
Femur				1	1													
Tibia					3	3			1	3								
Astragalus	1	1	1	1														
Patella	1																	
Fourth Tarsal			3	3			3	3										
Metatarsal			3	3			3	3										
First Phalanx	4	4	4															

Table VI.46 Number of non-replicable zones recorded for each skeletal element for *Gazella* spp. at SRP046, following Dobney and Rielly (1988).

VI.5.4.6 *Gazella* spp.

Gazelles (*Gazella* spp.) are by far the most common wild taxon (Table VI.14) and appear throughout the site. Based on an understanding of more recent historical gazelle biogeography,[50] these remains are most likely to be from the goitered gazelle (*Gazella subgutturosa*).

VI.5.4.6.1 Body parts

Data in Table VI.46, expressed in Figure VI.15, show that a limited range of skeletal elements are present on the site. It is therefore unlikely that whole carcasses were present at SRP046.

VI.5.4.6.2 Biometrical analysis

The limited gazelle metrical data recovered are presented in Table VI.47.

50 Ibid.

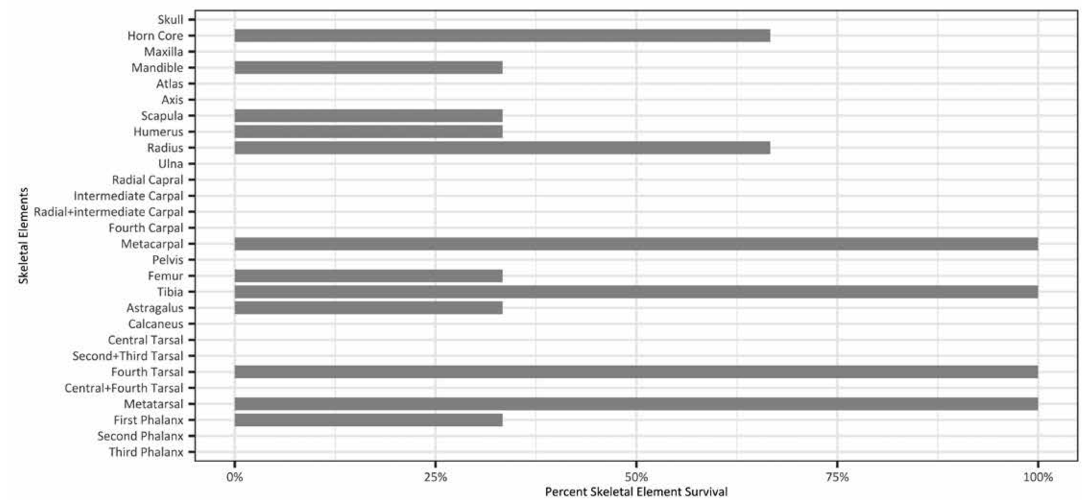

Figure VI.15 *Gazella* spp. body parts as a percentage of expected for intact carcases based on naturalised MNE. Data from Table VI.46.

Scapula

Sample	Area	Fusion*	BG	SLC
152	III	dF	16.6	13.4

Humerus

Sample	Area	Fusion	Bd	BT
40	II	dF	24.1	23.9

Radius

Sample	Area	Fusion	Bp	Bfp
16	II	pF	25.1	21.9
99	II	pF	23.3	21.3

Metacarpal

Sample	Area	Fusion	Bp	SD	BatF	BFd
13	II	dF			20.0	19.9
36	II	dF		10.2	18.2	18.8
110	II	pF	17.9			
120	II	dF			17.2	17.8
195	IV	pF	27.1			

Tibia

Sample	Area	Fusion	SD	Bd	Dd
116	II	dF		19.8	17.1
195	IV	dF		20.1	16.4
228	I	dF	13.6	16.8	20.6

Astragalus

Sample	Area	Fusion	GLl	GLm	Bd
26	II	F	25.9	23.6	15.7

Metatarsal

Sample	Area	Fusion	Bp	SD	BatF	BFd
36	II	dF		10.0	20.4	20.9
109	II	dF			19.8	20.3
195	IV	df			19.9	20.5

*Level of fusion recorded as d/pU=distal/proximal Unfused; d/pF=distal/proximal Fused; d/pf; distal/proximal fusing.

Table VI.47 Post-cranial measurements of *Gazella* spp. from SRP046 following von den Driesch (1976). All measurements in mm.

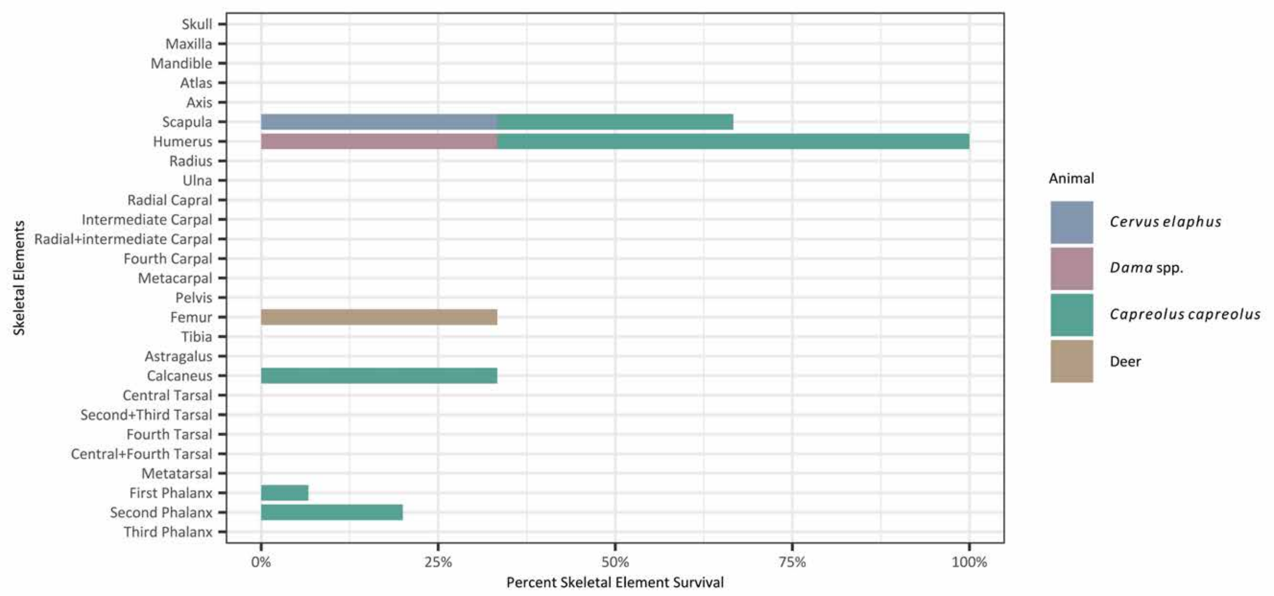

Figure VI.16 Cervid body parts as a percentage of expected for intact carcases based on naturalised MNE. Data from Tables VI.48-51.

