

## ORIGINAL ARTICLE

# Tell Abraaq during the second and first millennia BC: site layout, spatial organisation, and economy

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## Abstract

Research recommenced at Tell Abraaq in 2007, carried out by Bryn Mawr College with an international team in co-operation with the Sharjah Archaeology Authority. Between 2007 and 2010 fieldwork was limited to documenting sections of the previous excavations and one small sounding while our attention focused mainly on the nearby shell-midden site of Hamriya and the fortified Iron Age settlement site of Muweilah. Since 2010, large-scale excavations have been conducted which have fundamentally altered our understanding of the layout of the settlement and its economic relations during the second and first millennia BC. In this report, we detail the results of this work and present preliminary interpretations.

## KEYWORDS

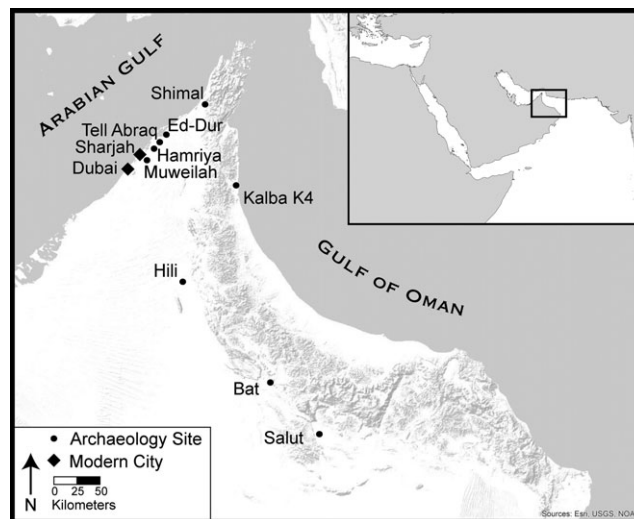
Bronze Age, dromedary domestication, Iron Age, settlement mound, south-east Arabia

## 1 | INTRODUCTION

Tell Abraaq is located in the northern United Arab Emirates (UAE) on the Arabian Gulf coast, divided roughly equally between the Emirates of Sharjah and Umm al-Quwain (Fig. 1). Our excavations have focused only on those areas contained within the Sharjah boundary limits. Before excavations began, it was determined on the basis of the results of previous excavations (Potts, 1990; 1991; 1993; 2000) as well as the topography of the mound, that it was in these areas that the most important deposits relevant to our research questions were located.

Prior to our research, the site had been the focus of two previous excavations. The first was conducted in the early 1970s when a brief excavation was undertaken by a team of Iraqi archaeologists visiting the UAE. Their work was never published in any detail but subsequent excavations by Potts identified a trench dug by this team on the upper mound. Potts (1990; 1991; 1993; 2000) conducted excavations at Tell Abraaq between 1989 and 1998. His excavations arrived at two main results. Firstly, they documented

a relatively intact Umm an-Nar tomb dating to the twenty-first century BC. Its excavation has revealed a mass of data



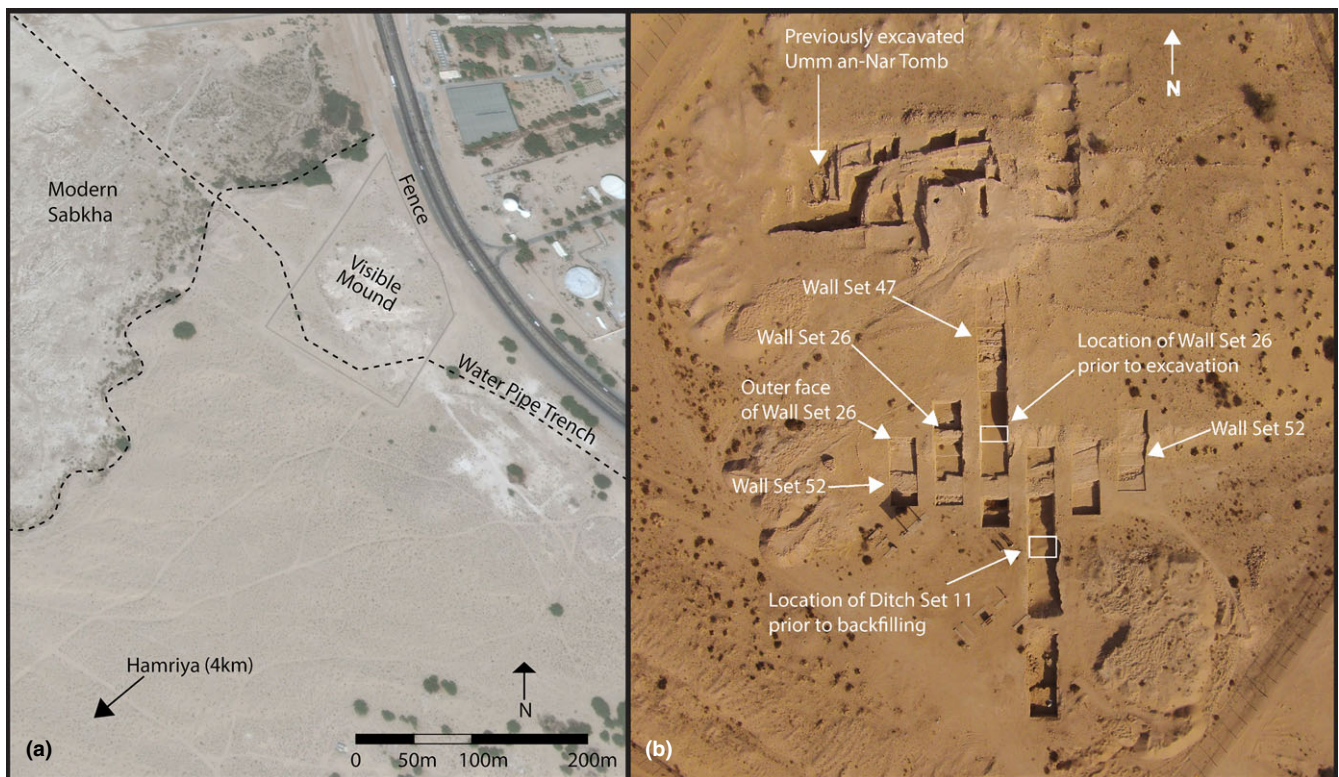
**FIGURE 1** A map showing the location of Tell Abraaq and other sites mentioned in the text

about human health, demographics, and long-distance trade (Blau, 1996; Cope et al., 2005; Gregoricka, 2014; Martin, 2007; Osterholz et al., 2014; Potts et al., 2013; Potts, 1993). Secondly, they determined that an Umm an-Nar-period tower formed the nucleus of Tell Abraq and habitation occurred around this tower between *c.*2500 BC and AD 300 (Potts, 1990; 1991). The latter conclusion marked Tell Abraq as a site of immense significance, since few sites in the UAE contain a comparable stratigraphic sequence. Examination of archaeozoological data from these levels has permitted an assessment of not only the changing subsistence pattern at the settlement itself, but also the broader issue of the appearance of domesticated dromedary in south-eastern Arabia (Almathen et al., 2016; Uerpmann M., 2001; Uerpmann & Uerpmann, 2002, 2005).

The earlier excavations focused on the visible mound (Fig. 2). The full extent of the ancient settlement was not understood during this time, in part because the areas of excavation were bounded to the east by a two-lane highway and to the north by sabkha, coastal salt flats. Geomorphological research confirms that in the past the sabkha was part of the coastal lagoon system with connection to the open sea. To the south and west, remains are obscured by post-occupationally formed sand dunes. Potts (1993: 117) concluded that Tell Abraq was about 4 ha in size

while noting the environmental constraints in understanding the full extent of the ancient site. One goal of our current excavations is to gain a more complete picture of the actual extent of the ancient settlement away from the visible mound. The digging of a ditch by Sharjah Municipality to lay a water pipe near the settlement helped to clarify this issue as it revealed intact archaeological deposits located south and west of the mound. Furthermore, erosion revealed intact deposits on the edge of the sabkha to the north. The ancient settlement is, therefore, much larger than assessed by the earlier excavators. Given the location of deposits in the water pipe trench and the sabkha boundary, the extent of settlement was at least 250 by 250 m, or more than 6 ha, and this is not taking into account that the deposits are truncated by the highway and investigations have never been carried out to the east of the road because this is the location of an industrial area.

Furthermore, even this assessment probably masks a more complicated picture of the ancient settlement. Before commencing work at Tell Abraq, we focused our attention over two seasons at Hamriya, about 4 km to the south of Tell Abraq. We concluded that 'The western extent of the site (Hamriya) is demarcated by *sabkha* that represent palaeo- and active lagoons while the eastern extent can be estimated by mapping the furthest evident surface remains



**FIGURE 2** (a) An aerial photograph showing Tell Abraq, the modern sabkha, and the course of the water pipe trench; (b) an aerial photograph of the excavations of Tell Abraq taken in January 2015; highlighted are the Umm an-Nar tomb excavated in the 1990s as well as ditch Set 11 and wall Sets 26, 47, and 52 that have been uncovered as part of the current excavations [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

in each of the inter-dunal troughs running west to east. When these factors are taken into consideration we can estimate that archaeological remains are spread over an area measuring at least 2.2 km north to south and 2.9 km east to west.' (Magee et al., 2009: 20). Our analysis of surface collections and radiocarbon dating suggested that Hamriya was occupied during similar periods as Tell Abraq (2009). They were, however, not exactly the same: during the third millennium BC, Tell Abraq was established as a tower settlement while occupation appears to have been sparse at Hamriya, perhaps because of poor preservation due to sea-level oscillations in the Arabian Gulf in the aftermath of the maximum of Holocene marine transgression (Händel, 2014). During the second and first millennia BC, however, both sites were intensively occupied and exhibit a similar range of archaeological materials. The question arises whether or not both Hamriya and Tell Abraq may be considered a continuous 'settlement' at this time, in the broadest sense of the term. Surface archaeological remains at Hamriya are less than 4 km from the edge of Tell Abraq, and it is possible that sand-dune cover in the area between obscures a near contiguous spread of archaeological remains. Modern construction, starting with a highway and an industrial area adjacent to the site, as seen in Figure 2, has made it difficult to determine how far to the north and east of Tell Abraq occupation may have continued, but it should be noted that ed-Dur, roughly 10 km to the north-east, preserves Iron Age material as well (Phillips, 2001).

Determining how the distribution of archaeological materials may reflect the existence of a single ancient settlement bounded, in some manner, in the landscape is always difficult. In the canonical understanding of urbanism in the ancient Near East, most settlements are identified as locales in which people lived in a contiguous permanent settlement. Such a definition of urbanism cannot be applied to much of the Arabian Peninsula, where contiguous settlement is rare and where a significant portion of the settlement may be inhabited on a seasonal or temporary basis. For example, aerial photographs of towns like Dubai and Sharjah from the early twentieth century and earlier accounts of the Oman peninsula's east coast from Portuguese and Dutch explorers and merchants, illustrate this alternative mode of urban organisation. A fort and some mud-brick buildings formed the core of the settlement while many other buildings were *areesh*, or palm-frond, constructions. There is no doubt that those inhabiting these *areesh* structures identified the place in which they lived by the same name as those in the mud-brick buildings, and they would have acknowledged the authority of the sheikh or ruler of the time. They were, in short, living in the same town, bounded in a single settlement even though they lived outside the walled compound that formed the centres

for both Sharjah and Dubai, and even though they may not have lived there permanently or year-round.

This alternative model for urbanism must not be uncritically projected into prehistory. Nevertheless, in excavating at Tell Abraq we are conscious that the 'settlement' represented by the mound was part of an occupation of the landscape that stretched along the coast. Our excavations have revealed a complex and dynamic system of wall-bound terraces and ditches around the mound, and it is hard to imagine that such a prominent marker in a relatively flat landscape did not form, in some way, the centre of a much larger settlement. This settlement incorporated the coastal plains both to the north-east and south-west along the ancient lagoon shorelines, ebbing and flowing in size in accordance with a range of social and economic factors that would have encouraged people to settle here on a temporary basis. In this sense, our work at Tell Abraq is conceptualised as part of a broader project that seeks to address the transformation of human settlement throughout the coastal margins of south-eastern Arabia during the Bronze and Iron Ages.

## 2 | PROJECT OBJECTIVES

The main objective of our excavations is to investigate the economy of this area between c.2000 and 500 BC. Within this time frame, a number of key issues in the archaeology of south-eastern Arabia are unresolved.

