

# ARCHAEOLOGY AND ENVIRONMENT OF THE DEAD SEA PLAIN: PRELIMINARY RESULTS OF THE THIRD SEASON OF INVESTIGATIONS BY THE JOINT LA TROBE UNIVERSITY/ ARIZONA STATE UNIVERSITY PROJECT

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## Introduction

We report here on the third season of the Archaeology and Environment of the Dead Sea Plain Project's triennial fieldwork program located in the Dhrā' (الذراع) region of the Karak Governate (Fig. 1). The project has been a joint undertaking co-directed by Phillip Edwards (La Trobe University), Steven Falconer and Patricia Fall (Arizona State University), with the aim of investigating the consequences of long-term human interaction with the agriculturally marginal environment of the Dead Sea Plain. Our procedure has been to investigate pulses of occupation that fall at key periods of agricultural intensification during the Holocene. The first two seasons thus investigated the Pre-Pottery Neolithic A site of Zahrāt adh-Dhrā' 2 (ZAD 2) and the Middle Bronze Age hamlet of ZAD 1 (Edwards *et al.* 2001; 2002). Sediment cores were retrieved from the Lisān Peninsula (اللسان) and analysed in order to elucidate the palaeoenvironmental setting of these communities.

In further pursuance of these goals, the third season saw the completion of a detailed geological map of the Zahrāt adh-Dhrā' region, carried out by La Trobe student Emily House under the supervision of Dr John Webb and Dr Christopher Day. Emily House also took sediment samples from the ZAD 2 sections in preparation for a micromorphological study of the site's deposits. On the archaeological side, a third excavation season was carried out at ZAD 2, while La Trobe doctoral student Alexandra Ariotti simultaneously commenced work at Qaşr al-Bulayda (قصر البليدة) (Fig. 1). This sprawling Roman-Nabatean site complex represents the most recent of the 'pulses' of human occupation investigated by the project, and dates to one of southern Jordan's most significant periods of socioeconomic intensification. Project excavations have been completed at the intervening MB site of ZAD 1, and in the current season, Steven Falconer conducted a wide-ranging survey in order to contextualise ZAD 1 within a landscape that is dominated by enigmatic but apparently ritual con-

structions which include numerous cairns, monoliths, and wall lines. Below we provide summations of Falconer's landscape survey work together with reports on the excavation season at ZAD 2 (Phillip Edwards), the survey, excavation and analysis of Qaşr al-Bulayda (Alexandra Ariotti, Steven Falconer and Patricia Fall) and the ongoing analyses of the Lisan sediment cores (Patricia Fall and Thomas K. Swoveland).

(PCE, SEF and PLF)