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Scapula									1									

Table VI.48 Number of non-replicable zones recorded for each skeletal element for red deer at SRP046, following Dobney and Rielly (1988).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Humerus			1		1		1											

Table VI.49 Number of non-replicable zones recorded for each skeletal element for fallow deer at SRP046, following Dobney and Rielly (1988).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Scapula	1	1	1	1	1													
Humerus			1	1	1	1	2	2										
Calcaneus		1	1	1	1	1												
First Phalanx	1	1	1															
Second Phalanx	1	2	2															

Table VI.50 Number of non-replicable zones recorded for each skeletal element for roe deer at SRP046, following Dobney and Rielly (1988).

Element/Zone	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
Metacarpal	1	1			1	1												
Femur						1	1	1										

Table VI.51 Number of non-replicable zones recorded for each skeletal element for deer at SRP046, following Dobney and Rielly (1988).

VI.5.4.7 Cervids

Cervids are present throughout the site, albeit in very small numbers. Three species have been identified. Of these, roe deer (*Capreolus capreolus*) is the most common. Remains identified to *Dama* spp. are also present. These could come from either Mesopotamian fallow deer (*Dama mesopotamica*) or fallow deer (*Dama dama*). The former occupies a range of woodlands, savanna, and shrubland[51] as well as mountainous regions.[52] The latter also has a wide range, inhabiting forest, shrubland, and grassland, as well as worked agricultural land.[53] Both species of *Dama* are therefore possibilities to occur at SRP046. One specimen was identified as red deer (*Cervus elaphus*). They inhabit open deciduous woodland, upland moors, and open mountainous areas, sometimes even above the treeline,[54] meaning they would have been within reach of the inhabitants of SRP046.

VI.5.4.7.1 Body parts

The data in Tables VI.48 to VI.51, expressed in Figure VI.16, show that there is a limited range of skeletal elements present. This suggests that deer, in a similar way to gazelle, may have been butchered away from the site and brought to site in parts. The occurrence of phalanges could be indicative of hides with attached feet entering the site.

VI.5.4.8 Micromammals

Only 10 micromammal remains were recovered from the site (Table VI.14). Considering the archaeological background for the site suggests diverse domestic and elaborate food production, coupled with the fact that rodent gnawing has been recorded on a small number of specimens, the recovered micromammal sample is unlikely to be an accurate representation of the living small mammal populations around Kani Masi. The low frequency of micromammals is instead likely due to collection procedures. The bones are small and fragile and are often overlooked during normal excavation; extensive wet sieving is necessary to capture their presence.[55]

VI.5.4.9 Non-mammals

Very few non-mammalian remains were recovered, consisting of 11 fish, 12 bird, 1 amphibian, 1 tortoise and 2 crab fragments (Table VI.14). Most fish and bird specimens appear in Area I, and most of the bird remains are from Area IV. The latter is associated with possible post-Bronze Age occupation of the site. Birds also appear in Areas I-II in very low numbers. The low frequency of birds is interesting, since, according to textual sources, bird is a staple of the Babylonian diet. For instance, 10 of the 35 Yale Culinary Tablet recipes are bird dishes, including pigeon broth, and several ways in which to prepare bird's gizzards and entrails.[56] As with the micromammals, many of these smaller taxa may be under-represented.

51 Werner *et al.* (2015).
52 Hatt (1959, 63).
53 Masseti *et al.* (2008).
54 Lovari *et al.* (2018).
55 Baker and Worley (2019).
56 Reynolds (2007, 189).

VI.6. Kani Masi (SRP046) 2014 test trench

Katheryn Twiss

Taxon	Skeletal Element	NISP	MNE	Mms	NISP per taxon	MNE per taxon
Bos sp.	Upper second premolar (P^2)	1	1		1	1
Equus sp. (small/medium equid)	Scapula	1	1	SLC=51.1 GLP=64.9 LG=40.8* BG=34.3*	1	1
Ovis/Capra	Atlas	1	1		3	3
	Radius	1	1	Bp=34.7* BFp= 30.6*		
	Scapula	1	1	SLC = 22.8		
Ovis/Capra/Capreolus/Gazella	Scapula	2	1		13	2
	Tooth fragment	11	1			
Cattle-sized animals	Long bone shaft splinters	7			7	
Sheep-sized animals	Long bone shaft splinters	4			14	
	Scapula	8				
	Unidentified	2				
Unidentified	Long bone shaft splinters	1			2	
	Skull	1				
Total		41	7		41	7

Table VI.52 Faunal remains recovered from SRP046 test trench. NISP is Number of Identified Specimens (raw count). MNE is Minimum Number of Elements, calculated following Dobney and Rielly (1988). "Mms" = measurements following von den Driesch (1976); asterisks indicate estimated measurements. Specimen surfaces almost all demonstrated moderate degrees of weathering; one bone had a surface in notably poor condition, and one was in good condition. None bore traces of burning, rodent gnaw, or carnivore gnaw.

Appendix VII
Biomolecular Analyses

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Michael Buckley, and Claudia Glatz

VII.1 Zooarchaeology by Mass Spectrometry (ZooMS)

Zooarchaeology by Mass Spectrometry (ZooMS) is a low-cost analytical technique which uses proteins preserved in archaeological faunal remains to accurately determine its species.[1] This method is particularly useful for determining the species which cannot be identified easily based on skeletal morphology alone, such as sheep and goat. The SRP faunal assemblage is heavily fragmented and friable, and presents some challenges in applying morphological species identification criteria.[2] To support the morphological criteria, ZooMS analyses are also applied to selected specimens where detailed qualitative stable isotope analyses and interpretations are being made (Table VII.1), as husbandry practices may follow species-specific practices.[3]

Collagen extraction and digestion was carried out following van der Sluis *et al.*,[4] in which approximately 25-50 mg bone powder was decalcified with 0.6 M hydrochloric acid overnight for approximately 18 hours and then centrifuged at 12,400 rpm for 1 minute. The supernatant was then removed to 10 kDa molecular weight cut-off ultrafilters and centrifuged at 20 minutes before being washed twice with 500 µL 50 mM ammonium bicarbonate. After the second wash, 100 µL was added to resuspend the acid-soluble collagen and moved to a separate tube for digestion with sequencing grade trypsin for 18 hours at 37 ^{o}C. Samples were then diluted and co-crystalised with 10 mg/mL hydroxycinnamic acid in 50% acetonitrile/0.1% trifluoroacetic acid following Buckley *et al.* and analysed using a Bruker Rapiflex MALDI-ToF mass analyser using a *m/z* range of 700-3700.[5] Discriminations between sheep (*Ovis*) and goat (*Capra*) were made by reference to the markers presented in Buckley *et al.*.[6]

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1 Buckley *et al.* (2010).
2 Zeder and Lapham (2010).
3 Price *et al.* (2020).
4 Sluis *et al.* (2014).
5 Buckley *et al.* (2016).
6 Buckley *et al.* (2010).

ID No.	Element	Morphological ID	ZooMS ID
34.2	Tib	Goat	Sheep
35	Cal	Sheep	Sheep
56	Man	Sheep	Sheep
116	LM3	Goat	Sheep
135.1	Hum	Goat	Goat
136.2	Tib	Goat	Goat
137	Sc	Goat	Goat
160	Tib	Sheep	X
204	Ast	Goat	Sheep
258.1	LM3	Goat	Goat
258.2	LM3	Goat	Goat
259	Mtc	Sheep	X
260.2	Hum	Goat	X

Table VII.1 Concordance table of specimen list with ZooMS results.