First, during the Wadi Suq and Late Bronze Ages as well as the Iron Age I period, which collectively date from roughly 2000 to 1100 BC, there is a poor understanding of chronology and material culture (Magee, 1996; Magee & Carter, 1999; Velde, 2003). Previous excavations at Tell Abraq and Shimal defined Late Bronze Age and Iron Age I periods (Magee, 1996; Velde, 2003), but the initial excavations at both sites lacked  $^{14}\text{C}$  dates. Moreover, recent research in the Sultanate of Oman has led some scholars to suggest that the Iron Age I period does not, in fact, exist as a discrete material culture phase and the material culture that defines the Iron Age II period (1100–600 BC) was already in production by about 1300 BC (Avanzini & Phillips, 2010; Phillips, 2010). Clarifying the chronology is important, not only from the point of view of assessing whether Iron Age I represents a discrete phase of occupation in parts of south-eastern Arabia, but also because it is within this period that archaeological observations suggest settlement declines throughout the region. Although some scholars have attributed this decline to the cessation of the copper trade in the Arabian Gulf (Cleuziou, 1981; Edens, 1992), the original excavations at Tell Abraq and subsequent research at K4 at Kalba (Carter, 1997) on the east coast of the Emirate of Sharjah indicated that large settlements were still occupied during these centuries. It is also



clear that imported ceramics continue to form an integral part of the material culture, and thus the inhabitants continued to engage economically with their neighbours through the Arabian Gulf and beyond. Our excavations at Tell Abraq aim at further investigating this by quantitatively assessing the artefactual record and conducting geochemical analysis to determine the origin of ceramics and other materials.

Second, the end of the second millennium and the beginning of the first millennium BC see a massive intensification of settlement throughout south-eastern Arabia. During this time, which is normally defined as the Iron Age II period, large sedentary settlements are established throughout the major environmental zones of the region (Magee, 2014: 217–230). A distinctive and widespread material culture accompanies this settlement intensification. In the last twenty years, scholars have focused on *falaj* irrigation and dromedary domestication as in some way linked to this phenomenon (Magee, 2014: 215–220; al-Tikriti, 2010). Iron Age II *aflaj* are now well known at a number of sites in the inland oases around al-Ain and al-Madam as well as in the interior regions of Oman (Córdoba, 2013; Magee, 2014: 217–221; al-Tikriti, 2002). The recent argument by Charbonnier (2015) that few *aflaj* actually date to the Iron Age is interesting but requires further testing. There can be little doubt that the use of these *falaj* systems fundamentally altered human-environmental dynamics and permitted locally concentrated increases in agricultural production.

Evidence for the appearance of domesticated dromedary in south-eastern Arabia is found in both the artefactual record, in the form of terracotta figurines, and in the archaeozoological record from both Tell Abraq and Muweilah (Magee, 2015). The archaeozoological record from Tell Abraq is of particular importance in this regard. Uerpmann and Uerpmann's (2002) analysis indicated that the number of dromedary bones decreases to a low point between c.1500 and 1000 BC and then suddenly increases after 1000 BC. The latter increase coincided with a reduction in the size of the dromedary from Tell Abraq. When this information is combined with the demographic profile of dromedary remains from the well-dated site of Muweilah, it seems clear that the domesticated dromedary was present in this region by 1000 BC. Analysis as to whether domesticated dromedary appeared earlier than this time and whether *in situ* domestication took place in the preceding centuries in south-eastern Arabia were hampered by the recovery of very few remains dating from c.1500 to 1000 BC in the original excavations (Uerpmann M., 2001). Nevertheless, recently published genetics research (Almathen et al., 2016) concluded that the wild dromedaries from the Arabian Peninsula were the 'founder gene pool' of all domesticated dromedary in the world, and when taken with the evidence from Tell Abraq and

Muweilah, this raises the possibility that initial domestication occurred within south-eastern Arabia during the end of the second millennium BC. A major objective of our excavations is, therefore, to obtain further archaeozoological data on the centuries in which domestication could have taken place (i.e. from c.1500 to 1000 BC).

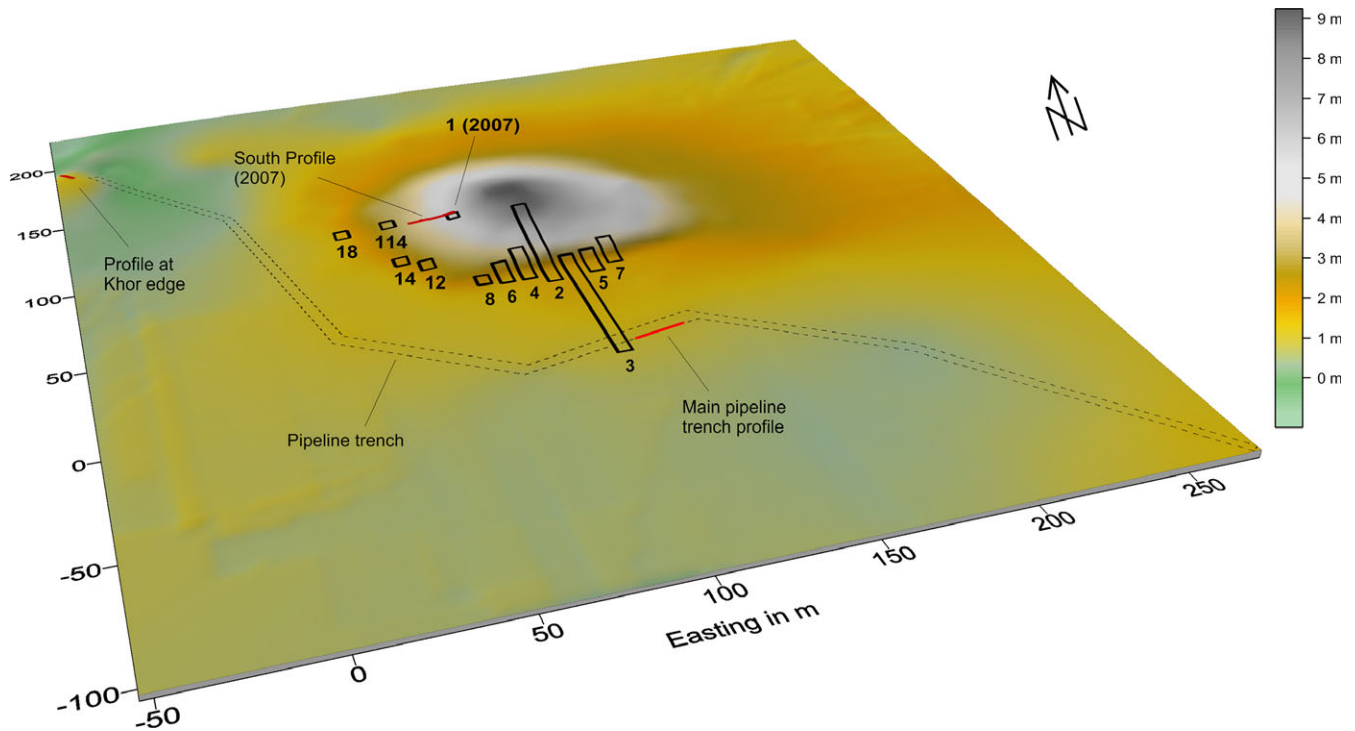
Third, both *falaj* irrigation and dromedary domestication must be seen within the broader context of human-environmental relations spanning several centuries. Neither simply appeared suddenly and, even if both were first perfected elsewhere and then adopted within south-eastern Arabia, the decision to employ them must be understood within the broader economic and environmental factors that contoured life within prehistoric south-eastern Arabia. The renewed excavations at Tell Abraq provide an opportunity to address these factors as it is the only known site in the region that contains substantial cultural deposits dating from the Bronze Age into the Iron Age.

Last but not least, previous excavations revealed a site layout centring on the Umm an-Nar tower building as the main and dominant architectural feature throughout Tell Abraq's occupation history. One of our objectives is to examine this conclusion by application of a revised field strategy that includes the investigation of both the visible mound's edges and subsequently of the adjacent 'off-mound' areas. Indeed, the necessity for re-evaluation of the site's spatial layout became obvious when we uncovered a previously unknown massive 4–5 m-wide stone wall at the edge of the mound in the first few days of our excavations.

### 3 | FIELDWORK RESULTS

#### 3.1 | 2007: excavation near the Umm an-Nar tower

In 2007, we cleaned the south section of the trench excavated in the late 1980s (Fig. 3). Documentation included ortho-rectified photographs recorded in the local co-ordinate system created by the previous excavations and picked up by our excavations in order to ensure spatial congruency. Documentation of the section also included a sampling strategy for charcoals for the purpose of radiocarbon dating. To date, two of the samples from the section were chosen and are included in Table 1. Beta 228619 (Field ID 10009 in Fig. 4) is from a hearth dug into archaeologically sterile aeolian sand at the base of the Umm an-Nar tower. The calibrated date reinforces the earlier conclusion that the tower was constructed sometime after 2500 BC, roughly the beginning of the Umm an-Nar period. Beta 228620 (Field ID 10051 in Fig. 4) originates from one of a pair of ditches cutting sterile sand just outside the Umm an-Nar tower building, which were first identified during the cleaning and recording of the southern section. The sample comes from



**FIGURE 3** A topographic model of Tell Abraq, showing the location of excavation trenches [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

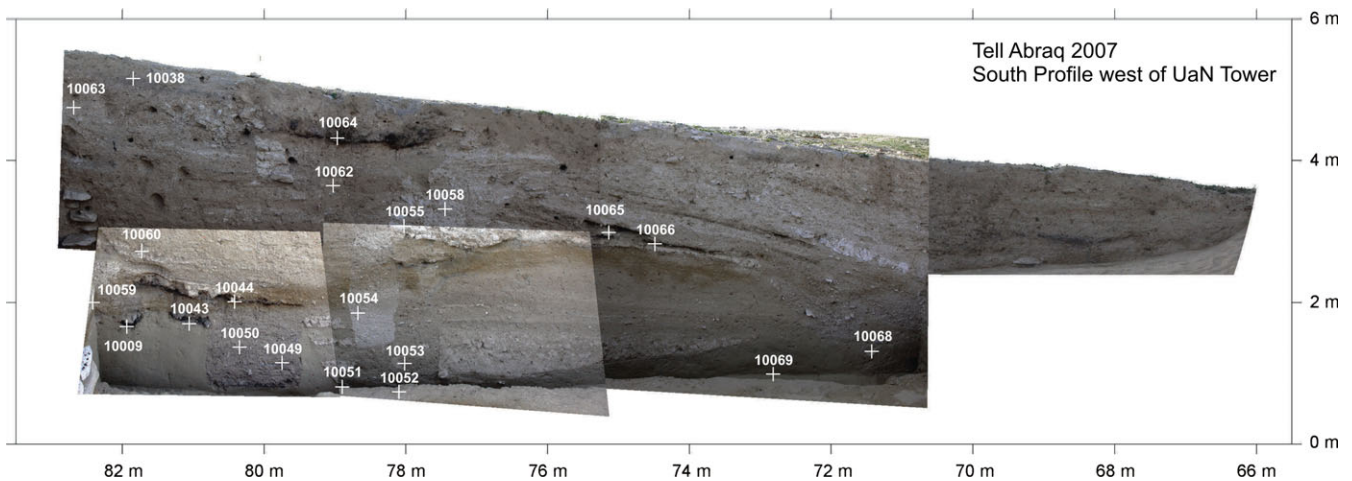
**TABLE 1** Radiocarbon data calibrated with IntCal13 using Calib 7.1 (<http://calib.org/>) accessed on 01.09.2017 (Reimer et al., 2013).

Lab Code	Field ID	Locus	Material	Radiocarbon	
				Age	Calibrated 2-sigma range
Beta 228619	10009	5002	charcoal	3840±40	2461–2199 BC (.99), 2159–2154 BC (.01)
Beta 228620	10051	5005	charcoal	3610±40	2130–2087 BC (.07), 2050–1881 BC (.93)
Beta 301240	11107	5081	charcoal	2930±40	1258–1246 BC (.01), 1233–1010 BC (.99)
Beta 301241	11199	5070	charcoal	3000±30	1376–1348 BC (.06), 1303–1126 BC (.94)
Beta 301242	11324	5112	charcoal	2960±30	1262–1072 BC (.99), 1066–1056 BC (.01)
Beta 301243	11330	5099	charred date seed	2930±30	1219–1027 BC (1.00)
Beta 301244	11333	5089	charcoal	2990±30	1373–1357 BC (.02), 1299–1119 BC (.98)
Beta 301245	11436	5126	charcoal	2430±30	749–684 BC (.20), 667–639 BC (.07), 590–576 BC (.01), 571–405 BC (.71)
Beta 301246	11438	5202	charcoal	2940±30	1257–1250 BC (.01), 1231–1042 BC (.99)
Beta 334296	12048	5245	charred date seed	3100±30	1431–1284 BC (1.00)
Beta 334297	12438	5428	charcoal	3630±30	2127–2090 BC (.09), 2045–1905 BC (.91)
Beta 334298	12424	5424	charcoal	4330±30	3018–2894 BC (1.00)
Beta 334300	12375	5392	charcoal	3040±30	1396–1216 BC (1.00)
Beta 383159	14548	6242	charcoal	3420±30	1871–1844 BC (.06), 1812–1802 BC (.01), 1776–1634 BC (.93)
Beta 402747	15405	6399	charcoal	3040±30	1396–1216 BC (1.00)
Beta 402748	15747	6579	charcoal	2980±30	1372–1359 BC (.01), 1297–1111 BC (.99)
Beta 402749	15699	6569	charcoal	3070±30	1414–1260 BC (.99), 1241–1235 BC (.01)
Beta 402750	15404	6395	charcoal	2910±30	1208–1138 BC (.26), 1135–1012 BC (.75)

(Continues)

TABLE 1 (Continued)

Lab Code	Field ID	Locus	Material	Radiocarbon Age	Calibrated 2-sigma range
Beta 402751	15304	6444	charcoal	2930±30	1219–1027 BC (1.00)
Beta 402752	15305	6444	charcoal	2950±30	1258–1244 BC (.03), 1234–1052 BC (.97)
Beta 409911	15252	6384	charred date seed	2930±30	1219–1027 BC (1.00)
Beta 409912	15152-4	6360	charred seed	2860±30	1117–930 BC (1.00)
Beta 430296	16901	6879	charred date seed	3230±30	1607–1582 BC (.08), 1561–1432 BC (.92)
Beta 430299	16690	6716	charred date seed	3280±30	1628–1498 BC (1.00)
Beta 436095	16316-1	6701	charred seed	2870±30	1127–967 BC (.93), 964–930 BC (.07)
Beta 436096	16316-2	6701	charred seed	2830±30	1083–1064 BC (.02), 1058–906 BC (.98)



**FIGURE 4** The rectified south profile of the previous excavation's east–west trench as documented in 2007, showing the location of radiocarbon samples; Beta 228619 comes from Field ID 10009 and Beta 228620 from Field ID 10051; the profile abuts the Umm an-Nar tower to the east (left) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

the fill of the ditch and suggests the ditch was open prior to 2100 BC. It raises the possibility that the ditch system, which was exposed to the south through our excavations, was already employed by the late third millennium BC. Ditches encircling third-millennium towers are known from Hili (Cleuziou, 2009), Bat (Frifelt, 2002), and Salut (Degli Esposti, 2016). In each case, the excavators have suggested a possible irrigation function, although Charbonnier (2015: 43–46) has recently criticised this interpretation, arguing instead that the primary function of the ditches was defensive. At Tell Abraq, we have no evidence to support the interpretation that these ditches were used for irrigation.