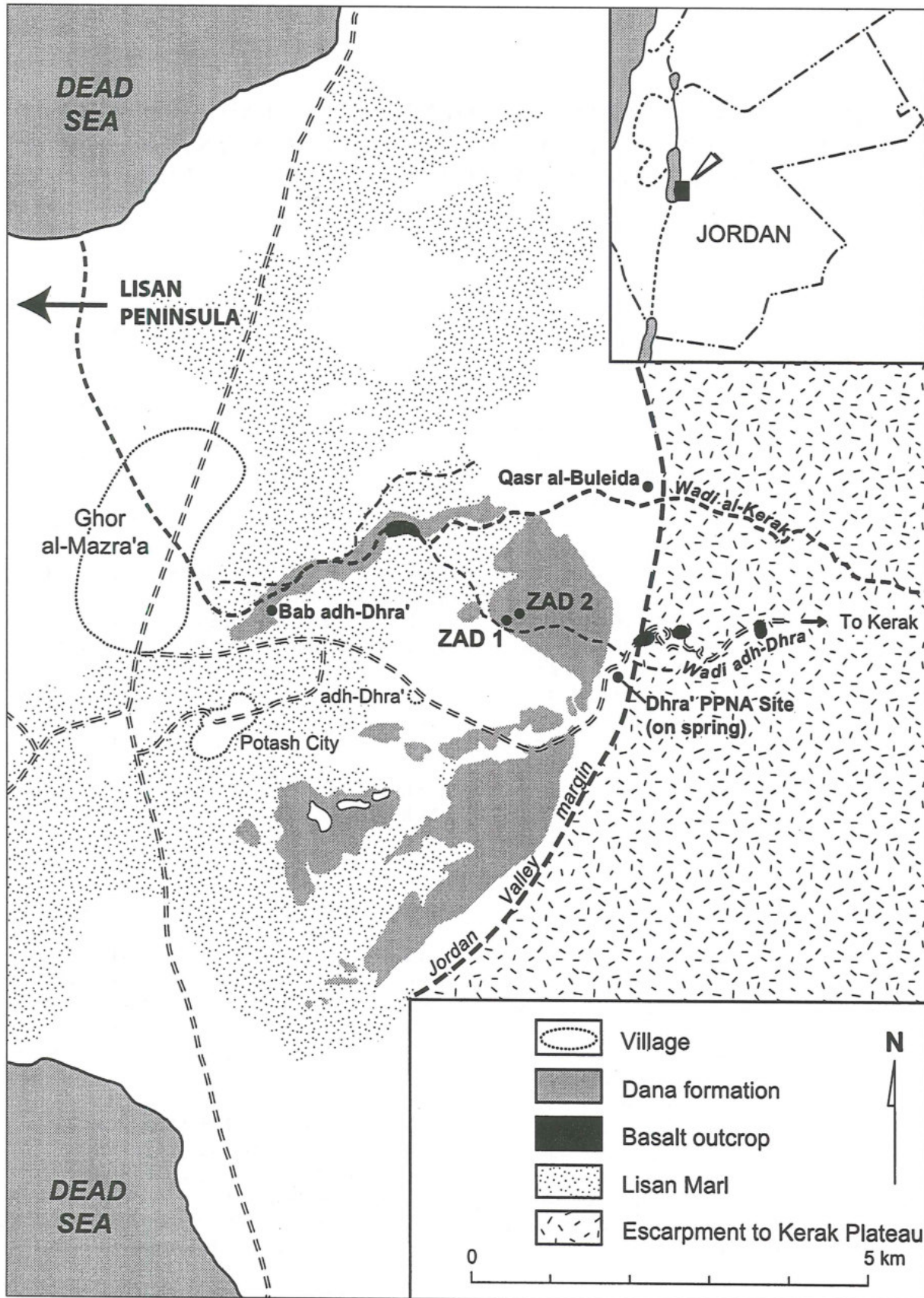
## Palaeoenvironmental Investigations on the Lisān Peninsula, Dead Sea

In 2000 eight sediment cores were collected from four localities along the northwestern edge of the Lisān Peninsula. Cores were collected from the modern surface of the Lisān Peninsula with a mechanized rotary drill rig and with a hand operated piston corer. In a previous article (Edwards *et al.* 2002) we reported on the preliminary results from Lisan Core 3, spanning the time period from 20,000 to 12,000 BP (uncalibrated radiocarbon years before present). Carbon and oxygen isotopes revealed a late glacial climate, between 20,000 and 14,500 BP, that was relatively cold and dry compared to today, followed by warmer and wetter climatic conditions from 14,500 to 12,000 BP (Swoveland 2001; Edwards *et al.* 2002). In this report we discuss the stratigraphy and radiocarbon ages for the younger cores, Dead Sea 1-3; and the carbon and oxygen isotopes from Dead Sea 3. Figure 2 shows the location of Lisan Core 3 and Dead Sea Cores 1-3.