VII.2 Bone collagen sampling and stable isotope analysis

Specimens for collagen analysis were preferentially selected based on having associated radiocarbon dates. All faunal samples came from well contextualised and species-rich loci (Areas I, II, III) at Kani Masi (SRP046) (Table VII.2). All human samples were taken from clearly defined burials.

Collagen extractions were undertaken at the Bone Chemistry Laboratory at the School of History, Classics, and Archaeology at the University of Edinburgh. Samples (n=38) were processed following a modified Longin method.[7]

Where possible a 1-2g sample of bone was taken from each specimen. Samples were demineralised in 200mL 0.5N HCl, this was reduced to 0.25N HCl for more fragile samples. Once demineralised, samples were filtered with a Hartley funnel and put in a fresh beaker with 100mL of Milli-Q ultrapurified water, then set on a sandbath on at hotplate at 80°C for at least 16 hours. The sample was then filtered again, retaining the solution. The solution was then put in a clean beaker placed directly on the 80°C hotplate to evaporate to 10mL where it was subsequently transferred to a scintillation vial before being put in the -80°C freezer. After at least 48 hours the samples were then freeze dried to remove the remaining water.

Collagen δ^{13}C and δ^{15}N stable isotope ratios were measured by Scottish Universities Environmental Research Centre Radiocarbon Laboratory (SUERC) in East Kilbride, UK, using a Thermo Scientific Delta V Advantage continuous-flow isotope ratio mass spectrometer (CF-IRMS) coupled via a Thermo Scientific ConfloIV to a Costech ECS 4010 elemental analyzer (EA) fitted with a pneumatic auto sampler. Their in-house gelatine standards, which are calibrated to the International Atomic Energy Agency (IAEA) reference materials USGS40 (L-glutamic acid, δ^{13}CV-PDB = -26.39‰), USGS41 (L-glutamic acid, δ^{13}CV-PDB = +37.63‰), IAEA-CH-6 (sucrose, δ^{13}CV-PDB = -10.45‰), USGS25 (ammonium sulphate, δ^{15}NAIR = -30.41‰), IAEA-N-1 (ammonium sulphate, δ^{15}NAIR = +0.43‰) and IAEA-N-2 (ammonium sulphate, δ^{15}NAIR = +20.41‰), and NBS-127 (Barium sulphate, δ^{34}SV-CDT = +20.30‰), are run in duplicate for every ten unknown samples. Results are corrected for linearity and instrumental drift, and are reported as per mille (‰). Analytical precision for δ^{13}C is ± 0.2‰, and for δ^{15}N it is ± 0.3‰.

VII.3 Tooth enamel sampling, preparation and stable isotope analysis

The enamel of five sheep and goat lower third molars (M_3) was sequentially sampled for stable isotope analysis (Table VII.3). Teeth were cleaned mechanically with a diamond tipped drill to remove adhering dirt and the surface layer of the enamel. A series of sequential enamel samples was then taken along each tooth crown, in a sequence perpendicular to the growth axis of the column of the tooth. Each sample was taken with a ~1mm-diameter drill bit as a horizontal band across the lobe and through the depth of the enamel, being careful to avoid the inclusion of underlying dentine. In four teeth, the buccal enamel of the middle lobe was sampled during the full laboratory analysis of the faunal material. In one tooth, sampled during an earlier preliminary assessment of the assemblage, the lingual enamel of the distal lobe was sampled. As such the sequence and range of carbon and oxygen values from this specimen are not directly comparable to the other four, and so are not discussed in Chapter 8 alongside these, but the strontium isotope values can be compared to those derived from the other teeth (see Chapters 3 and 8). The positions of the samples on the crown were measured from the enamel-root junction (ERJ) (Table VII.4, Figure VII.1) at the locations where powdered samples were drilled from the teeth.

The enamel of two human second molars were also mechanically cleaned with a diamond tipped drill to remove the enamel surface. A series of three enamel samples was then taken in a sequence along each tooth crown (samples designated – coronal, middle, and cervical). Each sample was taken with a ~1mm-diameter drill bit as a horizontal band through the depth of the enamel, being careful to avoid the inclusion of underlying dentine. Full results are provided in Chapter 8 (Table 8.3).

7 Longin (1971); Brown *et al.* (1988).

ID	Lab no (GUsi)	Site	Area	Taxa	Element	Collagen yield (%)	$\delta^{15}N$	$\delta^{13}C$	$\delta^{34}S$	Nitrogen (%)	Carbon (%)	Sulphur (%)	CN Molar	CS Molar	NS Molar	Notes
32	GUsi11390	46	II	Sheep	Ph1	1.0	4.9	-19.4	18.0	10.5	29.3	2.89	3.2	27	8	
33	GUsi11391	46	II	Sheep	Ph2	9.7	6.6	-18.7	18.5	13.5	38.9	0.76	3.4	136	41	
34.1	GUsi11393 A	46	II	Goat	Mtc	6.6	3.7	-19.4	-186.1	5.3	14.1	0.38	3.1	153	47	duplicate
34.1	GUsi11393 B	46	II	Goat	Mtc	6.6	3.6	-19.2	-228.3	5.1	13.7	4.74	3.1	8	2	duplicate
34.2	GUsi11392	46	II	Sheep	Tib	4.8	6.5	-20.1	17.1	7.9	21.9	4.62	3.3	8	3	
35	GUsi11394	46	II	Sheep	Cal	4.2	4.7	-20.1	-341.8	1.1	1.9	8.26	2.0 (fail)	1	0	
38	GUsi11395	46	II	Sheep	Ph1	11.7	4.5	-19.3	17.1	9.3	26.2	0.49	3.3	143	44	
39	GUsi11396	46	II	Pig	Rad/Uln	1.7	7.6	-19.8	14.5	12.6	36	0.25	3.3	386	116	
55.1	GUsi11397	46	III	Pig	Rad	1.6	-	-23.2	15.7	-	0.5	1.55	-	1	-	
55.2	GUsi11398	46	III	Pig	Ast	2.6	5.7	-20.2	12.2	1.5	3	3.55	2.4 (fail)	2	1	
62	GUsi11399	46	III	Goat	Hum	1.8	4.7	-20.2	16.0	2.5	5.6	1.96	2.6 (fail)	8	3	
84	GUsi11400	46	I	Sheep	Ast	4.4	4.4	-19.4	15.8	9	24.3	0.84	3.2	77	25	
134	GUsi11401	46	III	Sheep	Rad	4.4	4.4	-19.2	-313.7	1.8	3.7	6.78	2.5 (fail)	1	1	
135.1	GUsi11402 A	46	III	Goat	Hum	3.5	6.0	-19.7	17.1	5.6	14.2	0.81	3.0	47	16	duplicate
135.1	GUsi11402 B	46	III	Goat	Hum	3.5	6	-19.7	17.3	5.6	14.2	0.54	3.0	69	23	duplicate
135.2	GUsi11403	46	III	Sheep	Rad	6.0	4.2	-20.5	16.4	0.9	1.5	3.44	2.0 (fail)	1	1	
136.1	GUsi11404 A	46	III	Goat	Tib	5.0	7.5	-19.5	17.7	14.4	40.5	1.50	3.3	72	22	duplicate
136.1	GUsi11404 B	46	III	Goat	Tib	5.0	7.5	-19.5	16.7	14.2	40.7	0.83	3.3	130	39	duplicate
136.3	GUsi11406	46	III	Pig	Rad/Uln	3.2	6.3	-20.2	16.5	5.1	13.2	1.24	3.0	28	9	
136.4	GUsi11407	46	III	Pig	Sk	1.6	7.7	-20.5	17.2	8.8	25.1	0.84	3.3	80	24	
137	GUsi11408	46	III	Goat	Sc	4.0	6.2	-19.7	16.2	2.7	6.3	0.43	2.7 (fail)	39	14	
149	GUsi11413	46	III	Goat	Ph1	3.6	8.4	-18.6	16.3	3.3	7.2	1.17	2.5 (fail)	17	7	
153.1	GUsi11414	46	III	Pig	Sk	2.6	7.7	-20.7	16.0	9.7	26.1	0.98	3.1	71	23	
204	GUsi11418	46	II	Sheep	Ast	3.0	6.0	-19.2	10.6	12.9	35.5	0.23	3.2	420	130	