### 3.2 | 2010–2016 excavation results

A total of eleven trenches have been opened along the southern and western edges of Tell Abraq since 2010 (see

Fig. 3). Most of the trenches were originally positioned so as to expose the interface between the archaeological deposits on the mound and those located under the surrounding plain. In addition, a trench dug by Sharjah Municipality to lay a water pipeline about 50 m south and west of the mound revealed intact archaeological deposits. In the 2010/2011 season this trench was documented and sampled. Each archaeological feature or deposit identified in the excavation trenches and the pipeline trench was assigned a unique locus number beginning at 5001 and reaching 7049 by the conclusion of the 2015/2016 season. In certain cases, the interpretation of one locus depends on its immediate relation to one or more other loci such as a floor with post-holes, a wall with multiple construction phases, or a ditch with several different fills. In these instances, the related loci are grouped into a set (Table 2).

**TABLE 2** List of sets

Set	Trench	Terrace	Description
1	2, 3, 4	4	Levelling event to the north of wall Set 52
2	2	3	Floor 5138 with associated tanour, pits and post-holes.
3	2	3	Floor 5165/5604/6361 with post-holes, channel and pits.
4	2	4	Collapse surface 5158 with post-holes and tanours.
5	2	3	Floor 5244/5696/6415 with post-holes and pit.
6	2	3	Floor 5289/5799 with post-holes, oven with flute and wall.
7	2	3	Floor 5303/5950/6486 with post-holes and channels.
8	2	3	Floor 5322 with post-holes.
9	2	3	Floor 5338/6011 with post-holes.
10	2, 3	below Terrace 4	Ditch south and under big wall Set 52.
11	3	off mound	Ditch to the south of wall Set 52.
12	2	3	Floor 5352/6053 with plaster coating, post-holes and pit.
13	2	3	Floor 5363 with post-holes.
14	2	3	Floor 5368/6208 with burnt patch and post-holes.
15	2	below Terrace 3	Ash concentrations and hearths and tanour cut into sterile sand (5230).
16	2	3	Three hearths and one tanour cutting into fill 5454.
17	4	4	Floor 5460 with associated post-holes.
18	2	3	Floor 5461/6301 with post-holes and channels.
19	2	3	Floor 5504/6317 with pits, post-holes and channels.
20	2	3	Floor 5561 with pit, channel and post-holes.
21	4	4	Pisé platform 5590 with pit and post-hole.
22	4	3	Floor 5629 with pit, channel, and post-holes.
23	2	3	Floor 5648 with channels and post-holes.
24	2	3	Floor 5680 with post-holes.
25	4	3	Floor 5670 with post-holes.
26	2, 4, 6	3	Terrace wall 5226/5301-2/5406/5473/5687-9/6592-5 retaining Terrace 3.
27	3	off mound	Pits and hearth cutting sandy fill 5690.
28	2	3	Floor 5773 with burning patch and post-holes.
29	4	3	Floor 5784 with pit and post-holes.
30	4	3	Floor 5915 with post-holes.
31	4	below Terrace 4	Well 5902 with fills 5895, 5906, 5907, 5911, 5914, 5945.
32	4	3	Floor 5973 with post-holes.
33	4	3	Floor 5993 with post-holes.
34	4	3	Floor 6051 with post-holes.
35	2	3	Floor 6100 with post-holes.
36	4	3	Floor 6116 with post-holes.
37	4	3	Floor 6124 with post-holes.
38	2	3	Floor 6139 with post-holes.
39	2	3	Floor 6152 with post-holes.
40	4	3	Floor 6171 with post-holes, pit and channel.
41	2	3	Oven 6202 in use during occupations connected to sets 7, 9, 12, and 14.
42	6	4	post-holes cutting collapse 6278.
43	2	3	post-holes cutting loose collapse 6283.

(Continues)

TABLE 2 (Continued)

Set	Trench	Terrace	Description
45	6	4	Floor/platform 6352 with post-holes and channel/crack.
46	6	4	Floor 6400 with post-holes and ceramic vessel <i>in situ</i> .
47	2	2	Terrace wall 6348/6481/6522/6629/6630/6639/6666/6667 retaining Terrace 2.
48	6	4	Floor 6508 with post-holes.
49	2	3	Floor 6527 with post-holes.
50	2	3	Floor 6547 with post-holes.
51	2	3	Floor 6561 with post-holes and burnt patch.
52	2, 3, 4, 5, 6, 7, 8, 12, 14	4	Terrace wall 5076/5114/5416/5686/6010/6260-2/6589/6610/6615 retaining Terrace 4.
53	2	3	Buttress 6630 with wall Set 47 and post-holes.
54	2	2	Floor 6656 with post-holes.
55	3	off mound	Features cut into sterile sand 6699 in Trench 3's first 2015-16 extension.
56	2	2	Floor 6720 with post-holes.
57	2	2	Floor 6740 with post-holes.
58	12	4	Floor 6747 with post-holes.
59	12	4	<i>Tanoor</i> 6745 with fills.
60	2	2	Floor 6814 with post-holes.
61	2	1	Terrace wall 6640, 6642, 6665, 6815 retaining Terrace 1.
62	2	2	Floor 6816 with post-holes.
63	3	off mound	Features cut into sterile sand 6902 in trench 3's third 2015-16 extension.
64	2	2	Floor 6909 with post-holes and burnt patches.

#### 4 | LATE THIRD-/EARLY SECOND-MILLENNIUM BC OCCUPATION

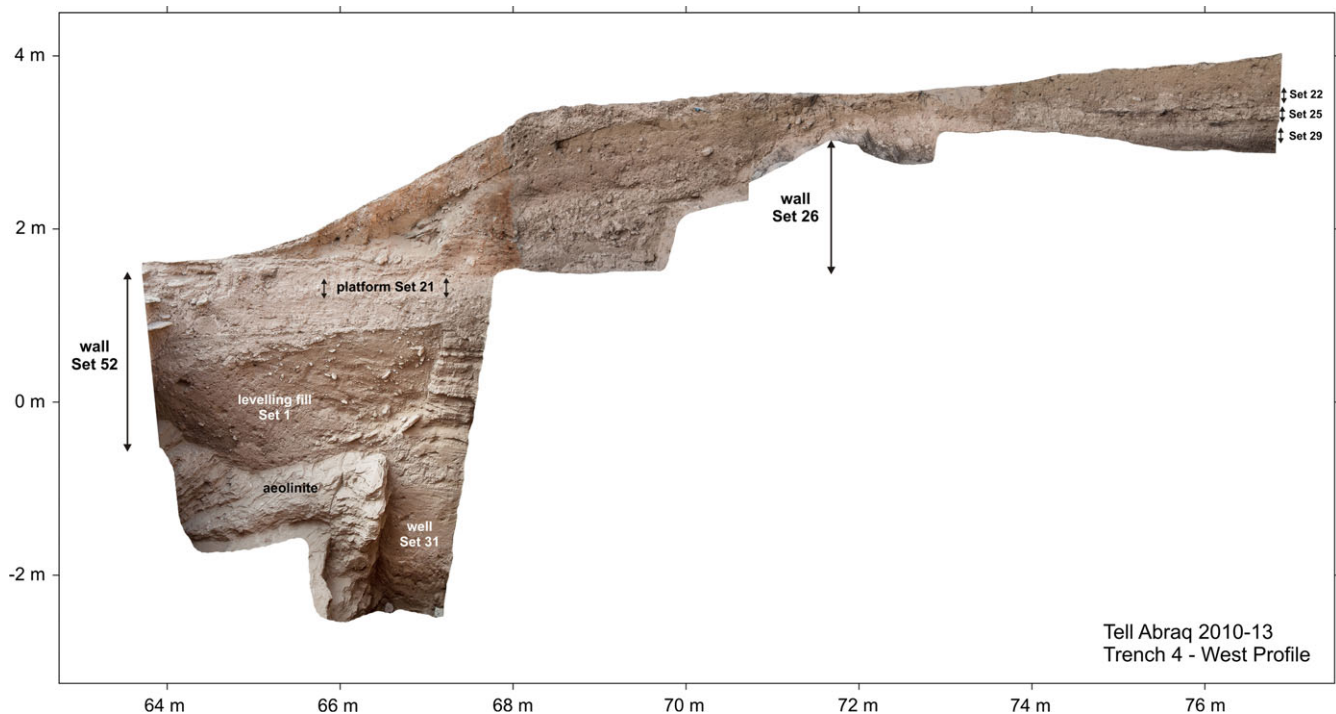
The sequence from our trenches suggests that around 2000 BC, the Umm an-Nar tower was the main focus of settlement. The late Umm an-Nar tomb to the west of the tower represents an obvious contemporary utilisation of the landscape. As much as we can tell, the Umm an-Nar tower was built into a *nud*, or settled dune.

For this period, there is also evidence of occupation to the south of the Umm an-Nar tower. This occupation takes two forms. In Trench 4 excavations off the mound exposed local bedrock made of sandstone formed by consolidation of palaeo-dune surfaces, referred to henceforth as aeolinite. Here two features cut the bedrock and their fills have yielded datable pottery. The first is a rectangular basin (Locus 5863) bound to the north by a wall (Locus 5901) (Figs. 5 and 6). This same wall formed the upper edge of Set 31, a well over 4 m deep that cuts through aeolinite layers of varied lithification. The lower fills of the well exhibit lamination from slow sedimentation in standing water, suggesting prolonged exposure. In contrast, the upper fills appear to have been deposited in quick succession and, therefore, mark the end of the use of the well. The fills of Set 31 contain Wadi Suq pottery

indicating that it was used up until the early second millennium BC. The modern sabkha that is about 200 m from the well today was at this time probably a lagoon linked to the open sea by way of the still active Umm al-Quwain lagoon. The inhabitants of Tell Abraq were thus obtaining fresh water in very close proximity to undrinkable salt water. The base of the well is about 4 m higher than the modern sabkha thus leaving space for a freshwater lens, even when considering a sea level closer to the transgressive maximum between 1 or 2 m higher than today. The presence of a well on top of the mound on Terrace 1 connected to the Iron Age has been documented by previous excavations (Potts, 1993: 118; 2000: 44-45).

The other form of late third-/early second-millennium BC occupation consists of a series of hearths and pits identified in Trench 2 along the southern slope of the mound (Fig. 7). Taphonomic processes removed the surfaces from which these features descended, leaving only the cuts and their associated fills, which are collectively referred to as Set 15. Beta 334297 was obtained from Locus 5428, one of the hearths belonging to Set 15, and confirms a date in this period (Table 1). These deposits should be considered in conjunction with the features cutting into the aeolinite in Trench 4, including the well.