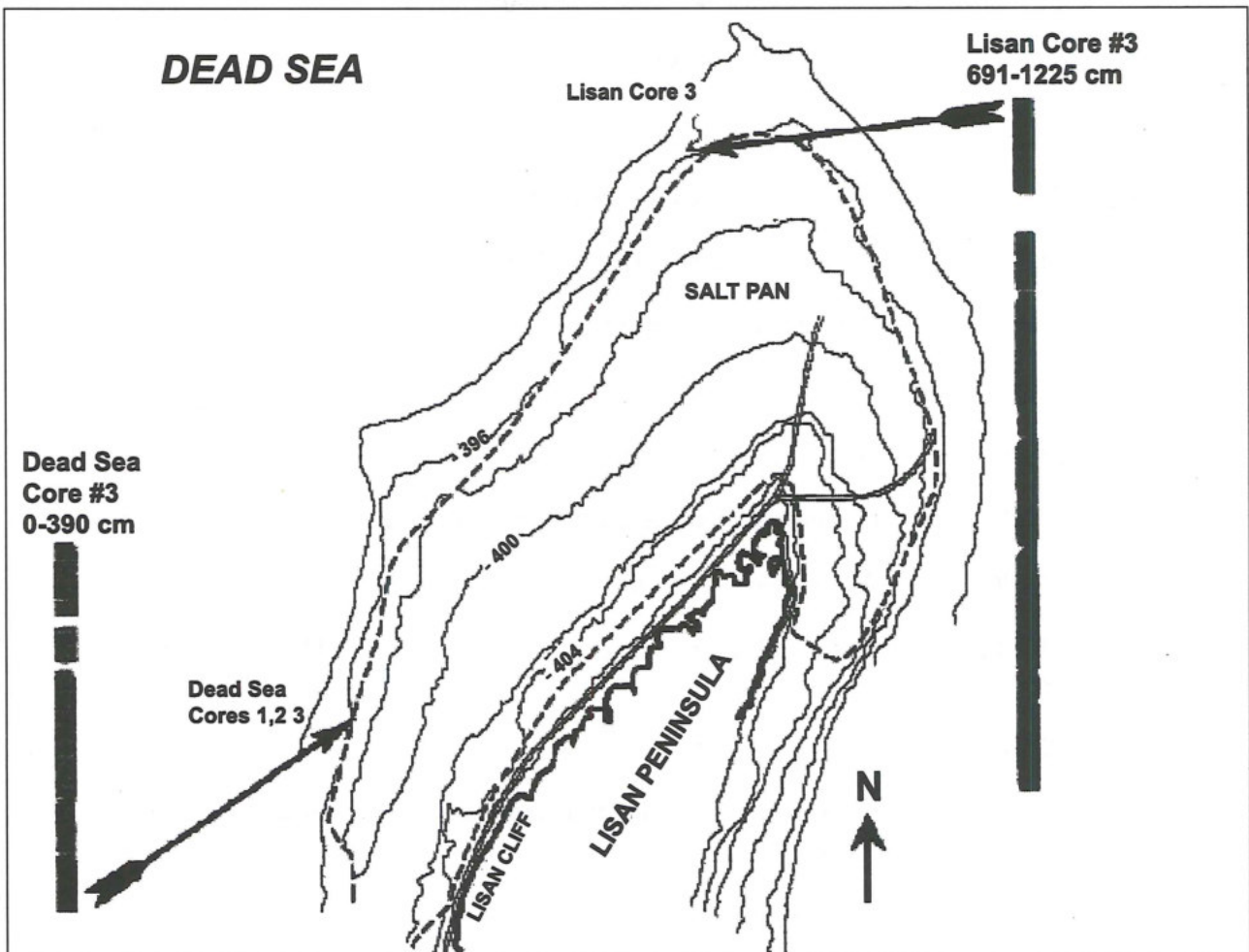
## Sediment Recovery of Dead Sea Cores 1-3

Three shorter cores (Dead Sea Cores 1, 2 and 3) were collected from along the northwestern edge of the Lisān Peninsula with a 5cm-diameter piston corer at -404 to -405mbsl (meters below sea level). The cores were taken approximately 100m (DS 1 and 2) and 50m (DS 3) inland from the modern western shore of the Dead Sea (Fig. 2). An impenetrable layer (15-25cm thick) of halite covers





1. The Dead Sea Plain, indicating fieldwork and other localities mentioned in the text.



2. The northern end of the Lisān Peninsula showing the coring localities of Lisan Core 3 and Dead Sea Cores 1-3; gallery images show the laminated stratigraphy of Lisan Core 3 and Dead Sea Core 3.

this portion of the peninsula in the vicinity of Dead Sea cores 1-3. This halite layer formed in shallow water in a near-shore environment. The halite shows ripple marks (indicating the prevailing wind direction from the WNW) and is covered with a fine layer of dust documenting wind erosion following formation. Vertical cracks in the clay and aragonite layers below the halite crust document a period of exposure and desiccation on the peninsula. Cores DS 1 and 2 were collected a few meters shoreward from the halite layer where our piston corer could penetrate the softer sediments below the halite crust.