Table VII.2 Stable isotope analysis of animal remains from Shakhi Kora (SRP191) and Kani Masi (SRP046); 24 of 38 samples taken produced measurable values.

Following Ventresca Miller *et al.*,[8] the powders were washed for 10 minutes at room temperature with 0.1M acetic acid, then rinsed 5 times with distilled water, centrifuging the samples between rinses to avoid losing powder. Tooth enamel $\delta^{18}O$ and $\delta^{13}C$ analysis was performed at the SEAPORT Stable Isotope Lab, University of Southampton, National Oceanography Centre. ~300mg of powdered sample was weighed out into borosilicate glass vials. During subsequent analysis in a Kiel IV carbonate device coupled to a MAT253 dual inlet isotope ratio mass spectrometer (both Thermo Fisher Scientific, Bremen, Germany) they reacted with 5 drops of 106% phosphoric acid at 90°C for 800 seconds. After cryogenic removal of water vapour and other gases the resulting CO_2 was measured multiple times against a CO_2 reference gas. Following data reduction and corrections, data was normalised using a two-point calibration with NBS18 and NBS19 (both from IAEA, Vienna, Austria) and reported relative to the VPDB scale. A suitable in-house reference material (GS1) was used for quality assurance purposes and to report instrument precision, which was determined to be 0.03‰ for $\delta^{13}C$ and 0.11‰ for $\delta^{18}O$ over the course of the sample runs.

Selected enamel samples were also submitted for measurement of strontium isotope compositions. $^{87}Sr/^{86}Sr$ analysis was performed at the University of Southampton Ocean and Earth Science ICP-MS Research Facility. The

8 Ventresca Miller *et al.* (2018).

enamel samples were dissolved in sub boiled concentrated nitric acid then dried down and then run through Sr-Spec resin columns to isolate the Sr. The Sr fraction was dried and then loaded onto an outgassed Ta filament with a Ta activator solution prior to analysis using a Thermo Scientific Triton Thermal Ionisation Mass Spectrometer at a beam size of 2V 88Sr.

Site	Context	ID	Tooth	Left/Right	ID	Sample location
SRP046	V85, L116, L7, B212	*Ovis*	LM3	R	56	buccal enamel of middle lobe
SRP046	Y82E, L17, L1, B132	*Ovis*	LM3	R	116	buccal enamel of middle lobe
SRP191	AA21, L21, L1, B4	*Capra*	LM3	R	258.1	buccal enamel of middle lobe
SRP191	AA21, L21, L1, B4	*Capra*	LM3	R	258.2	buccal enamel of middle lobe
SRP046	Z90D, L4, L1	*Ovis*	LM3	L	83	lingual enamel of distal lobe

Table VII.3 Sheep and goat teeth from Shakhi Kora (SRP191) and Kani Masi (SRP046) sequentially sampled for stable isotope analysis.

Sample	ERJ distance (mm)	Normalised $\delta^{13}C$ ‰VPDB Mean	Normalised $\delta^{18}O$ ‰VPDB Mean	$^{87}Sr/^{86}Sr$	±2SE
116A	6.3	-5.13	-4.99		
116B	8.6	-7.53	-4.20		
116C	11.0	-7.81	-4.06		
116D	13.1	-10.24	-3.88	0.708135	0.000013
116E	16.0	-9.71	-4.78		
116F	18.2	-10.43	-6.42		
116G	20.3	-10.33	-7.05		
116H	22.5	-10.39	-7.37		
116I	24.7	-10.56	-7.90		
116J	26.4	-10.38	-7.69		
116K	28.5	-10.52	-7.80	0.708160	0.000014
116L	30.4	-10.61	-7.68		
116M	32.4	-10.50	-7.24		
116N	34.3	-10.69	-6.49	0.708203	0.000012
116O	36.3	-10.37	-5.36		
258.1A	6.2	-9.63	-1.02		
258.1B	9.3	-8.68	-1.15		
258.1C	11.2	-8.32	-1.72	0.708153	0.000014
258.1D	13.2	-7.95	-1.36		
258.1E	15.5	-7.59	-0.88		
258.1F	16.9	-8.48	-0.11		
258.1G	19.7	-8.08	3.05		
258.1H	23.6	-7.89	3.91		
258.1I	25.8	-8.05	4.18	0.708128	0.000013
258.1J	28.2	-8.53	3.90		
258.1K	30.4	-8.47	2.65		
258.2A	5.2	-8.60	-3.62		

Sample	ERJ distance (mm)	Normalised δ^{13}C ‰VPDB Mean	Normalised δ^{18}O ‰VPDB Mean	^{87}Sr/^{86}Sr	±2SE
258.2B	7.7	-9.94	0.09		
258.2C	10.5	-8.81	2.98		
258.2D	12.5	-8.82	4.35	0.708121	0.000014
258.2E	15.0	-9.54	3.91		
258.2F	16.8	-10.02	3.66		
258.2G	22.9	-10.32	0.18		
258.2H	24.9	-9.43	0.17		
258.2I	27.3	-9.63	-0.08	0.708123	0.000014
258.2J	29.1	-9.61	0.70		
56A	2.0	-5.75	-3.23		
56B	4.4	-6.54	-3.23		
56C	7.0	-9.70	-1.37	0.708076	0.000014
56D	8.7	-10.47	-1.78		
56E	9.8	-10.52	-1.95		
56F	11.7	-8.06	2.63		
56G	13.5	-10.16	-2.33		
83.1	1.0	-8.78	0.61		
83.2	2.0	-9.72	-0.82		
83.3	3.0	-9.75	-1.98	0.70802	0.000013
83.4	4.0	-9.63	-2.07		
83.5	6.0	-9.15	-2.23		
83.6	8.0	-9.07	-1.97		
83.7	10.0	-8.66	-1.82		
83.8	12.0	-8.55	-1.96		
83.9	14.0	-8.28	-1.57		
83.10	16.0	-7.71	-1.45		
83.11	18.0	-7.20	-0.97		
83.12	20.0	-7.00	-0.67	0.70806	0.000013
83.13	22.0	-7.15	-0.29		
83.14	25.0	-7.85	0.54		

Table VII.4 δ^{13}C, δ^{18}O, and ^{87}Sr/^{86}Sr results from sequentially sampled teeth (with measurements).