**FIGURE 5** The rectified west profile of Trench 4 as documented in January 2013, showing the stratigraphic position of well Set 31 beneath the levelling fill Set 1 and a truncated sequence of floors [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

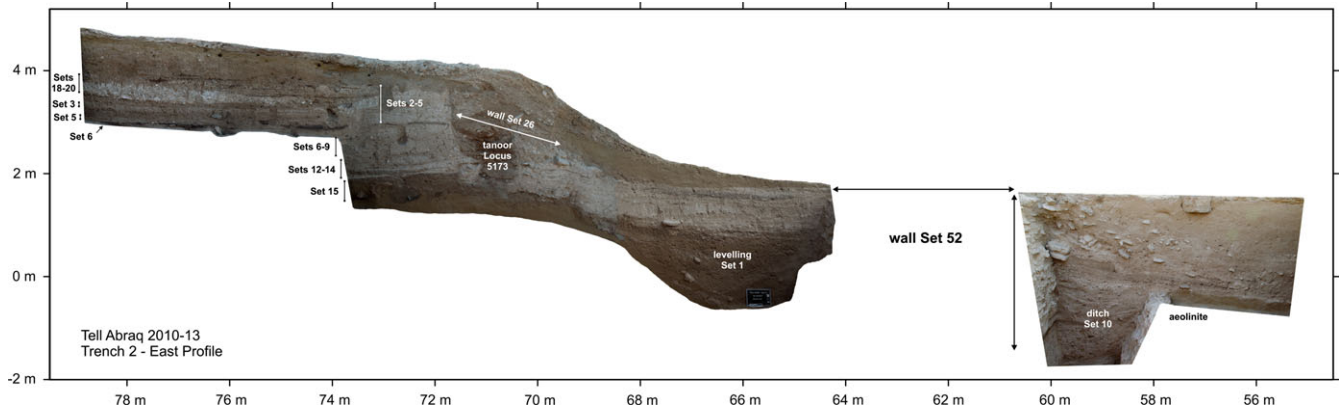


**FIGURE 6** The well (Set 31), the rectangular basin (Locus 5863), and the wall (Locus 5901) recorded in Trench 4 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

In the 2013/2014 season, the northern extension of Trench 2 revealed a phase of occupation which lay above Set 15, but which was below the hitherto identified earliest

Late Bronze Age floor with post-holes (Set 14). These remains were not extensive, but they did include Set 41, an elaborately constructed oven (Fig. 8) that appears to have been built before Set 14 and remained in use through Sets 9 and 7, two Late Bronze Age floors with post-holes that followed Set 14. Beta 383159 provides a  $^{14}\text{C}$  date obtained from a fill layer deposited before Set 14 but following the construction of the oven (Table 1). This sample indicates occupation on this part of the mound during the second quarter of the second millennium BC and provides an important chronological link between Set 15 and the sequence of Late Bronze Age floors.

The 2015/2016 campaign determined that during the late third-/early second-millennium BC occupation was concentrated further up the mound. Excavations in Trench 2 reached the first deposits inside the Umm an-Nar tower wall. This wall consists of multiple building phases that include several later mud-brick additions and is collectively identified as Set 47 (Fig. 9). Although excavations are still ongoing, it has been possible to identify a collapse that sealed the first of a sequence of floors (Sets 64, 62, and 60). This massive collapse can be followed stratigraphically from Terrace 2 to Terrace 3 (Fig. 10) and connects to the uppermost fills of Set 31, the well cut into aeolinite at the base of the mound, both in terms of stratigraphy and in the sense that the pottery from the collapse and the upper fills of the well are of the same date. Large stones from this collapse have subsequently been used to buttress the outer base of terrace



**FIGURE 7** The rectified east profile of Trench 2 as documented in January 2013, showing the hearths and ovens of Set 15 beneath a sequence of subsequent floors (Sets 14, 13, 12, 9, 8, 7, 6, 5, 3, and 2); the retaining wall of this sequence, Set 26, is cut by a *tanoor* [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 8** The elaborately constructed oven Set 41 between occupations connected to Sets 15 and 14 in Trench 2 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 10** The massive post-Wadi Suq collapse found on Terraces 2 and 3 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 9** The original Umm an-Nar tower wall with later mud-brick additions (Set 47) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

walls Set 61 and Set 47. Our excavations halted on a floor level marked with numerous post-holes (Set 64), which are a common feature of subsequent floors from the middle and late second millennium BC (Fig. 11). In many cases the post-holes show linear or curvilinear alignments suggesting the former presence of *areesh* structures. Set 47 served as a retaining wall for the second-millennium BC floors that collectively form Terrace 2 (Fig. 12). Beta 430296, a charred date seed found in the fill immediately above Set 64, suggests that occupation of Terrace 2 prior to the large-scale collapse dates to the sixteenth century, and this is in agreement with Beta 430299, which came from this collapse that seals the floors (Table 1). Although it is not yet fully excavated, we observed that Set 61, the retaining wall for Terrace 1, is built partially above this collapse on Terrace 2. At least one phase of Set 61, therefore, must post-date the floors sealed by the collapse, but the exact chronological relationship remains to be determined by future excavation.





**FIGURE 11** Terrace 2: state of excavation in January 2016; the floor and post-holes form Set 64 running against terrace wall Set 61 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

#### 4.1 | Mid-second-millennium BC terrace walls and habitation deposits

The next major phase of occupation is represented by extensive modification of the southern part of the mound through the construction of terrace walls and floors. This system was first identified in the 2012 to 2014 seasons in Trenches 2 and 4 where a large mud-brick wall was identified. This wall, which was built in several phases that collectively form Set 26, acted as a retaining wall for a sequence of floors located along its northern face, which form Terrace 3.

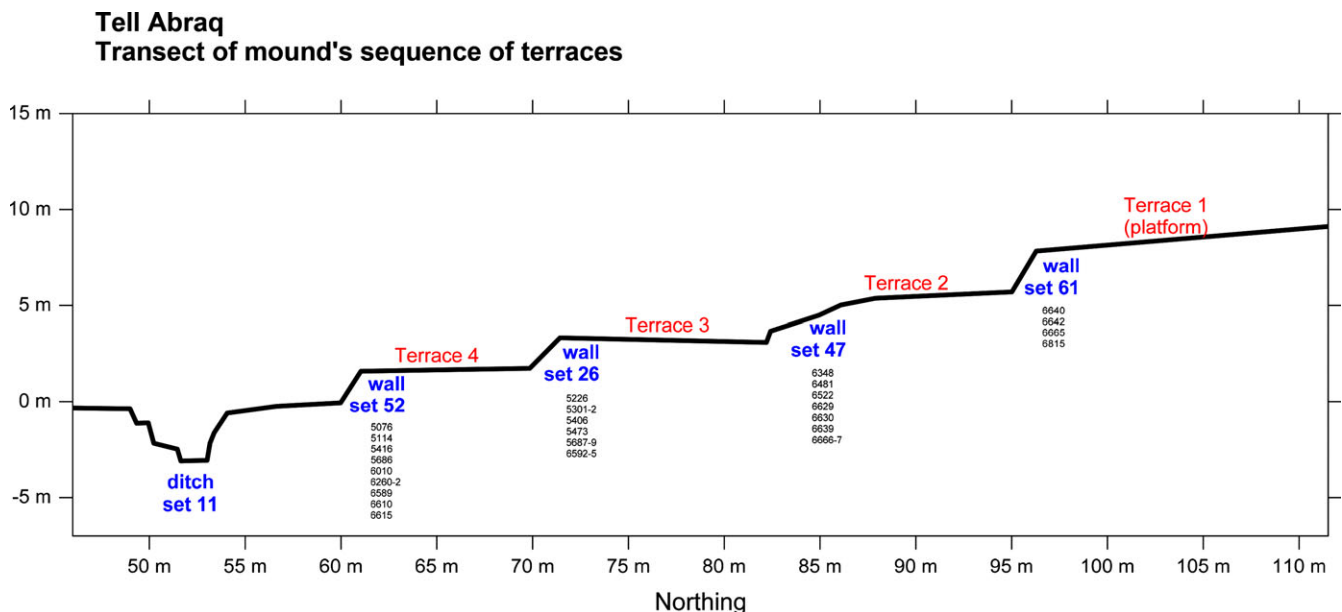
The earliest deposit directly to the north and associated with Set 26 is a floor with traces of burning and numerous

post-holes collectively referred to as Set 14 (Fig. 13). The post-holes follow an east–west orientation across the trench, possibly belonging to a single, large structure. Ceramics dating to the Late Bronze Age were recovered in the fill above this floor level. A radiocarbon sample collected from inside one of the post-holes of Set 14 is consistent with a date in the Late Bronze Age/Iron Age I (Beta 334300, Table 1).

Several floors were excavated above Set 14. From the earliest to latest these floors and their accompanying features were recorded as Sets 13, 12, 9, 8, and 7. In each of these floors, numerous post-holes were documented. There is no evidence of a hiatus in occupation and one gets the impression that these floors were constructed over a short period of time. The fills between the floors, typically 5–10 cm thick, represent the occupation debris. It is therefore in these fills that most of the ceramics and small finds were recovered.

The 2014/15 excavations in Trench 2 revealed the northern boundary of the habitation sequence on Terrace 3. These floors and fills were bounded to the north by the mud-brick walls of Set 47, which, as previously mentioned, is thought to have originally been the Umm an-Nar tower wall. The mud-brick walls represent later additions to the exterior of this wall.

In Trench 4, we observed that the wall Set 26 retaining Terrace 3 was constructed with several different courses of mud brick and stone. Excavations to the north of this wall revealed a series of floors and habitation deposits that are contemporaneous with those of Terrace 3 in Trench 2. Because of the 3-m baulk separating Trenches 2 and 4 the set numbers for each trench remained independent.



**FIGURE 12** A transect model of the mound showing the system of terraces; considered is data from Trenches 2, 3, and 4 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 13** An overview photograph of Trench 2, showing the floor and post-holes that form Set 14 and the retaining wall Set 26 for Terrace 3 (left) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 14** An overview photograph of Trench 2 showing the floor, post-holes, and wall that form Set 6 on Terrace 3 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

In Trenches 2 and 4 a series of floor levels extended across the top of Set 26. The earliest of these is represented by Set 6 that comprised a hardened floor and a series of post-holes associated with a small wall constructed from two rows of mud bricks (Fig. 14). The wall runs south-east to north-west but is clearly truncated by the edge of the trench. The post-holes appear to be arranged in a semi-circular fashion against this wall, perhaps representing the remnants of a single *areesh* structure. In Trench 2, Set 6 is



**FIGURE 15** The massive stone and mud-brick wall Set 52 that retains Terrace 4 crosses and is partially founded in the earlier ditch Set 10 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

followed from earliest to latest by floors with post-holes identified as Sets 5, 3, and 2. A secure radiocarbon sample collected from below the floor of Set 5 provides important information on the span of occupation of Terrace 3 (Beta 334296, Table 1). The date is very close to that obtained from the earliest floor occupation labelled as Set 14. Although more dates are needed for confirmation, at present the evidence indicates that the occupation and construction of sequential floors in this part of the mound was very rapid and may have taken place over only 100 years.

Excavations further south revealed a ditch cut into layers of aeolinite (Set 10). On the basis of the date for Set 52, a later wall discussed below, this ditch was open and therefore functioning as a defensive feature during the second half of the second millennium BC. Seen from the south, during this period the mound would have looked, therefore, like a three-stepped terrace construction with a ditch circling around it.

## 5 | THE LATE SECOND MILLENNIUM BC

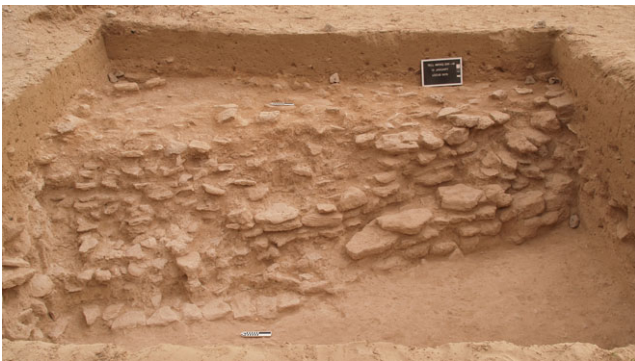
Sometime towards the end of the second millennium BC, there was major construction and re-organisation in the investigated southern and south-western parts of the mound. The massive stone and mud-brick wall recorded as Set 52 was constructed above the ditch of Set 10 and is founded in the ditch where Set 52 crosses Set 10 (Fig. 15). This was followed by a levelling event, designated as Set 1, that took place along the inside face of Set 52. The result of the levelling event was the creation of Terrace 4.

Set 52 consists of several stages of construction. Its main phase (Locus 5076) is a 4–5 m wide stone and





**FIGURE 16** The outer face of wall Set 52 in Trench 7 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 17** The outer face of wall Set 52 in Trench 14 after it has curved northwards [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

mud-brick construction (Fig. 16). Excavations in Trenches 2–8 exposed over 50 m of Set 52 with an east–west orientation. The wall begins to curve to the north in Trench 8 and continues into Trenches 12 and 14 (Fig. 17).

Several pieces of information permit us to clarify the chronology of Set 52's construction and subsequent use. Before detailing these, however, it should be noted that a  $^{14}\text{C}$  date, Beta 334298, was obtained from charcoal from a pisé feature underneath Set 52 in Trench 2 (Table 1). The feature is not structurally a part of the wall but a remnant of an earlier structure that was present in this part of the mound at some point before the wall was constructed. The date represents the earliest radiocarbon date yet obtained from Tell Abraq and indicates human activity occurring at the site at the beginning of the third millennium BC.