Sediment was recovered from Dead Sea Core 1 to a depth of 65cm; below this the water table was encountered and no deeper sediments were recovered (Table 1). Dead Sea Core 2 was collected a few meters from DS 1. Sediments were recovered from the surface to 73cm and from 240 to 555cm below the modern surface, with the water table encountered between 73 and 240cm depth where no

sediments were present. Dead Sea Core 3 was collected about 50m seaward of cores 1 and 2, at about 1m lower elevation (-405 mbsl). Sediments were recovered from Dead Sea 3 between 0 and 58cm and from 100 to 391cm, with the water table between 58-100cm.

#### *Radiocarbon and Sediment Analyses of Dead Sea Cores 1-3*

The sediments in the Dead Sea cores are brown to grey clays with white aragonite ( $\text{CaCO}_3$ ) layers and some minor evaporate minerals present in some sections (Table 1). The topmost sediments have no laminations and contain halite crystals. The lowermost sediments contain sand-size particles (ooids). Radiocarbon (AMS) analyses of small pieces of wood and charcoal fragments were used to date the cores (Table 2). DS 2 represents the period between about 5000 and 1500 BP, from the Chalcolithic through the Byzantine period. DS 3 may cover a similar time span; the younger, dat-



**Table 1:** Sediment description of Dead Sea Core 1-3.

Core	Depth (cm)	Sediment description	Interpretation
<u>DS 1</u>	0-21	Massive brown clay with halite crystals	Very shallow water
	21-65	Truncated aragonite and clay laminae	Deeper water
	65-189+	Water table (no sediment)	
<u>DS 2</u>	0-23	Massive brown clay with halite crystals	Very shallow water
	23-33	Grey clay and aragonite laminae	Deeper water
	33-73	Overtuned grey clay and aragonite laminae	Tectonic event(s); deeper water
	73-240	Water table (no sediment)	
	240- 425 depth	Massive grey clay with occasional laminae	Moderate water
	425-475	Missing sediment	
	475-555	Massive grey clay with gritty sediment beach	Shallowest, near
<u>DS 3</u>	0-7	Massive brown clay with halite crystals	Very shallow water
	7-58	Grey clay and aragonite laminae	Deeper water
	58-100	Water table (no sediment)	
	100-122	Grey clay with aragonite laminae	Deeper water
	122-348 depth	Massive grey clay with occasional laminae	Moderate water
	348-391 beach	Brown crumbly sandy sediment (ooids present)	Shallowest, near

ed portion of the core covers about 2690 to 1350 BP, from the late Iron Age through the late Byzantine period. An analysis of the number of laminations per year in DS 3 shows a 1:4 ratio between the number of couplet layers and the number of radiocarbon years, whereas the ratio is close to 1:1 between layer couplets and years in Lisan Core 3 (Prud'homme 2002). This demonstrates that the couplets in Lisan Core 3 probably represent annual laminations, whereas the laminae in Dead Sea Core 3 were not deposited annually.

#### *Palaeoenvironmental Interpretation Based on Dead Sea Cores 1-3*

The youngest sediments recovered were late Byzantine in age, suggesting that the water level in the Dead Sea dropped following the Byzantine period (**Table 2**). At least the upper 150 years of sediment have been eroded from the top of Dead Sea Core 2, based on a comparison of the surface ages of DS 2 and DS 3. Halite crystals in the uppermost sediments of Dead Sea 1, 2 and 3 represent a shallow water, near-shore environment. The laminated



**Table 2:** AMS age determinations from the Dead Sea Cores (DS 2 and DS 3).  
Beta ages calibrated courtesy of Beta Analytic; ANSTO ages (labeled OZG) calibrated using Calib 4.4.