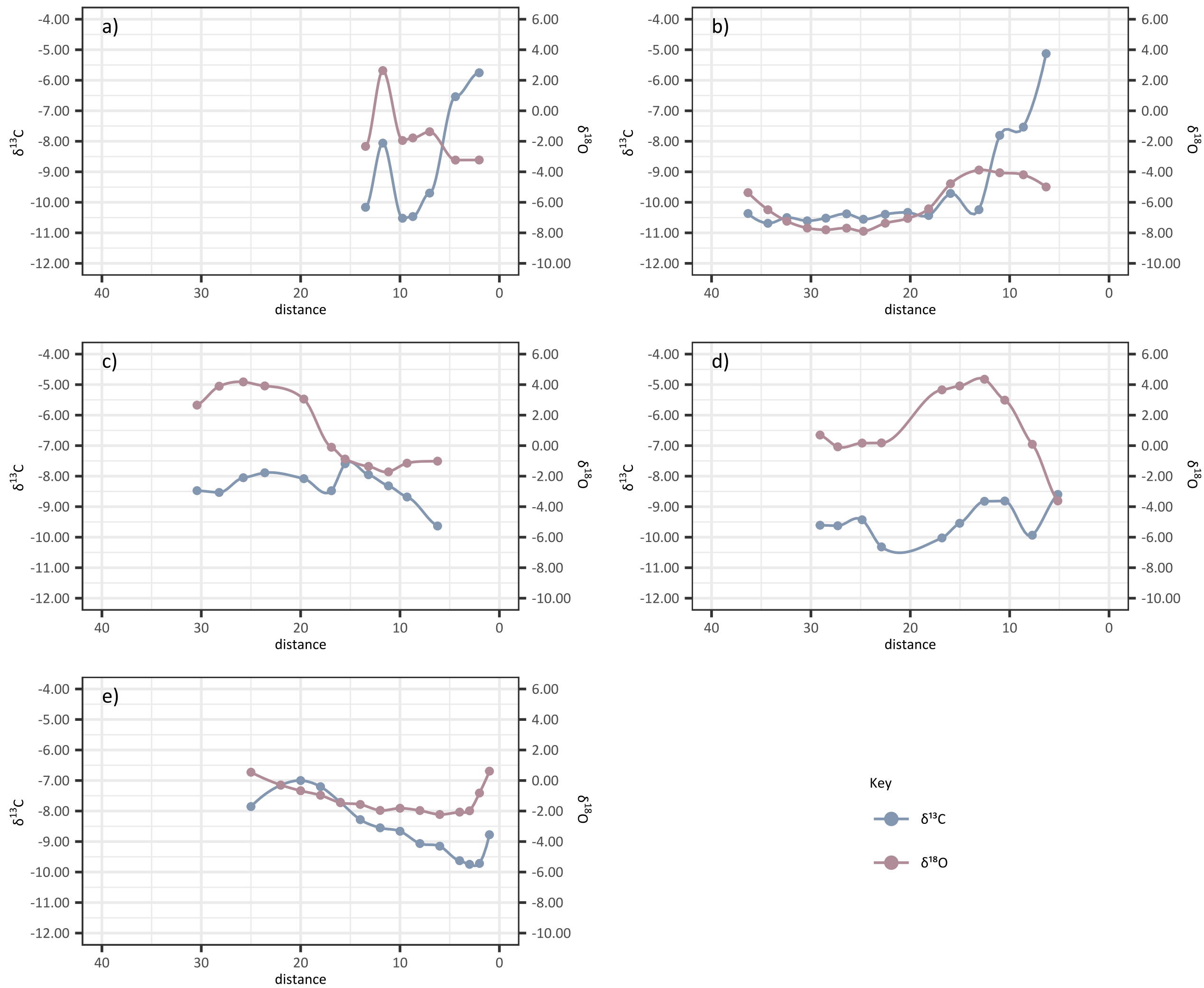

Figure VII.1 Sheep and goat sequential enamel isotope results (see Table VII.3 and Table VII.4 for specimen data and values): intra-tooth variation of carbon ($\delta^{13}C$) and oxygen isotope ($\delta^{18}O$) values, presented in terms of measurements in relation to the enamel-root-junction. a) sheep LM3, sample # 56, b) sheep LM3, sample # 116, c) goat LM3, sample # 258.1, d) goat LM3 sample # 258.2, e) sheep LM3, sample # 83 (see Table VII.3).

VII.4 Plants

Modern plant samples from around Kani Masi (SRP094 and SRP046) were collected and dried in August 2018 and exported. Samples of three different positively identified species were selected for strontium isotope analysis (Table VII.5).

The samples were digested in a CEM Mars 6 microwave digestion system at 200deg C using 5ml of concentrated sub boiled nitric acid. The samples were made to a mother solution by diluting with Milli-Q water and then screened for Sr concentration. A sub sample equivalent to 1µg of Sr was taken, dried down and then run through Sr-Spec resin columns to isolate the Sr. The Sr fraction was dried and then loaded onto an outgassed Ta filament with a Ta activator solution prior to analysis using a Thermo Scientific Triton Thermal Ionisation Mass Spectrometer at a beam size of 2V ^{88}Sr.

Sample number	Species	$^{87}Sr/^{86}Sr$	±2SE
160	*Prosopis farcta*	0.708153	0.000012
161	*Capparis spinosa*	0.708131	0.000013
164	*Alhagi maurorum*	0.708134	0.000012

Table VII.5 Kani Masi modern plant samples submitted for Sr analysis.

Appendix VIII
Osteological Report

Jessica Pearson

Numbering of burials and other human remains reflects the sequence in which they are discussed in Chapter 5 (SRP094 and SRP189) and Chapters 6, 8 and 9 (SRP046). It is also broadly chronological, moving from earlier to later burials at each of the sites investigated.

VIII.1 Shakhi Kora (SRP191)

Site	Trench	Locus	Lot	Description
SRP191	AA21	9	3	Three adult skull fragments.

VIII.2 Kani Masi (SRP094)

Site	Trench	Locus	Lot	Description
SRP094	K136	4	1	Human adult M3 tooth. Might also be pig?
SRP094	K136	101	1	Large quantity of adult cranium fragments, quite thick. Some sutures still fusing. Age: adult. Also includes a distal femur fragment, femur midshaft fragments, a possible ulna fragment, and possible mandible/maxilla fragment showing alveola.

VIII.3 Kani Masi (SRP189)

VIII.3.1 Burial 189.1

The trench report indicates that the individual was buried on their right side in flexed position. Osteological observations: Individual was more or less complete. Skeleton was extremely friable and encased in cement like substance that could not be removed. Age: adult. Sex: unknown.