As previously noted, Set 52 is constructed much later and is partly founded in the Set 10 ditch. The levelling event that abuts the inner face of Set 52 to the north consists of a series of fills that have been excavated in Trenches 2, 3, and 4. Three radiocarbon dates were obtained from these fills (Beta 301242, Beta 301243, and

Beta 301244) (Table 1). The results indicate that the material from this levelling event should date to the last quarter of the second millennium BC. These three samples were taken from three different loci stretching from the bottom of the levelling fill to the very top in Trench 3. The proximity of these radiocarbon ages supports our stratigraphic field data that the levelling event was a single process, with the purpose of creating Terrace 4. In support of this idea, there were very few artefactual differences between the lower and upper loci within the fill. Assuming that the fill represents recently used material, we can conclude that the fill occurred between c.1300 and 1000 BC. The three dates are statistically the same and when averaged produce a calibrated range of 1256–1251 (0.08) and 1231–1116 BC (94.6).

Excavations in Trench 6 in 2014/15 provided further information on the chronology and function of the wall Set 52. A floor with post-holes recorded as Set 45 extended from the northern face of Set 52 to Set 26, the terrace wall delimiting the Late Bronze Age floor sequence of Terrace 3 (see above). It was therefore constructed later than both. On top of this floor, a fill deposit (6444) accumulated before being capped by the next floor with post-holes, which was recorded as Set 46. Two radiocarbon dates, Beta 402751 and Beta 402752, were obtained from the fill between Sets 45 and 46 and must post-date the construction of Set 52 (Table 1). These two dates are statistically the same and when averaged produce a calibrated range of 1216–1056 BC.

An additional radiocarbon date provides information on the construction of this wall (Beta 301246, Table 1). Locus 5202 is an ashy layer with fish bones and burnt artefacts and stones to the exterior of Set 52. It represents an event connected with *in situ* burning that took place after the construction of the wall. It is located well below the level of collapse from the wall. The  $^{14}\text{C}$  sample from Locus 5202 has a very similar lower limit of 1042 BC suggesting that the wall was constructed before that date.

All of these radiocarbon dates are in agreement, both statistically and in their implication. They suggest that the wall was constructed sometime before the middle of the eleventh century BC. The earliest date of the wall can only be addressed from circumstantial evidence. Firstly, we assume that Set 10, the ditch into which the wall was partly constructed, was open during earlier settlement phases which are evidenced on Terraces 2 and 3 (and possibly Terrace 1, but this has yet to be assessed by future fieldwork) and seems to have come to an end around 1300 BC. Secondly, we assume that the fill deposits placed against the wall's inner face were deposited shortly after the wall was constructed in order to create Terrace 4. The three dates from this fill fall within the thirteenth century BC at the earliest. For these reasons, our preliminary

interpretation is that the wall was constructed at some point during the interval from 1300 to 1050 BC, or what has been referred to as the Iron Age I period (Magee, 1996).

The longevity of the wall is suggested by charcoal sample from Locus 5126 (Beta 301245, Table 1), an ashy layer immediately below the massive collapse of the wall that marks its destruction. The upper date of this sample indicates that the wall was still in existence after 750 BC.

A ditch (Set 11) was cut into the aeolinite bedrock to the south of Set 52 (Fig. 18). The ditch was deep and large enough to have served as a defensive function. The chronological relationship between the wall and the ditch (Set 52 and Set 11) is unclear, but it is our operating assumption that they were functionally coeval and that they were constructed at the same time. Besides pairing functionally, the construction of the ditch also would have provided the bulk of the necessary (and documented) building material for the wall in the form of aeolinite blocks.

### 5.1 | Late second-millennium BC ‘extra-mural’ occupation

Extensive habitation deposits dating to the last two centuries of the second millennium BC were found to the south of wall Set 52. Their extent was mainly assessed in Trench 3 and the pipeline trench.

This evidence was first revealed in 2010, when Sharjah Municipality dug a trench to lay a water pipeline running



**FIGURE 18** The ditch Set 11 cut into aeolinite, seen from the top of wall Set 52 in Trench 3 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

from the south towards the mound, and then turning west around it before continuing northwards through the sabkha towards the main Sharjah-Umm al-Quwain highway (see Figs. 2 and 3). The pipeline trench provides important information on this previously uninvestigated area of the site. Realising its importance, we decided to document and sample the trench. In order to provide a stratigraphic connection of the deposits in the pipeline trench to the mound, we extended Trench 3 southwards in 5-m stages. Trench 3 had reached and crossed the pipeline trench in the 2015/16 campaign.

Several significant features in the pipeline trench contained artefacts and/or material for radiometric dating. A deep narrow pit (Locus 5071) contained light coloured ash, shell, some pottery, and animal bones (Fig. 19). This pit cut into the aeolinite and was capped by a dark grey ashy layer and loose fill. Only seven small sherds were found in the pit and they were consistent with a date of between 1500 and 1000 BC. A similar pit (Locus 5072) was also cut into the aeolinite (Locus 5063). It was capped by a loose fill level and contained a few sherds of pottery also dating to between 1500 and 1000 BC. In the south-west of the pipeline trench a large triangular-shaped feature (Locus 5070) was revealed. This feature cut into sterile compact sand. Its wide splaying shape differs from the other refuse pits in this area. The possibility that it is a ditch that cut across this area is supported by the cleaning on the northern profile of this area, which revealed the same feature. A single radiocarbon date, Beta 301241, from the fill of this ditch dates to the last three centuries of the second millennium BC (Table 1). Further to the east a post-hole (Locus 5038) was documented (Fig. 20), possibly suggesting some type of *areesh* structure in this area. These well-defined pits are representative of most other features found in the pipeline trench. The impression is that the area was filled



**FIGURE 19** Pits (Loci 5070, 5071, and 5072) identified in the main pipeline trench profile indicated in Figure 3 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]





**FIGURE 20** A post-hole (Locus 5038) identified in the profile of the pipeline trench [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

with refuse events that may represent some type of transitory habitation of the site.

Against this general pattern was a pit with a high density of finds (Locus 5055) just over 1 m wide. The vast majority of the artefacts were shell and the deposition indicated a single refuse event. Over 300 ceramic sherds were found in this feature and in their form and fabric they are consistent with a date between 1500 and 1000 BC. A similar pit (Locus 5081) with dense shell remains was poorly preserved but evident in the northern section of the trench. From this pit, a single charcoal sample provided a radiocarbon date calibrated to the last centuries of the second millennium BC (Beta 301240) (Table 1). Excavations in Trench 3 revealed a substantial number of pits of this type (see below).

In as much as we can judge their chronology from ceramics and radiocarbon dates, the preserved features from the base of the archaeological sequence in the pipeline trench suggest use of this area within a time frame that is consistent with the Iron Age I period (1300–1100/1000 BC). Material remains from higher up in the sequence point to continued use beyond this period, though it remains to be determined how long this was the case.

In the 2014/2015 and 2015/2016 excavations, similar features and material were exposed in the southern extensions of Trench 3 (Fig. 21). Although the pottery is still under study, our preliminary analysis has indicated that it is consistent with that from the pipeline trench. Furthermore, we obtained seven  $^{14}\text{C}$  dates from features at the base of the



**FIGURE 21** Pits and hearths cutting sterile sand in Trench 3 to the south of Set 52 and outside ditch Set 11 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

archaeological sequence within Trench 3 (Beta 402747, Beta 402748, Beta 402749, Beta 402750, Beta 409911, Beta 436095, and Beta 436096) and one from an ash lens near the surface (Beta 409912) (Table 1). These dates all fall within the 1300–1000 BC time frame. As with the pipeline trench, the presence of artefacts stratigraphically above these features points to continued use into later periods.

The large pits with shells and the evidence of post-holes suggest that this area was occupied on a non-permanent basis. One suspects that this was common at prehistoric settlements throughout south-eastern Arabia. The method of disposing of shells, however, is quite unusual. At nearby Hamriya, shell middens attest to the seasonal exploitation of the rich lagoon areas in which shells were eaten and discarded in a pile. Tell Abraaq was also located at a lagoon, and shell middens mark the landscape around the mound, but in the area of the settlement exposed by the pipeline trench and the southern part of Trench 3, shells from the lagoon were deposited in pits in a single episode. Shells also form a greater part of the assemblage of the find layers above the pits, but in the pits, these represent up to 90% of the artefacts.

This area of occupation was separated from the main area on and immediately around the mound by Set 11, the large late second-millennium BC ditch. This ditch is approximately 4 m wide and is cut about 2.5 m deep into the aeolinite (see Fig. 12). The lowest 1 m of its northern face (towards the mound) is cut down vertically and the upper 1.5 m is gently sloping up. In contrast, the south face of the ditch (away from the mound) is stepped and reinforced by a retaining wall built up against the aeolinite. This wall was constructed from alternating layers of roughly cut sandstones and mud plaster.

Several fill deposits were documented within Set 11. These include a hardened laminated surface (Locus 5587) that

TABLE 3 Ceramic fabrics

Fabric	Description
1	Orange to tan clay matrix often with a grey core. Highly variable amounts of temper including large irregularly shaped grey to translucent mineral inclusions as well as crushed rounded white calcareous inclusions. Vegetable temper is rare. Evidence of wheel turning. A variant has fewer mineral inclusions which are typically small (< 5mm) and more vegetal temper.
2	Grey to brown clay matrix which is normally poorly fired. Flat, sharp-edged mineral temper in typically high density but variation in temper quantity is not uncommon. Variants include added shell or white calcareous inclusions of small size (<5mm) and examples with a smoothed, washed exterior. Typically handmade by slab construction. Referred to as EZ ware by Velde and Handmade Coarse Ware by this author it was likely produced in Wadi Haqil in Ras al-Khaimah.
3	A fabric group which comprises variants of pottery that are typical of the Rumeilah I or the Iron Age II ceramic corpus, well known throughout the UAE. The first, referred to as Sandy Ware, consists of a fine sandy clay matrix well fired to tan/buff. Variable amounts of mineral temper depending on vessel function with larger vessels containing high density of rounded mineral (gravel) inclusions. Likely produced in the al-Ain oasis. The second variant consists of a fine clay matrix with crushed and rounded white calcareous inclusions.
4	Very fine red-orange, occasionally grey, clay matrix which is well fired and contains a high density of lime inclusions that are spawling on the surface (eg 'exploding lime temper'). Typical of Barbar pottery production on Bahrain from the early second millennium BC and pseudo-Barbar production during the Iron Age. Wheel-made with pronounced ribbing on interior.
5	Hard, highly fired grey to black clay matrix often with a discrete thin red core. Medium density of small (<5mm) white and yellow mineral inclusions and no vegetal temper. Probably not a local production. Typically fast wheel-made, with pronounced ribbing on interior.
6	Well-fired buff-green clay matrix with no grey core, with very little mineral temper and high density of chaff and vegetal temper. Consistent with pottery from southern Mesopotamia. Wheel-made.
7	Well-fired orange clay matrix with no grey core. Varies between no visible temper to low density of very small (<3mm) white mineral inclusions. Fast wheel-made and typically decorated with a burnished maroon slip. Referred to as Burnished Maroon Slipped Ware by Magee.
8	This is a fabric 'group' that consists of very fine orange to buff clay matrix with very little or no mineral temper. Well fired and wheel-made. Includes Sandy Red Ware of the Umm an-Nar period and <i>céramique semi-fine</i> of the early Wadi Suq period as defined by Méry. Fast wheel-made.
9	Well-fired tan ware with high density of rounded red and brown inclusions that are well sorted and visible in section and on the surface. Possibly not local and visually consistent with material from the area around Minab in south-eastern Iran.
10	High fired orange clay matrix with no visible temper. Fast wheel-made, typically with thin white slip on exterior.
11	Well-fired brown tan clay matrix with a high density of rounded mineral temper in various sizes and occasional grog (broken clay) inclusions. Often with thick (lime?) slip.
12	High fired tan clay matrix with no visible temper. Very thin wall and fast wheel-made. 'Eggshell ware'
Misc	Fabrics not represented in the above typology

may have been exposed for some time. We are still in the process of analysing the ceramics from these fills but the portion examined thus far from the upper deposits is consistent with the Iron Age III period (600–300 BC). Obviously, this suggests that the ditch was open prior to and including this time frame. As previously mentioned, wall Set 52 most likely paired with ditch Set 11 as a defensive system and the lower limit of Beta 301245, which provides a date for the destruction of wall Set 52, falls within the Iron Age III period.

The wall Set 52 collapsed mainly to the exterior, away from the terraced part of the settlement. This collapse includes material which dates as late as the Iron Age III period. Although the analysis of this material is just beginning, it seems clear this area of the settlement was intensely used, up until around the middle of the first millennium BC. The collapse of the wall provides an opportunity to examine *in situ*

deposits that span the Iron Age II and III periods, the latter of which is still poorly attested throughout the region. In the subsequent centuries, from the middle of the first millennium BC, occupation appears to have been concentrated on the terraces and the area north of the mound. Previous excavations directed by Potts (1991: 105–119) identified evidence for occupation at Tell Abraç during the first centuries AD, but current excavations have uncovered this later occupation in only a limited area.