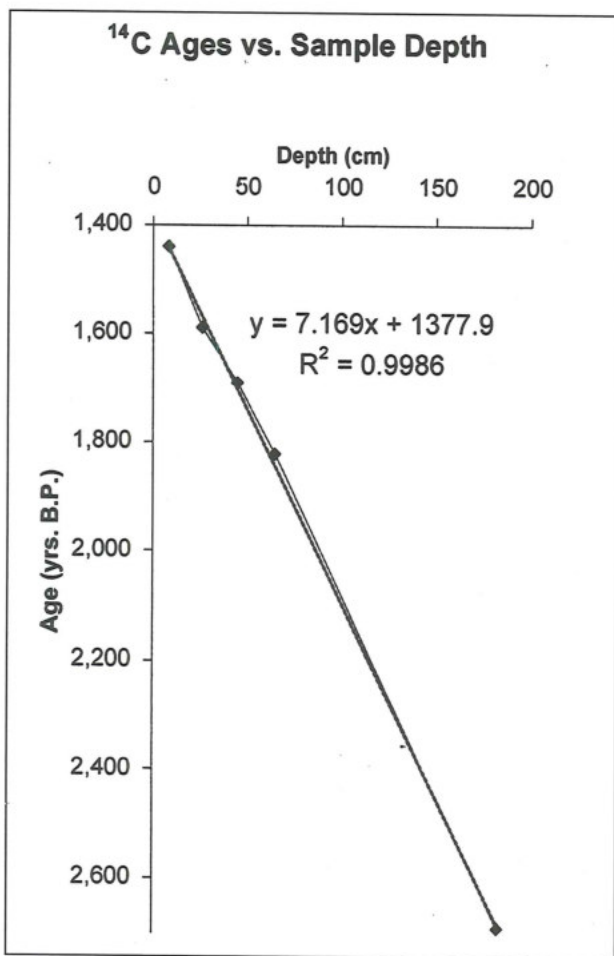
Core	Depth (cm)	Age (yr BP)	Laboratory Number	Calibrated Age (95% probability Stuiver <i>et al.</i> 1998)	Cultural Period
DS 3	8.5	1440 $\pm$ 40	Beta-160106	AD 550-660	late Byzantine
DS 3	26	1590 $\pm$ 40	Beta-160107	AD 400-560	Byzantine
DS 3	45	1690 $\pm$ 40	Beta-153581	AD 250-430	late Roman/Byzantine
DS 3	108	1820 $\pm$ 40	Beta-153582	AD 100-260 and AD 290-320	late Roman
DS 3	234	2690 $\pm$ 50	OZG298	930-790 BC	Iron II
DS 2	1.5	1510 $\pm$ 40	OZG294	AD 440-640	Byzantine
DS 2	299.5	2670 $\pm$ 40	OZG295	900-800 BC	Iron II
DS 2	361	7030 $\pm$ 50*	Beta-155306	6000-5790 BC	--
DS 2	398.5	30050 $\pm$ 300*	OZG296	--	--
DS 2	512	5020 $\pm$ 50	Beta-155307	3960-3680 BC	Chalcolithic
DS 2	548	5020 $\pm$ 50	OZG297	3950-3700 BC	Chalcolithic
*These two AMS ages are interpreted to represent reposition of older wood into these massive and possibly reworked clays. OZG296 was a very small twig weighing 7mg. A third sample from 268cm produced too little carbon to age (Beta-160108).					

clays and aragonite below the massive clays with halite crystals were deposited in deeper water. Both Dead Sea Cores 1 and 2 show evidence of tectonic activity. The laminae in DS 1 are offset; laminae in DS 2 are overturned. Based on AMS ages from DS 2 the tectonic event(s) occurred in the late Roman/Byzantine period. The more massive clays without distinct laminations were deposited prior to the Roman period, in a moderate water depth. The lowermost sediments in both DS 2 and 3 contain sand sized ooids suggesting that they were deposited at the beach edge of the Dead Sea where wave action could rework the sediments into small spheroids. Based on two AMS ages from DS 2 these lowermost sediments were deposited near the end of the Chalcolithic period.