Site	Trench	Locus	Lot	Description
SRP189	I113	8	4	Long bone midshaft fragments, otherwise unidentifiable.
SRP189	I113	8	27	Long bone midshaft fragments, otherwise unidentifiable.
SRP189	I113	8	34	Possible human femur fragments.
SRP189	I113	8	41	Three midshaft femur fragments, one unidentifiable fragment, one possible acetabulum fragment.
SRP189	I113	8	41	Long bone midshaft fragments including femur, tibia and fibula.
SRP189	I113	8	41	Combination of tibia and femur midshaft fragments.
SRP189	I113	8	41	Numerous fragments, unidentifiable, one midshaft humerus section.

Site	Trench	Locus	Lot	Description
SRP189	I113	8	41	Midshaft long bone fragments, possibly radius?
SRP189	I113	8	41	One fibula midshaft section, one possible vertebrae neural arch.
SRP189	I113	8	41	Unfortunately, the skull fragments are encased in solid clay and could not be evaluated.
SRP189	I113	8	41	A combination of rib and long bone/clavicle fragments cemented in matrix.
SRP189	I113	8	41	One small possible adult midshaft of radius/fibula/ulna/clavicle.

VIII.3.2 Burial 189.2

The trench report indicates the individual was buried supine with slightly flexed legs and arms with the elbows bent and hands placed to the top of their chest. Osteological observations: Individual was more or less complete. Skeleton was extremely friable. Age: young-mature adult based on dentition. Sex: male?

Site	Trench	Locus	Lot	Description
SRP189	I113	9	55	Cemented soil with some bone fragments fixed in soil matrix - otherwise unidentifiable.
SRP189	I113	9	55?	Possibly humerus, one fragment likely distal humerus.
SRP189	I113	9	55	Cemented matrix with bone embedded, clearly long bones but otherwise unidentifiable.
SRP189	I113	9	54	Cemented matrix with bone embedded, section of bone clearly adult femur. Extremely friable individual.
SRP189	I113	9	?	A selection of unidentifiable fragments, one adult central incisor, heavily worn with pulp exposure.
SRP189	I113	9	53?	A large amount of soil and friable bone fragments with the midshaft of tibia identifiable. One cemented lump of matrix showed two parallel bones which appeared to be tibia and fibula midshaft.
SRP189	I113	9	?	Age of adult according to Brothwell dental wear is 30+/- 5 years (M1 crown is worn completely, but there is no dentine exposure on M2 or M3). Not clear if M3 is in occlusion. Male? Skull may have been crushed not clear where the true surfaces on the frontal are, but super orbital ridge appears pronounced.

VIII.4 Kani Masi (SRP046)

VIII.4.1 Burial AIII.1

A flexed primary inhumation of a juvenile individual lying on their right side. Osteological observations: The skeleton was a primary inhumation based on the full articulation of the skeleton and the presence of hand and foot phalanges suggesting it was not disturbed after burial. Age: 5 years ± 1 year based on long bone measurement.

Site	Trench	Locus	Lot	Description
SRP046	V85	180	1	Juvenile hands (10 metacarpals), six proximal phalanges, five medial phalanges, two possible carpal fragments + mid section of hyoid (minus the wings).
SRP046	V85	180	1	Seven vertebral bodies (thoracic and lumbar), 11 neural arches (cervical to lumbar), one sternum segment.
SRP046	V85	180	1	Five metatarsals, four proximal phalanges, four terminal phalanges, five terminal manual phalanges, one talus, one calcaneus, two unidentifiable tarsals.
SRP046	V85	180	1	Fibula: 165mm, midshaft of femur (no articulations), distal 2/3 of tibia, small fragment of pubis.
SRP046	V85	180	1	Ulna R: 120mm, radius: 105mm.
SRP046	V85	180	1	First metatarsal terminal phalanx, scapula body, coracoid and acromion, ilium crest, a number of skull fragments.
SRP046	V85	180	1	Two petrous bones, one extra ossicle (not sure of suture location), one parietal fragment with possible pathological condition. Dentition: mandible and maxilla present, most dentition present comprising both primary and secondary teeth. Two cervical vertebra fragments, one atlas half portion missing the central articulation with dens.
SRP046	V85	180	1	A number of rib fragments, 20 vertebrae neural arch fragments, fragments of left and right clavicles, four vertebral bodies, two scapulae, fragments from a number of manual phalanges, a deciduous incisor, fragment of sternum.
SRP046	V85	180	1	Fragments from femur and fibula.
SRP046	V85	180	1	Fragments of ilium, ischium and pubis.
SRP046	V85	180	1	Lumbar spine vertebral bodies, thoracic spine fragments, axis dens, complete pars basilaris.
SRP046	V85	180	1	Left humerus complete except for distal articulation, left ulna (120mm) and left radius.
sSRP046	V85	180	1	One talus, five tarsals, four metatarsals, one terminal phalanx.

VIII.4.2 Burial AI.1

The trench report indicates the individual was buried flexed on the right side. Osteological observations: The skeleton was a more or less complete juvenile. Age: 4-5 years ± 1 year based on the dentition.

Site	Trench	Locus	Lot	Description
SRP046	Z88	16	2	A few small fragments, one of iliac crest.
SRP046	Z88	16	2	A small collection of rib midshafts.
SRP046	Z88	16	2	Femur fragments including possible epiphyses, tibia fragments, fibula, five metatarsals.
SRP046	Z88	16	2	Femur midshaft fragments, tibia midshaft fragments, first metatarsal, one terminal pedal phalanx.
SRP046	Z88	16	2	Two distal humeri, midshaft ulna, midshaft radius, two fragments of metacarpal, two proximal phalanges, one terminal phalanx.
SRP046	Z88	16	2	Number of rib fragments, one clavicle proximal portion, small number of vertebral neural arches, coracoid process of scapula.
SRP046	Z88	16	2	Permanent and deciduous teeth. Age: 4-5 years.
SRP046	Z88	16	2	A few small fragments of thoracic vertebrae, first rib proximal end, one rib midshaft.
SRP046	Z88	16	2	Several metacarpals encased together in mud, two loose metacarpals, one midshaft humerus, ulna and radius midshafts, two proximal manual phalanges, two medial manual phalanges, four terminal manual phalanges.
SRP046	Z88	16	2	Very small bone fragments from a juvenile: several ribs, several vertebrae fragments, two scapula fragments, five phalanges.
SRP046	Z88	16	1	Juvenile cranial fragments including petrous bone – cranial base not completely fused to basi-occipital.

VIII.4.3 Burial AI.2

Burial: Individual was buried on their right side but the lower half of the body (from the pelvis) is supine. Osteological observations: Individual was more or less complete. Age: 2.5-6.5 ±1 years of age based on dentition.

Site	Trench	Locus	Lot	Description
SRP046	Z88	17	1	Two upper central incisors, one lateral incisor, two canines, and one canine fragment, one first deciduous molar, several cranial fragments, four phalanges, at least one vertebral fragment, several rib fragments, plus a number of unidentifiable fragments. All fragments appear juvenile.
SRP046	Z88	17	2	Three humerus fragments, one with porotic hyperostosis. Two fibula fragments. Several other unidentifiable long bone fragments.
SRP046	Z88	17	2	A number of subadult rib fragments.
SRP046	Z88	17	2	Highly fragmented skull, with three teeth including one subadult m1 and two adult M1 teeth crowns only. Age estimate: 3-6 years.
SRP046	Z88	17	2	Unidentifiable bone fragments.
SRP046	Z88	17	2	Infant long bones, two femur midshaft fragments, two possible humerus midshaft fragments, two narrower long bone midshafts (possibly radius, ulna, and/or tibia).
SRP046	Z88	17	2	Several adult rib midshafts.