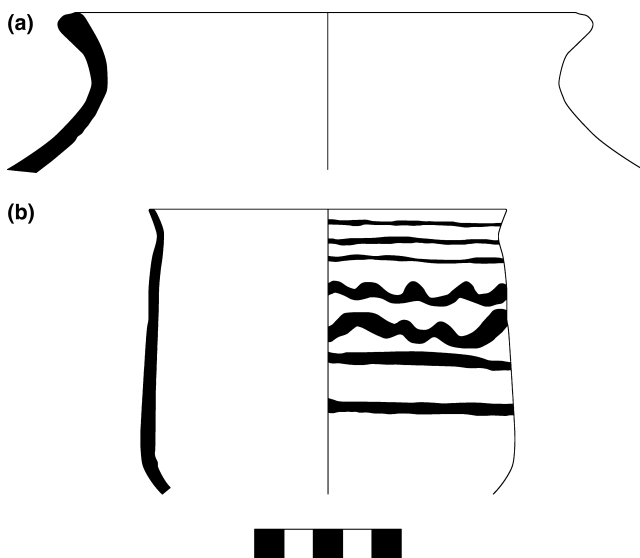
## 6 | CERAMIC ANALYSIS

The detailed stratigraphic sequence at Tell Abraç provides an opportunity to examine changes in ceramic production and exchange across a critical time in south-east Arabian





**FIGURE 22** Fragmentary Wadi Suq pottery from Set 15 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 23** Two Wadi Suq sherds from Set 31; ID (a) 13689.1001; (b) 13689.1004

prehistory. Both diagnostic and non-diagnostic sherds were examined, but it should be noted that such analysis is still at a preliminary stage. The results presented below represent a sample from the main areas of excavation in Trenches 2, 3, and 4, but not a complete analysis. Nevertheless, there is good reason to believe that this sample has captured much of the variation within the ceramic corpus. Further research will refine and alter the preliminary conclusions reached below.

The first stage of the ceramic analysis comprised the formation of a fabric typology. This was constructed on the visual appearance of the matrix and inclusions of each



**FIGURE 24** Wadi Suq jars [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

sherd and the technology that lay behind its production. Distinct fabric groups are numbered 1–12 with an additional miscellaneous category for any sherds that cannot be assigned to one of the fabric groups (Table 3).

## 6.1 | Wadi Suq ceramics

The earliest ceramics yet discovered in our excavations at Tell Abraç consist of those associated with Set 15 and the lower fills of Set 31, the well. As noted above, Set 15 is a series of hearths and pits cut into sterile sand dated to the late third/early second millennium by  $^{14}\text{C}$  sample Beta 334297 (Table 1). Set 31 still lacks radiometric dating but ceramics from the fills situate it within the Wadi Suq period.

The pottery from these deposits is a mix of typical ceramics of the early Wadi Suq facies known throughout the UAE and Oman. These include beakers with bands and wavy lines made in a variant of Fabric 8 which is equivalent to Méry's (2000: 253–256) *céramique semi-fine* and which is paralleled in the earlier excavations at the site and a number of other sites throughout the UAE and Oman. Most examples for the hearths and pits were very fragmentary (Fig. 22), but two larger sherds came from the fill of Set 31, both of which are illustrated here (Fig. 23).

Storage jars from this period comprise a wide range of forms typical of the Wadi Suq period. They are made on a fast wheel in a variant of Fabric 8 that contains well-sorted mineral temper and are typically undecorated. Rim forms include necked jars with outflaring rim (Fig. 24a), a rolled rim (Fig. 24b), and sharply turned out collar rims (Fig. 24c).

Although the vast majority of sherds from this rather limited phase of occupation are attributed to the well-known types of Wadi Suq pottery, there are some unusual



**FIGURE 25** Handmade Coarse Ware sherds from Wadi Suq deposits [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

types that may be limited to Tell Abraq and the immediate economic environment in which it operated. Of particular interest in this regard is Handmade Coarse Ware. This coarse ware, which corresponds to Fabric 2 in our typology is typical of the Late Bronze Age and Iron Age I deposits at the site. We have hypothesised that it was produced in Wadi Haqil in Ras al-Khaimah (Magee, 2011). Several sherds of it were noted in Wadi Suq deposits in our excavations (Fig. 25). As in later periods, the fabric is used to produce simple handmade bowls. The examples we recovered in Wadi Suq deposits were slightly different than those common at the end of the second millennium BC and contained less flat, sharp-edged mineral temper but more rounded gravel inclusions. There is no doubt, however, that it sits within the same tradition of Handmade Coarse Ware that is described in more detail below.

Several imported sherds were also recovered in Wadi Suq deposits. The most common of these are typical City II Barbar ceramics that were common in Potts's excavations at Tell Abraq (Fig. 26). Characterised by a distinctive lime spawling or 'exploding lime grits', this distinctive ceramic is well noted at coastal sites along the UAE but the quantities recovered at Tell Abraq appear to be significant and probably attest to the important role it played in maritime trade during the early second millennium BC.

## 6.2 | Ceramics of the eighteenth to sixteenth century BC

As noted above, one of the most important discoveries of the 2013/2014 excavation season was the uncovering of deposits dating to the second quarter of the second millennium BC. Thus far, these have only been found in the very northern area of Trench 2.



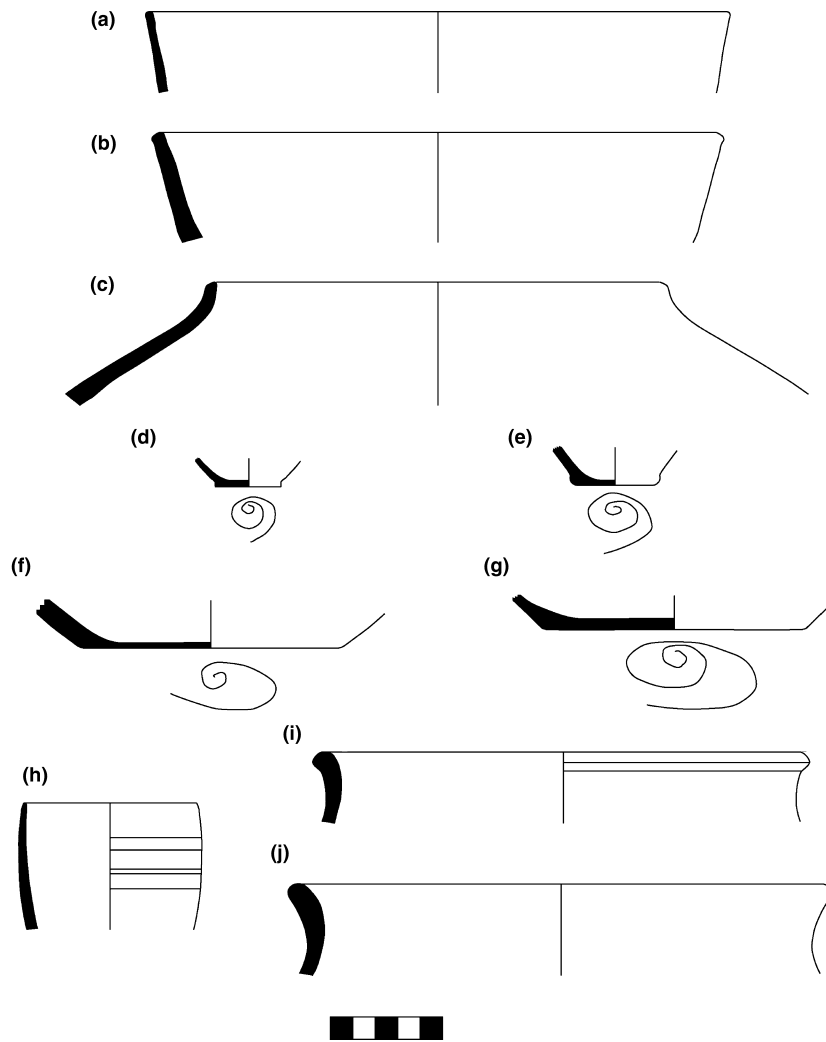
**FIGURE 26** City II Barbar Ware from Wadi Suq deposits [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

The material from these levels is still being examined, but preliminary results indicate that ceramics comprise typical Wadi Suq material, including Barbar ceramics, as well as goblets with string-cut bases and Handmade Coarse Ware that is typical of the Late Bronze.

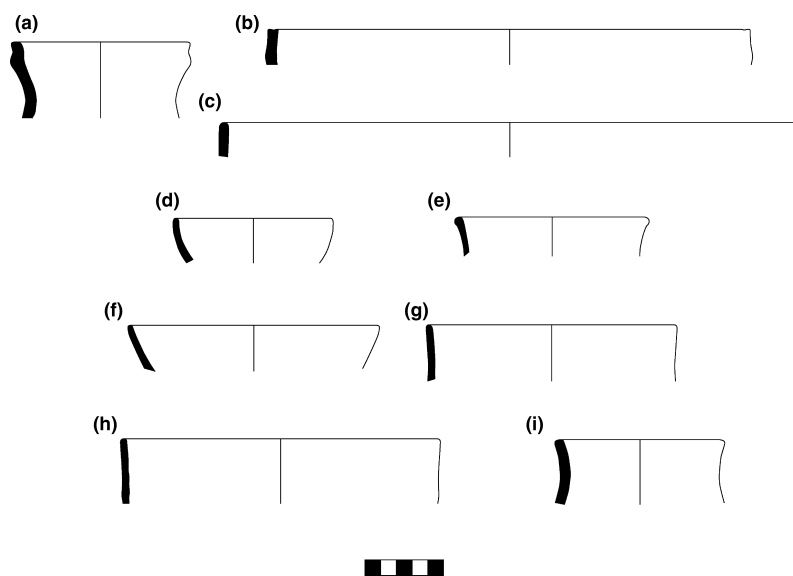
## 6.3 | Late Bronze Age and Iron Age I ceramics

By far the majority of our evidence thus far comes from the period from *c.*1500 to 1000 BC. During this time frame, habitation extended across the southern area of the mound in a series of floor levels first on Terraces 2 and 3 (Fig. 27), and after construction of the large wall labelled Set 52 and the associated Set 1 levelling event, also on Terrace 4. Terrace 1 may be regarded as in use at this period as well; as previously noted, however, excavations have only just begun to explore this part of the site and this material is only partially integrated into the ceramic study at present. In addition to the terraces, there is extensive evidence of occupation in the area beyond the fortification formed by Sets 52 and 11, as assessed by Trench 3 and the pipeline trench (Fig. 28).

The absolute chronology of these deposits extends across the Late Bronze Age, as defined by Velde (2003) from 1600 to 1250 BC and the Iron Age I period as defined by Magee (1996) from 1300 to 1100/1000 BC. It is now abundantly clear on the basis of our excavations at Tell Abraq, that the ceramics from these two periods are very similar to each other and, indeed, in terms of material culture the Iron Age I period can be seen as a final phase of the Late Bronze Age. Although in this report we treat the ceramics from these phases of occupation together, it is worth noting that discrete deposits can be discerned from the stratigraphy and attributed to either the Late Bronze Age or Iron Age I. Our continuing work is



**FIGURE 27** Diagnostic pottery from below Set 38, a floor on Terrace 3: (a) 14344.1002; (b) 14344.1003; (c) 14344.1001; (d) 14345.1001; (e) 14345.1002; (f) 14345.1003; (g) 14345.1004; (h) 14345.1008; (i) 14345.1007; (j) 14345.1005



**FIGURE 28** Diagnostic pottery from pits cutting sterile sand south of Set 52: (a) 15194.1001; (b) 15194.1002; (c) 15194.1003; (d) 15199.1003; (e) 15199.1004; (f) 15199.1001; (g) 15199.1002; (h) 15209.1002; (i) 15209.1001

focusing on defining these deposits, but for now some general observations on the ceramic corpus as a whole are possible.