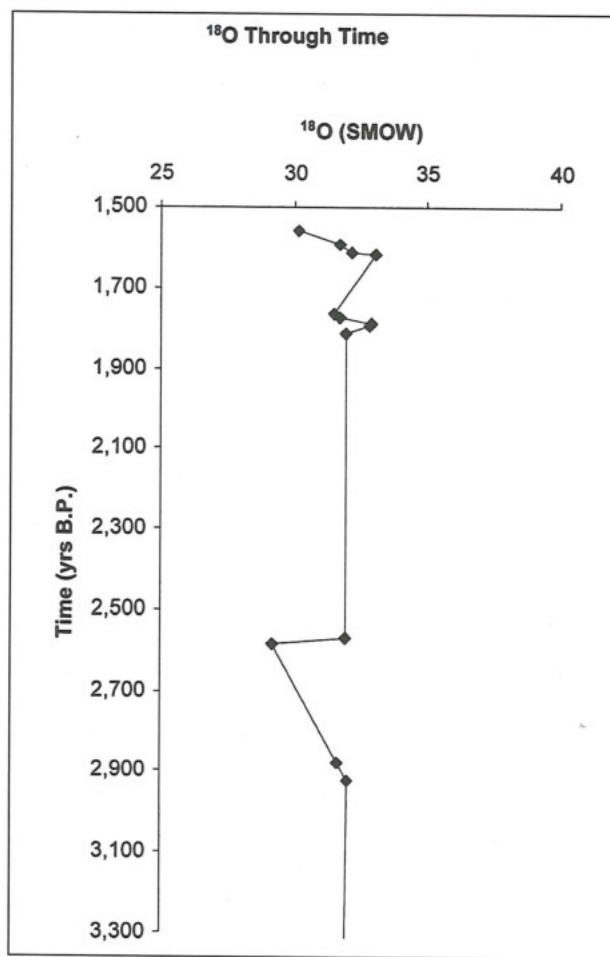
#### *Carbon and Oxygen Isotope Analyses of Dead Sea Core 3*

Isotope analyses were conducted at Arizona State University by Swoveland. Based on the regression curve of AMS ages we calculated the age/depth relationship for DS 3 to compensate for the water table and lack of sediments deposited between 58-100cm below the modern surface (Fig. 3). Thus, for depths below 100cm we subtracted 42cm from their actual depths (Table 3). The deposition rate for DS 3 is about 6.6 years/cm. No isotope samples could be analyzed between 107-221.5cm depth (64-178.5cm corrected depth), from about 2660 to 1800 BP.

Analyses of carbon and oxygen isotopes were undertaken on the aragonite layers in DS 3. It is



3. Regression curve for age vs. depth for Dead Sea Core 3.



4. d18O SMOW (o/oo) from Dead Sea Core 3.

assumed that  $^{13}\text{C}$  can be used as a proxy for past precipitation, and that  $^{18}\text{O}$  is a proxy for paleotemperature.  $^{18}\text{O}$  becomes enriched as temperatures increase and  $^{13}\text{C}$  becomes enriched during dry periods. Isotopic results cover the time period from about 3290 to 1560 BP, from the Iron Age through the Byzantine period (Table 3). Variations in  $^{18}\text{O}$  and  $^{13}\text{C}$  are presented in Figs. 4 and 5.

A relative temperature curve was created from the  $^{18}\text{O}$  data using Craig's 1965 formula:

$$T(c) = 16.9 - 4.2(d_c - d_w) + 0.13(d_c - d_w)^2$$

where  $d_c$  indicates the  $^{18}\text{O}$  value of the mineral and the  $d_w$  value indicates the  $^{18}\text{O}$  value of the water from which the mineral precipitated. Without a clear  $d_w$  value, no absolute temperature numbers can be predicted. However, a relative temperature curve can be created comparing each mineral value to each other (Fig. 6).

The variations for the carbon and oxygen isotopes in DS 3 are relatively minor.  $^{13}\text{C}$  values lie between -1.99 to 2.17 PDB, and  $^{18}\text{O}$  values range between 33.06 and 29.23 SMOW. Much larger