VIII.4.4 Burial AI.3

Burial: report says buried flexed on left side. Osteological observations: The skeleton was a more or less complete infant. Age: 6 months ±3 months based on the dentition.

Site	Trench	Locus	Lot	Description
SRP046	Z88	19	1	One humerus distal fragment, two radius fragments, two ulna fragments. Age: All belong to perinatal or young infant.
SRP046	Z88	19	1	Two femur midshaft fragments, two tibia fragments, one fibula fragment.
SRP046	Z88	19	1	One fibula fragment, several rib fragments, one large skull fragment, several small cranial fragments, one medial phalanx, one proximal phalanx, one probable animal bone shard.
SRP046	Z88	19	1	Large number of rib fragments, one scapula fragment.
SRP046	Z88	19	1	Numerous infant/child cranial fragments including two petrous bones. Four deciduous teeth (canine, premolar, first and second molar) enamel shells only. Age: Consistent with age 6 months ± 3 months.

VIII.4.5 Burial AI.4

Burial: report says buried flexed on right side. Osteological observations: The skeleton was a more or less complete juvenile. Age: 5-8 years ±2 years based on the dentition.

Site	Trench	Locus	Lot	Description
SRP046	Z88	9	2	Small fragments of cranium, including two petrous bones. Dentition contains some deciduous teeth and a number of permanent teeth, some have shattered. One zygomatic. Age: based on root of permanent upper first incisor and development of permanent M1 (roots complete) and M2 (only crown complete): 8 years ± 2 years.
SRP046	Z88	9	2	Eleven teeth or teeth fragments: two deciduous molars, one deciduous canine, one deciduous lateral incisor, five tooth fragments, one permanent M1, one permanent canine. Two phalanges, several rib fragments, several vertebra fragments, plus a number of unidentifiable fragments. All fragments appear juvenile, dental age: 5 years of age ± 1.5 years.
SRP046	Z88	9	2	Juvenile individual, although not neonatal. Long bones, manual phalanges and metacarpals, ribs and one vertebral fragment. A number of small unidentifiable fragments; one clear skull fragment.

VIII.4.6 Burial AI.5

Neonatal petrous bone and several rib fragments found inside a fragmentary jar placed along Wall 1 in Room 1, Area I.

Site	Trench	Locus	Lot	Description
SRP046	Y88B	20	35	Neonatal bone represented by one petrous bone and several small rib fragments.

VIII.4.7 Burial AI.6

Site	Trench	Locus	Lot	Description
SRP046	Z88	14	4 (Vessel 1)	Highly friable and fragmented neonatal long bones, one skull fragment, one partial humerus, one partial scapula, several other non-diagnostic long bones.

VIII.4.8 Burial AI.7

Site	Trench	Locus	Lot	Description
SRP046	Z88	14	4 (Vessel 2)	Partial skeleton of an infant including skull fragments, femur, radius ribs, vertebrae, phalanges, and a large number of highly fragmented long bones and other elements.

VIII.4.9 Burial AI.8

Site	Trench	Locus	Lot	Description
SRP046	Z88	14	4 (Vessel 3)	Unidentifiable bone fragments.

VIII.4.10 Burial AIII.2

Burial: Located in kiln refuse area, no discernible burial cut, report says buried on right side. Osteological observations: The skeleton was a more or less complete juvenile. Age: 6 years ±2 years based on the dentition.

Site	Trench	Locus	Lot	Description
SRP046	V85	116	3	Juvenile skeleton: most elements represented including long bones (femur especially), tibia/ulna/radius, ribs, vertebrae, skull. Mandible with teeth: most of the mandibular dentition are present both adult and subadult teeth.
SRP046	V85	116	3	Single subadult deciduous M2.

VIII.4.11 Other human remains

Site	Trench	Locus	Lot	Description
SRP046	Y88A	16	24	Two human cranial fragments.
SRP046	Y88A	18	25	Possible human subadult femur diaphysis.
SRP046	Z88	22	2	Possible human rib vertebrae end.
SRP046	V85	164	6	Highly fragmented adult femur proximal and partial diaphysis.
SRP046	V85	164	6	Highly fragmented adult femur partial diaphysis.
SRP046	V85	143	2	Unidentifiable bone with (machine?) cut edge.
SRP046	L80C	6	2	M3 human tooth with incomplete roots, crown completed. One deciduous? upper lateral incisor.

Appendix IX
Personal Ornaments from Kani Masi

Emma Baysal

Material presented here comes from secure contexts most of which are burials or deliberate depositional acts, material from less secure contexts or in poor condition has been omitted.

Context	Bead No.	Form	Material	Colour	Size (mm) (diameter/width, length, perforation diameter)	Notes
Burial SRP189.1		Globular	Carnelian	Orange	14, 14, 3	-
Burial AIII.1: Necklace 1 Two types were used, globular forms of varying degrees of regularity, some almost spherical, some with small, flattened end areas. Five of the beads are short barrel forms with convex sides and flat end areas. The ends are not usually parallel. The single faience bead is of a typical 'melon' form, so-called because of the incisions running from end to end creating a segmented appearance.						
	1	Globular	Serpentine	Mottled green	11, 6, 3-	
	2	Globular	Agate	Orange/brown	12, 10, 3-	
	3	Globular	Marble	Black/beige/white	11.5. 9. 2-	
	4	Globular	Agate	Orange	11, 9, 1.5-	
	5	Globular	Agate	Orange	11.5, 10, 3-	
	6	Barrel	Marble	Cream/beige	12, 6, 3-	
	7	Globular	Agate	Orange	10.5, 9, 3-	
	8	Barrel	Quartz (rock crystal)	Transparent	14, 7, 2-	
	9	Globular	Agate	Orange	17, 14, 2-	
	10	Melon	Faience	Cream	14, 14, 2.5	Original surface colour prob lost
	11	Globular	Agate	Brown	14, 14, 2.5-	
	12	Globular	Quartz (rock crystal)	Transparent	13, 10, 1.5-	
	13	Globular	Agate	Orange	12, 10, 3-	
	14	Barrel	Marble	Cream/beige	12, 8, 3-	
	15	Globular	Agate	Orange/brown	-12, 8, 3	
	16	Barrel	Agate	Orange	12, 7, 3-	
	17	Barrel	Marble	Cream/beige	11, 6, 3-	
	18	Globular	Agate	Brown	12, 7, 3.5-	
	19	Globular	?	Beige	12, 7, 3-	