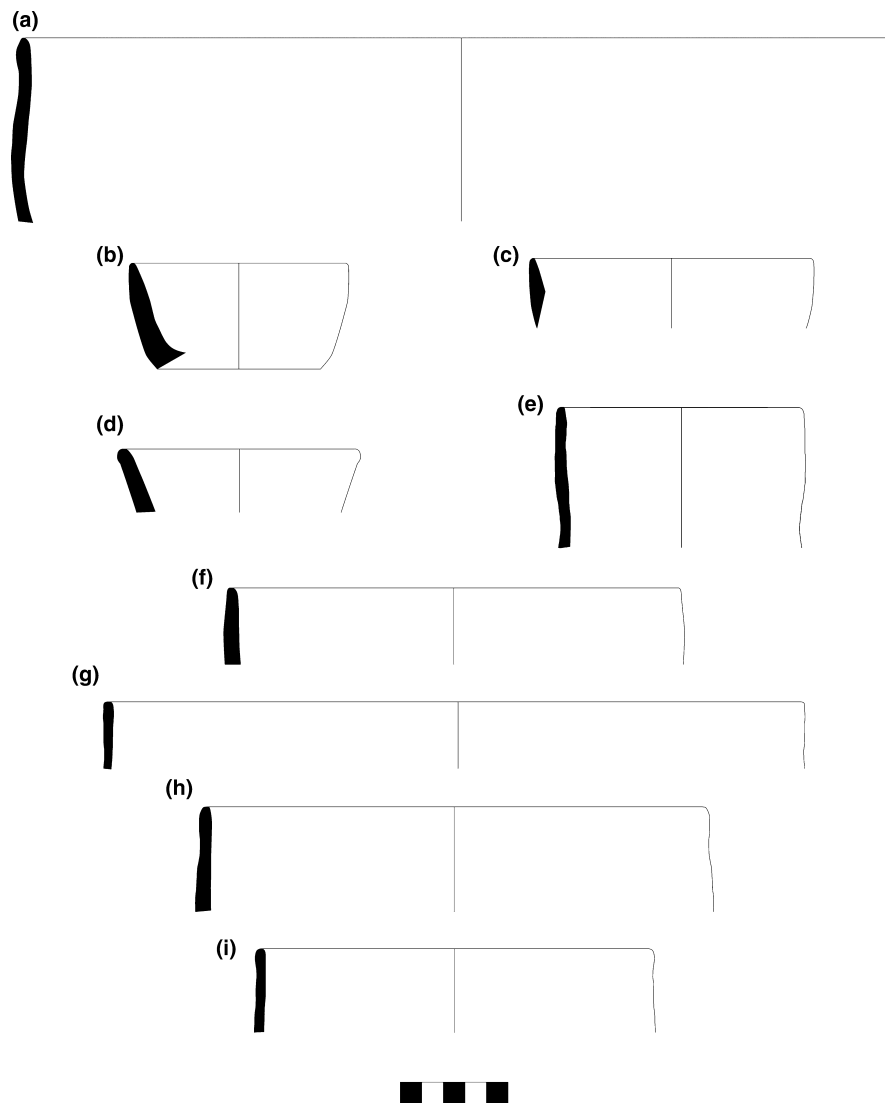
#### 6.4 | Local ceramics

Fabrics 1 and 2 dominate local ceramics in the second half of the second millennium BC. These are made into a variety of forms including bowls, necked jars, and storage jars. Generally, Fabric 1 is often wheel-made, especially when necked and storage jars are produced. Fabric 2, on the other hand, is generally handmade. As we have discussed in detail elsewhere, there is good reason to believe that Fabric 2, or at least variants of it, was produced in Wadi Haqil in Ras al-Khaimah, and they become increasingly common towards the end of the second millennium BC and Iron Age I period (Magee,

2011). Fabric 1, on the other hand, may represent part of a very long ceramic tradition which stretches back to the early second millennium BC and is the most common fabric produced during the first half of that millennium BC.

The bowls of this period have straight or flaring walls with simple rounded or flattened rims. They are generally undecorated but a few examples with simple lines drawn below the rim were found in our excavations. They are well paralleled in Potts's excavations at Tell Abraq and at Shimal (Figs. 29 and 30).

Numerous examples of footed goblets with a string-cut base were found in this phase at Tell Abraq and represent the leitfossil for the Late Bronze Age in south-eastern Arabia (Figs. 31 and 32). At Tell Abraq, these vessels are almost exclusively found in Fabric 1. The only exceptions to this are the fragments in Fabric 6, which are imported



**FIGURE 29** Late Bronze Age and Iron Age I bowls: (a) 13211.1002; (b) 11035.1002; (c) 11035.1003; (d) 11035.1006; (e) 13030.1011; (f) 11035.1008; (g) 12005.1002; (h) 13561.1002; (i) 13561.1001





**FIGURE 30** Bowls in Fabrics 1 and 2 from Locus 5055 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Mesopotamian examples typical of the Kassite ceramic horizon in southern Mesopotamia and the northern Arabian Gulf.

Locally produced necked and storage jars are also found in the second half of the second millennium BC at Tell Abraq (Fig. 33). These are made in both Fabrics 1 and 2. They are well paralleled in the Late Bronze Age and Iron Age I deposits excavated by Potts on the west side of the mound in the 1990s. Of particular interest are the handled jars (Fig. 33b and c). The examples discovered in our excavations were not well preserved enough to indicate whether they had two handles or a spout, as did some more complete examples from the earlier excavations at Tell Abraq. They are, however, a relatively rare form within the repertoire of south-east Arabian ceramics and are almost exclusively produced in Fabric 2.

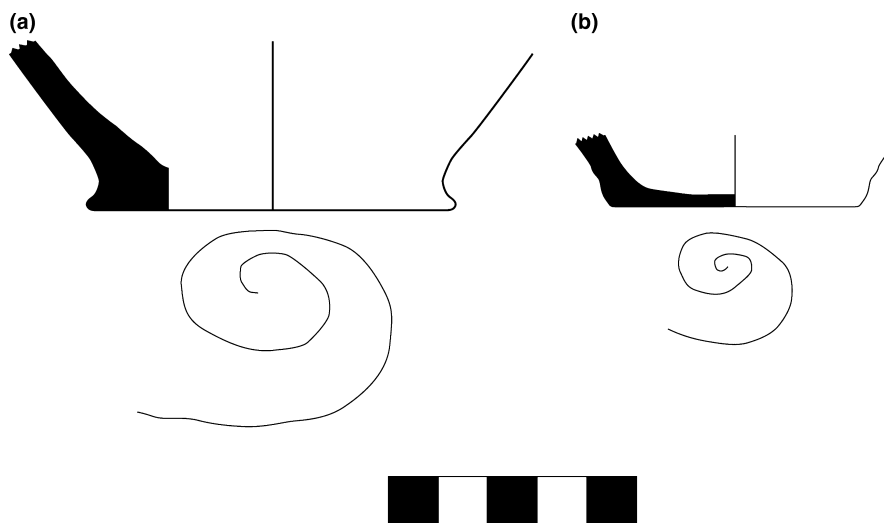


**FIGURE 31** Late Bronze Age footed goblets in Fabric 1 from Locus 5095 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

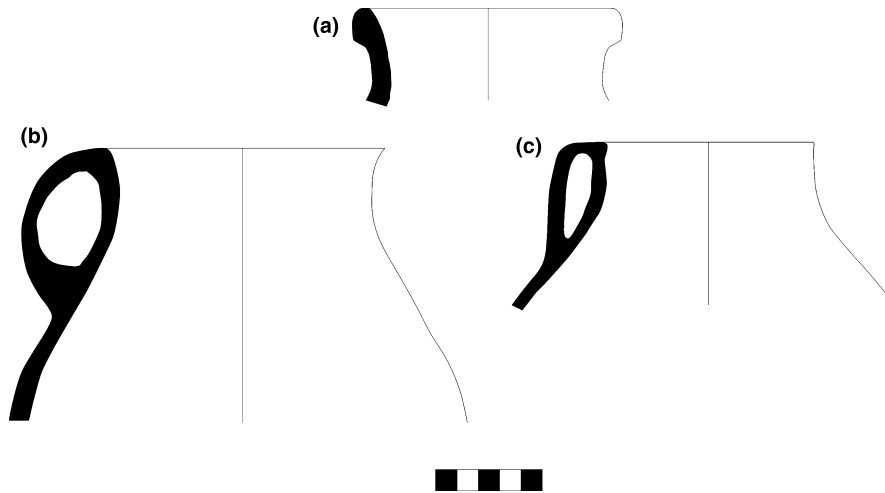
## 6.5 | Imported ceramics

Several fabrics identified in the Late Bronze Age deposits are imports. As we move forward with the analysis of ceramics, quantification of imported wares will provide important insights into the shifting mechanisms of trade throughout the Arabian Gulf in the second millennium BC.

One of the most imported fabrics in the period under consideration is Fabric 6 from Mesopotamia, which is found in a variety of shapes. Two shapes are found in this fabric during the second half of the second millennium BC at Tell Abraq. The first has a distinctive double or triple ridged rim and, based on complete examples from Failaka



**FIGURE 32** Late Bronze Age footed goblets: (a) 13291.1002; (b) 14365.1002



**FIGURE 33** Storage jars and handled jars in Fabrics 1 and 2: (a) 11035.1009; (b) 13165.1004; (c) 13151.1001

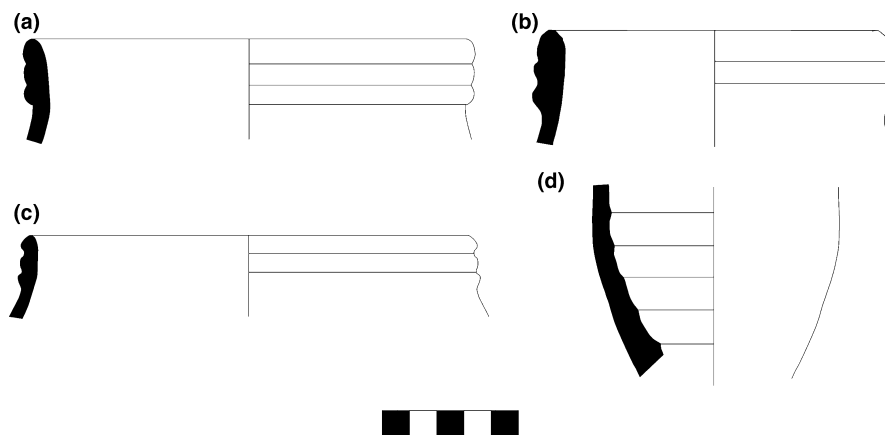
in Kuwait, belonged to ovoid transport jars (Fig. 34a–c). The other distinctive shape made in Fabric 6 is the small, fast wheel-made beaker (Fig. 34d). This too is considered a Kassite form and complete examples were found on Failaka (Højlund, 1981: 38–39). The base of these goblets is string cut and in shape resembles the locally made examples of goblets, which were probably inspired in their production by this import.

Traces of bitumen were noted on several Mesopotamian sherds and, in addition, lumps of bitumen were found in floor deposits containing Mesopotamian sherds (Fig. 35). While the transport of this material might explain the presence of the ovoid storage jars, it needs to be kept in mind that the presence of Kassite goblets at the site indicates a deeper cultural influence from the Mesopotamian world. That some of this Mesopotamian pottery may have been transported via Bahrain is indicated by the presence of typical pottery with exploding lime grits from that island.

A surprising element within the Late Bronze Age corpus was a hard-fired grey ceramic labelled Fabric 5. It represents a distinctive technology that is not paralleled in local ceramic production. Many body sherds of this ware were discovered, including many with finger-impressed cordons and sharp raised ridges (Fig. 36).

The origin of this material remains unknown until geochemical analyses are undertaken. The discovery, however, of several small painted sherds in the same fabric might provide a clue as to its origin. These sherds, from several deposits, are decorated with black and red geometric decoration (Fig. 37). One parallel for this material comes from the site of Pirak in Baluchistan where a bichrome painted ware and sherds with finger-impressed cordons in a grey ware are known (Enault, 1979: fig. 77), but further research needs to be conducted on these sherds to test this hypothesis.

In summary, the Late Bronze Age and Iron Age I deposits provide new and important information on local



**FIGURE 34** Mesopotamian pottery (Fabric 6) from Late Bronze Age deposits: (a) 12005.1003; (b) 13030.1009; (c) 13314.1002; (d) 11205.1005



**FIGURE 35** Mesopotamian pottery (Fabric 6) with traces of bitumen from Locus 5034 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 36** Fabric 5 sherds from Locus 5550 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

ceramic production and the role of Tell Abraq in long-distance maritime trade. Since deposits dating to this time frame represent the main focus of our excavations,

continued research will throw further light on centuries that have, until now, remained poorly known throughout south-eastern Arabia.

## 6.6 | Iron Age II and III ceramics

Iron Age II and III ceramics are known from within and under the collapse of the large late second-millennium BC wall Set 52 (Fig. 38). Since the main focus of our research has been the Late Bronze Age deposits, this material has been the subject of only brief analysis. Nevertheless, it is clear that these deposits hold the potential to provide important new information on the interface between the Iron Age II and III periods.

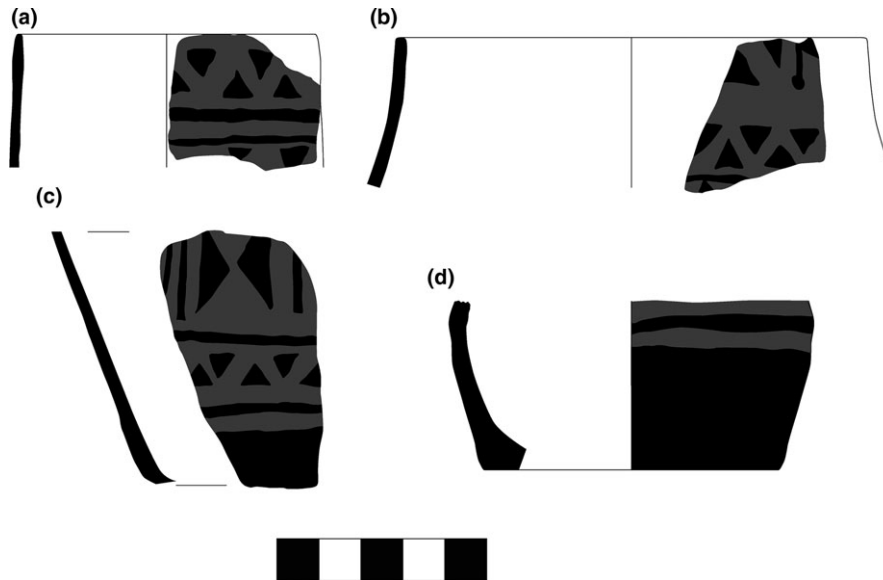
Iron Age II ceramics comprise a typical range of decorated storage jars and bowls which are well paralleled at numerous sites throughout south-eastern Arabia.