variations for these isotopes (between about -16 and 2 PDB for  $^{13}\text{C}$ , and from about 20 to over 38 SMOW for  $^{18}\text{O}$ ) are seen in Lisan Core 3 between 20,000 and 12,000 BP (Swoveland 2001; Edwards *et al.* 2002). Values for  $^{13}\text{C}$  between about -2 and +2 in Lisan Core 3 were interpreted as relatively dry conditions; and values of  $^{18}\text{O}$  between 33 and 29 SMOW were interpreted as relatively warm conditions. Isotope trends in DS 3 are relatively minor. Based on single data points, wetter conditions might be interpreted at about 2900 BP and warmer temperatures at around 2600 BP (both during the Iron Age). The isotope records show variability in temperature and precipitation from about 1800 to 1500 BP (late Roman/Byzantine) with perhaps a slight warming trend during the Byzantine period. Although the Roman/Byzantine era is interpreted here as warm and dry compared with the late Pleistocene (glacial), Dead Sea lake levels were higher than during the ensuing Islamic periods. Thus, the climate during the Roman/Byzantine era was cooler and wetter than today.

(PLF and TKS)



**Table 3:** 13C and 18O isotopic analyses from Dead Sea Core 3.

Depth (cm)	Depth* (corrected)	Estimated Age (yr BP)	$\delta^{13}\text{C}$ (pdb)	$\delta^{18}\text{O}$ (SMOW)
12	12	1560	-0.46	30.2
30	30	1590	0.09	31.69
33	33	1610	-1.2	32.2
34	34	1620	-0.49	33.06
47	47	1700	0.5	31.53
50	50	1724	0.85	31.73
50.5	50.5	1726	-1.99	32.89
53	53	1740	1.22	32.8
107	65*	1810	-0.17	31.97
221.5	179.5*	2570	1.29	31.95
225	183*	2590	1.29	29.23
268	226*	2880	2.17	31.62
275	233*	2920	-0.16	32
330.5	288.5*	3290	-1.37	31.97

\*42cm are subtracted from the depth below ground surface to compensate for the water table and lack of sediments between 58-100cm.

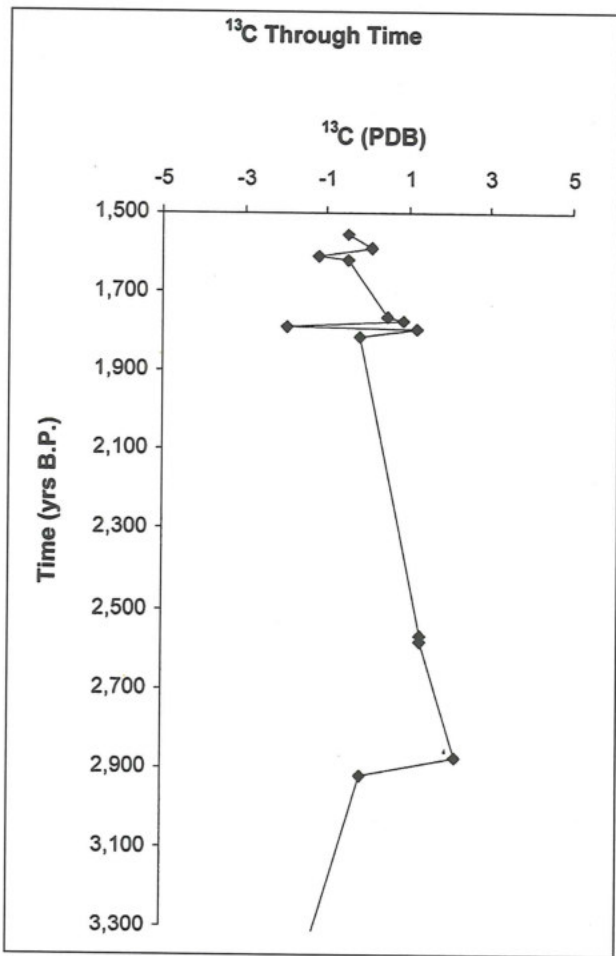
#### Excavations at the Pre-Pottery Neolithic A Site of *Zahrat adh-Dhrā'* 2 (ZAD 2)

The first two seasons of excavations in 1999 and 2001 revealed ZAD 2 as a small, low occupation mound containing an array of curvilinear architectural remains, distributed over an area of about 2,000 square meters. Three soundages excavated to the natural sediments at a maximum depth of 1.5 metres (in Structures 1, 2 and 3), revealed a single phase of curvilinear huts, containing a maximum of four successive floor layers in Structure 2. Nine radiocarbon dates demonstrate a relatively short-lived settlement dating to 9,600 – 9,300 BP, or from 9,250 Cal BC to 8,330 Cal BC. Since the vertical stratigraphy of the site had been fully investigated in the previous two seasons, the