Context	Bead No.	Form	Material	Colour	Size (mm) (diameter/width, length, perforation diameter)	Notes
Burial AIII.1: Necklace 2 This necklace is a combination of short disc/tube beads made from faience of blue, white, and red colours and long barrel forms with somewhat uneven cross-hatching that act as intermittent punctuation. A single high quality polished, transparent orange carnelian bead in bevelled biconical barrel form and a single *Engina mendicaria* shell make up the rest of the assemblage.						
	1	Disc	Faience	White/beige	4, 3	-
	2	Disc	Faience	White/beige	3, 2	-
	3	Barrel (incised)	Faience	Beige	2, 5	Broken
	4	Disc	Faience	White	3, 2	-
	5	Disc	Faience	White	3, 2	-
	6	Disc	Faience	Blue	3, 2	-
	7	Disc	Faience	White	3, 2	-
	8	Disc	Faience	Blue	3, 2	-
	9	Barrel (incised)	Faience	Beige	2, 6	-
	10	Disc	Faience	Blue	3, 2	-
	11	Disc	Faience	White	3, 2	-
	12	Disc	Faience	Blue	3, 3	-
	13	Disc	Faience	White	3, 2	-
	14	Disc	Faience	Blue	3, 2	-
	15	Barrel (incised)	Faience	Beige	2, 9	-
	16	Disc	Faience	Blue	3, 3	-
	17	Disc	Faience	White	3, 2	-
	18	Disc	Faience	Blue	3, 2	-
	19	Disc	Faience	White	3, 2	-
	20	Disc	Faience	Blue	3, 2	-
	21	Barrel (incised)	Faience	Beige	2, 9	-
	22	Disc	Faience	Blue	3, 2	-
	23	Disc	Faience	White	3, 2	-
	24	Disc	Faience	Red	3, 2	-
	25	Disc	Faience	White	3, 2	-
	26	Disc	Faience	Blue	3, 2	-
	27	Barrel (incised)	Faience	Beige	3, 8	-
	28	Disc	Faience	Blue	3, 2	-
	29	Disc	Faience	White	3, 3	-
	30	Disc	Faience	Red	3, 3	-
	31	Disc	Faience	White	4, 2	-
	32	Disc	Faience	Blue	3, 2	-
	33	Natural	*Engina mendicaria*	Beige	6, 10, 4	-
	34	Disc	Faience	Blue	3, 2	-
	35	Disc	Faience	White	3, 2	-
	36	Disc	Faience	Red	3, 3	-
	37	Disc	Faience	White	3, 3	-
	38	Disc	Faience	Blue	3,2	-
	39	Barrel (incised)	Faience	Beige	3, 13	-

Context	Bead No.	Form	Material	Colour	Size (mm) (diameter/width, length, perforation diameter)	Notes
	40	Disc	Faience	Blue	3, 2	-
	41	Disc	Faience	White	3, 3	-
	42	Disc	Faience	Red	3, 3	-
	43	Disc	Faience	White	4, 2	-
	44	Disc	Faience	Blue	3, 2	-
	45	Barrel (incised)	Carnelian	Orange	5, 5, 1	-
	46	Disc	Faience	Blue	3, 2	-
	47	Disc	Faience	White	3, 2	-
	48	Disc	Faience	Red	3, 2	-
	49	Disc	Faience	White	3, 2	-
	50	Disc	Faience	Blue	3, 2	-
	51	Barrel (incised)	Faience	Beige	2.5, 12	-
	52	Disc	Faience	Blue	3, 2	-
	53	Disc	Faience	White	4, 2	-
	54	Disc	Faience	Red	3, 2	-
	55	Disc	Faience	White	3, 2	-
	56	Disc	Faience	Blue	3, 2	-
	57	Barrel (incised)	Faience	Beige	2.5, 11	-
	58	Disc	Faience	Blue	2, 2	-
	59	Disc	Faience	White	4, 2	-
	60	Disc	Faience	Blue	3, 3	-
	61	Disc	Faience	White	3, 2	-
	62	Disc	Faience	Blue	3, 3	-
	63	Barrel (incised)	Faience	Beige	3, 10	-
	64	Disc	Faience	Blue	3, 2	-
	65	Disc	Faience	White	3, 2	-
	66	Disc	Faience	Blue	3, 2	-
	67	Disc	Faience	White	3, 2	-
	68	Disc	Faience	Blue	3, 3	-
	69	Barrel (incised)	Faience	Beige	2.5, 6	-
	70	Disc	Faience	White	3, 2	-
	71	Disc	Faience	Blue	3, 2	-
	72	Disc	Faience	White	3, 3	-
	73	Disc	Faience	Blue	3, 2	-
	74	Disc	Faience	White	3, 2	-
	75	Barrel (incised)	Faience	Beige	3, 4	broken
	76	Disc	Faience	White	3, 3	-
	77	Disc	Faience	White	4, 3	-

Context	Bead No.	Form	Material	Colour	Size (mm) (diameter/width, length, perforation diameter)	Notes
Burial AI.2						
		Disc bead group	Faience	White/beige/blue	4, 3, 1	Group of assorted faience beads, some adhering in groups. Significant colour variation.
		Natural	Cowrie shell	Natural	23, 17	Body perforated
		Lunate	Gold	Gold	13 overall diameter	Solid gold lunate earring
		Barrel	Faience	Beige	10, 7	-
		Barrel	Faience	Beige	12, 8	-
		Barrel	Faience	Beige	12, 7	-
		Barrel	Faience	Beige	12, 7	-
		Barrel	Faience	Beige	10, 7	-
		Barrel	Faience	Beige	11, 8	-
		Uneven disc	Stone	Black	5, 4, 2	-
Burial AIII.2		Flat lozenge	Faience	Beige	15, 5, 1.5	Flat bead with incised longitudinal lines, may be imitating grain or foliage. Transverse perforation.
		Flat lozenge	Faience	Beige	15, 5, 1,5	As above
Offering sets		Lunate	Gold	Gold	10 overall diameter	Solid gold lunate earring
Area VI beads		Tube	Faience	White	15, 33	Eroded surface
		Tube	Stone, volcanic	Black	13, 31	-
Area VI pierced shell		Concave hemisphere	Shell, species unknown	Natural	18, 5, 3	Heavily worked shell, chipping around perforation
2017 sounding in Area I		Globular	Carnelian	Orange	6, 6, 1.5	-

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PLACE, ENCOUNTER, AND THE MAKING OF COMMUNITIES

This book sketches the first archaeological history of the lower Sirwan/upper Diyala river valley of north-east Iraq and adjacent landscapes over a period of c. 12,000 years, from the earliest signs of human presence until the mid-first millennium BCE, based on data gathered between 2013 and 2023 by the Sirwan Regional Project (SRP).

The central research objective of the SRP is to move beyond traditional historical *topoi* and their predominantly external and state-centric perspectives that have dominated narratives of the region thus far. Instead, the chapters in this volume develop an in-depth, archaeological understanding of the nature of the region's past communities, their cultural and economic practices, the modes of socio-political organisation they developed, adopted, and rejected, and their long-term developments.

In order to reconstruct past Sirwan lifeways, the book interweaves regional-scale datasets with the results of ongoing and completed excavations at the Late Chalcolithic site of Shakhi Kora and the Late Bronze to Early Iron Age site of Kani Masi, as well as the results of a wide range of archaeological, Assyriological, art historical, and archaeometric analyses.

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