Although Tell Abraq exhibits a well-known range of locally produced Iron Age II ceramics, there are also unique elements in the corpus. The continued production of Fabric 2, typical of the Late Bronze Age and Iron Age I periods at the site, is of particular note. This coarse ware continues to be found in significant quantities in the Iron Age II deposits. It was observed in Potts's excavations that during the Iron Age II period this fabric is used predominantly for the production of bowls and jugs and not for storage vessels and necked jars as it had been used in the Iron Age I period.

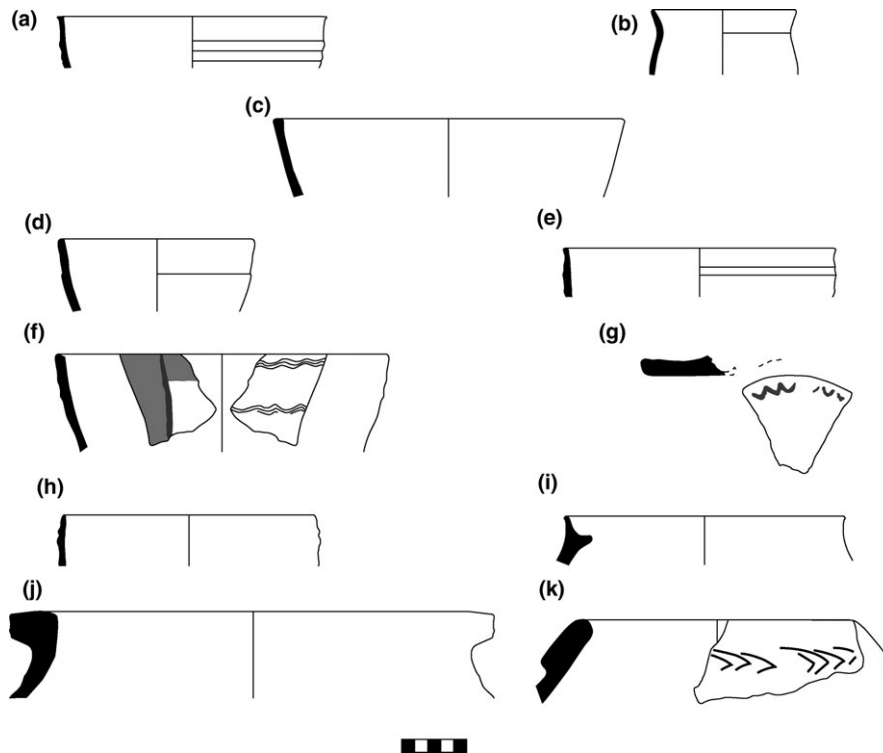
Iron Age III ceramics were found in the layers above the deposits containing Iron Age II material. The Iron Age III period is very poorly known throughout south-eastern Arabia and the recovery of deposits of this period is of immense significance. Although production of typical Iron Age II ceramics appears to have continued into the Iron Age III period, a new range of fast wheel-made ceramics make their appearance. These include ceramics that appear to be local in origin but which exhibit changes in the technology behind their production (Fig. 39).

Alongside these ceramics are many examples which may represent imports. One such group has been defined as Burnished Maroon Slipped Ware and is equivalent to our Fabric 7 (Fig. 40). Made with a fast wheel, it is decorated with a distinctive burnished surface. It can include a wide variety of forms including bowls and handled jars. Previous geochemical analysis has raised the possibility that it is Iranian in origin (Magee, 2005).

A thin very fast wheel-made fabric, which we labelled Fabric 12, was also recovered from the Iron Age III deposits. Some examples of this ware were coated with a thick glaze that was brown to red in colour. This fabric represents one of the most technologically innovative ceramics in the Iron Age and is almost certainly an import from Mesopotamia or Iran (Fig. 41).



**FIGURE 37** Painted Fabric 5 sherds: (a) 13211.1008; (b) 13162.1001; (c) 13162.1002; (d) 13291.1008



**FIGURE 38** Diagnostic pottery from the collapse of Set 52 (5118 and 6414) and an ashy layer (5126) immediately below the collapse: (a) 11229.1004; (b) 11229.1014; (c) 11229.1001; (d) 11258.1001; (e) 11258.1002; (f) 15239.1011; (g) 15239.1002; (h) 15239.1001; (i) 15239.1006; (j) 15239.1003; (k) 15239.1009

In summary, although the Iron Age II material from Tell Abraç is well paralleled throughout the region, its position stratigraphically below the Iron Age III deposits is of immense importance in understanding the changes that were occurring throughout this region in the middle of the first millennium BC.

## 7 | SMALL FINDS

More than 1500 small finds have been recovered from Tell Abraç to date. Many of these are small amorphous lumps of bronze and crucible fragments that represent the refuse of metalworking that was taking place at the site during the



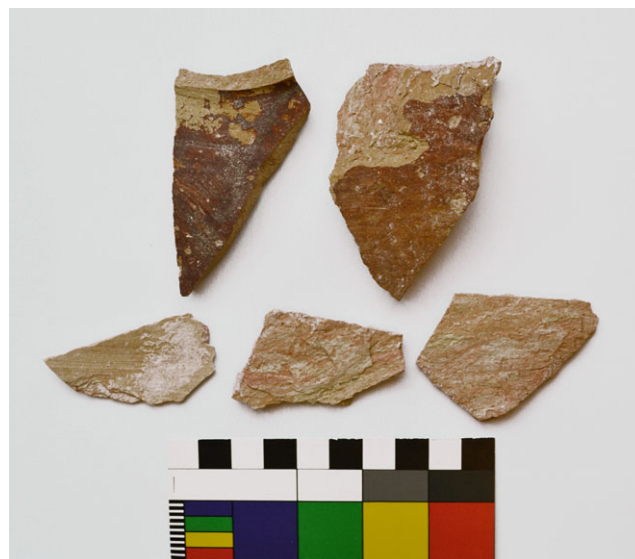


**FIGURE 39** Locally produced Iron Age III ceramics from Locus 5118 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 40** Burnished Maroon Slipped Ware (Fabric 7) from Locus 5118 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Late Bronze Age. Lumps of bitumen have also been found. Table 4 summarises the small finds and we discuss here some of the more important finds.



**FIGURE 41** Fabric 12 sherds from Locus 5118 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE 4** Summary of small finds

Small Finds	frequency
bead	19
bitumen	64
bronze lump	745
bronze objects and fragments	253
bronze slag	124
ceramic figurines	15
ceramic net sinkers/loom weights	7
crucible fragments	167
cylinder seal	1
flint	25
grinding stone	6
hammerstone	24
other stone objects	24
shell object	13
soft-stone fragments	102
whetstone	4
worked bone	1
Total	1594

Several terracotta camel figurines from Iron Age II deposits belong to a series of well-known figurines that were made after 1000 BC in south-eastern Arabia (Fig. 42). This example is painted in a decorative scheme that is paralleled by figurines from Muweilah in the Emirate of Sharjah (Magee, 2015). It is likely that the propensity for making these figurines in the Iron Age II period reflects the appearance of domesticated dromedary in the region.



**FIGURE 42** Terracotta figurines of dromedary camels from Iron Age II deposits [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Soft-stone vessel fragments have been recovered throughout the sequence, a sample of which is shown in Figure 43. These are decorated in a fashion typical for the Bronze and Iron Age in south-eastern Arabia. Of particularly interest in ongoing research is the soft-stone repertoire of the Late Bronze Age and Iron Age I period which, until now, has only been revealed in the excavations at Shimal. It is hoped that further exposure of these deposits will provide information on the transition from the dominant patterns of the Bronze Age comprising dot-and-circle decoration to the linear patterns of the Iron Age soft-stone corpus.

A stone cylinder seal was recovered from a disturbed Late Bronze Age deposit (Fig. 44). Decorated in simple linear patterns, it conforms to the very limited number of types that have been found in south-eastern Arabia. Its discovery in a Late Bronze Age deposit is particularly noteworthy since two cylinder seals were discovered in



**FIGURE 43** Examples of first- and second-millennia BC soft stone [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

similarly dated deposits in Potts's excavations (1990: 91, 123). Occurring at a time of increased contact with Mesopotamia, it is possible that this cylinder seal represents a local copy of an administrative device that had no function within south-east Arabian society but which was seen as an intriguing foreign curio.

The bronze sword hilt was discovered in the Iron Age III deposits (Fig. 45). Although the blade is gone, the type of sword to which it belonged has a long history within south-eastern Arabia (Potts, 1998: 191–199).

## 8 | ARCHAEOZOOLOGICAL RESEARCH

As noted above, one of the main aims of the project has been the investigation of the appearance of domesticated dromedary at Tell Abra. Research on this question is moving forward on a variety of fronts including archaeozoological



**FIGURE 44** A stone cylinder seal from a Late Bronze Age deposit [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 45** A bronze sword hilt from Iron Age III deposits [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

research, isotopic analysis of teeth, and DNA research. This work is long-term in scope, but it is worth noting in this preliminary report the species identified thus far in the Tell Abraq assemblage. The domesticated animals so far identified include cattle, sheep, goat, donkey, dog, and camel while wild mammals include hare, dugong, oryx, and gazelle in addition to a variety of fish and birds (Uerpmann M., 2001; Uerpmann & Uerpmann, 2005). Most noticeable among the latter are large quantities of Socotra cormorant remains, which are particularly abundant in the fills between the floors of the second half of the second millennium sequence on Terraces 3 and 4. In south-east Arabia cormorants are bound to mangrove habitats, which provide them with optimal conditions for feeding and breeding. Most important among the reptiles are different species of sea turtles.

As mentioned above, shellfish also provided a significant part of the diet, although we are aware that their role tends to be overestimated due to taphonomic issues, that is, better preservation than bones and teeth. Nevertheless, shell remains are abundant in all investigated areas and throughout all occupation phases. The most common species are *Terebralia palustris*, *Saccostrea cucullata*, *Marcia* sp. and, to a lesser extent, *Hexaplex kuesterianus*. Although the mollusc remains have not yet been studied in detail, our first impression is that there is little chronological variation of species composition. There are, however, differences in spatial distribution; for example, the species composition in the shell pits, which are more or less contemporaneous, is not always the same. Only in the deposits immediately beneath the collapse of wall Set 52 do we perceive an increase of *Marcia*. This stands in contrast to our investigations at Hamriya, where the degradation of the lagoon system to sabkha is reflected by the portions of key shell species: *Terebralia* is most characteristic for the earlier shell middens and *Marcia* clearly dominates Iron Age middens, while *Saccostrea* complements these species (Händel, 2009). It seems that at Hamriya, the increase of *Marcia* starts several hundred years earlier than at Tell Abraq and even then, *Marcia* does not dominate the shell assemblages. Due to the habitat preferences of *Marcia*, this suggests a degradation of the Hamriya lagoon system to tidal mudflats, which developed after accumulation of sediment started filling in the lagoon. *Terebralia*, on the other hand, is bound to a mangrove environment which seems still to have been intact at Tell Abraq by the mid-first millennium.

## 9 | CONCLUSION

Six seasons of excavations at Tell Abraq have fundamentally altered our understanding of the ancient settlement. These excavations have discovered a system of massive terrace walls and ditches culminating in the construction of

a 4–5 m-wide fortification wall at the end of the second millennium BC bounding another, lowermost terrace. By this time the fortified centre of the settlement consisted of four terraces that were—at least partially to the south—encircled by a massive ditch. Settlement, however, was not restricted to the area bounded by this ditch but extended outwards into the plain where extensive deposits and a great number of features such as pits and post-holes document centuries of non-perennial occupation.

This clearly demonstrates that the apogee of the settlement was not limited to the period when the Umm an-Nar tower was constructed. Rather, those who inhabited Tell Abraq continued to construct their surroundings so that it was a visible and important settlement across the coastal plains of the northern UAE. The longevity of the fortified settlement across the entirety of the second millennium BC is obviously a result of the relative stability of its immediate natural setting: an active lagoon providing access to marine resources and accessible fresh water. At the same time, the non-permanent settlement off the mound at the end of the second millennium points to episodic nucleation at this fortified settlement along the coast, which may, at least in part, have been driven by access to coastal resources. As noted elsewhere, this focus on the coastal resources of south-eastern Arabia was also critical to increased interaction with dromedary camels, which used the coastal zone for seasonal grazing (Almathen et al., 2016). It is perhaps not a coincidence therefore that the most complete bioarchaeological evidence for the transition to domestication comes from three coastal/lagoon sites: Muweilah, Tell Abraq, and al-Safouh.

Thus, settlement throughout the region was not necessarily contoured by the large-scale and well-documented maritime trade connections of the early second millennium BC. Examination of artefacts from the second half of the second millennium BC is still in progress but preliminary indications suggest that the inhabitants of Tell Abraq maintained maritime trade contacts with people across the Arabian Gulf and possibly beyond into the Arabian Sea. Thus, they adapted to changes in the geopolitics of the region as a whole while continuing to innovate local resources.

Finally, there is a significant and well-defined Iron Age III phase at Tell Abraq, which remains one of the least known phases of the Iron Age. Continued excavations at the site will provide more information on these centuries and as the trenches are continued to the north into the Umm an-Nar tower, unique insights into how this tower was used and how it relates to subsequent occupation will be revealed.

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