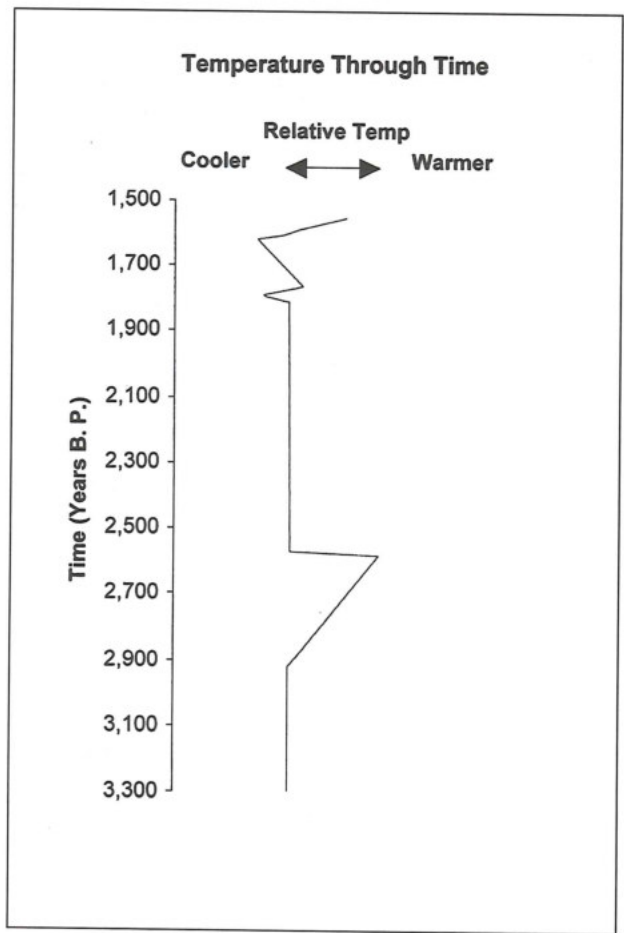
current season concentrated on horizontal exposure of the uppermost floors in Structures 2 and 4 (Fig. 7).

Accordingly, excavation in Structure 2 proceeded to expose the uppermost (Phase 1) floor south of the F. 4 (=Feature 4) hearth (Fig. 8). Square L25 revealed an oval cuphole mortar (F. 8) also set into the floor and framed by a surround of cobbles and pebbles (Fig. 9). To the south of this in turn was found a pestle fragment, and a fragmentary incised limestone plaque just above it. From Square M26 the floor gently dipped in an easterly direction, giving way to an earthen floor strewn with stone pebbles and fragments.

A hearth (F. 9) represented by stones strewn about an area of burnt and discoloured sediments



5.  $\delta^{13}\text{C}$  PDB (o/oo) from Dead Sea Core 3.



6. Relative temperature based on  $\delta^{18}\text{O}$  SMOW (o/oo) from Dead Sea Core 3.

in Squares M/N 26 yielded a rich trove of objects (Figs. 8, 10) including a complete pebble incised with a cross-hatched, geometric design on one face; two blank but shaped limestone plaques; a fragmentary ceramic figurine incised with a design of parallel short strokes, a fragment of a large bone haft, bone needles, pestles, hammerstones, edge-ground axes, large and small flaked tranchet axes, picks and cores. The concentration of artefacts thus included the first substantial numbers of bone tools found at ZAD 2. Many of the flaked artefacts here were made on a distinctive light grey flint, hitherto not encountered at ZAD 2. Many animal bone fragments were also recovered from the feature. The shaped limestone plaques are particularly interesting because they indicate an *in situ* workshop for the types of elaborately incised stone items found at ZAD 2 and more generally across PPNA sites in the Levant. Between F. 9 and Wall 1 lay an oval hearth (F.10) formed by an inset layer of burnt and fragmentary stones.

The relationship of Structures 2 and 3 was elucidated by the excavation of Square T22 (Fig. 8),

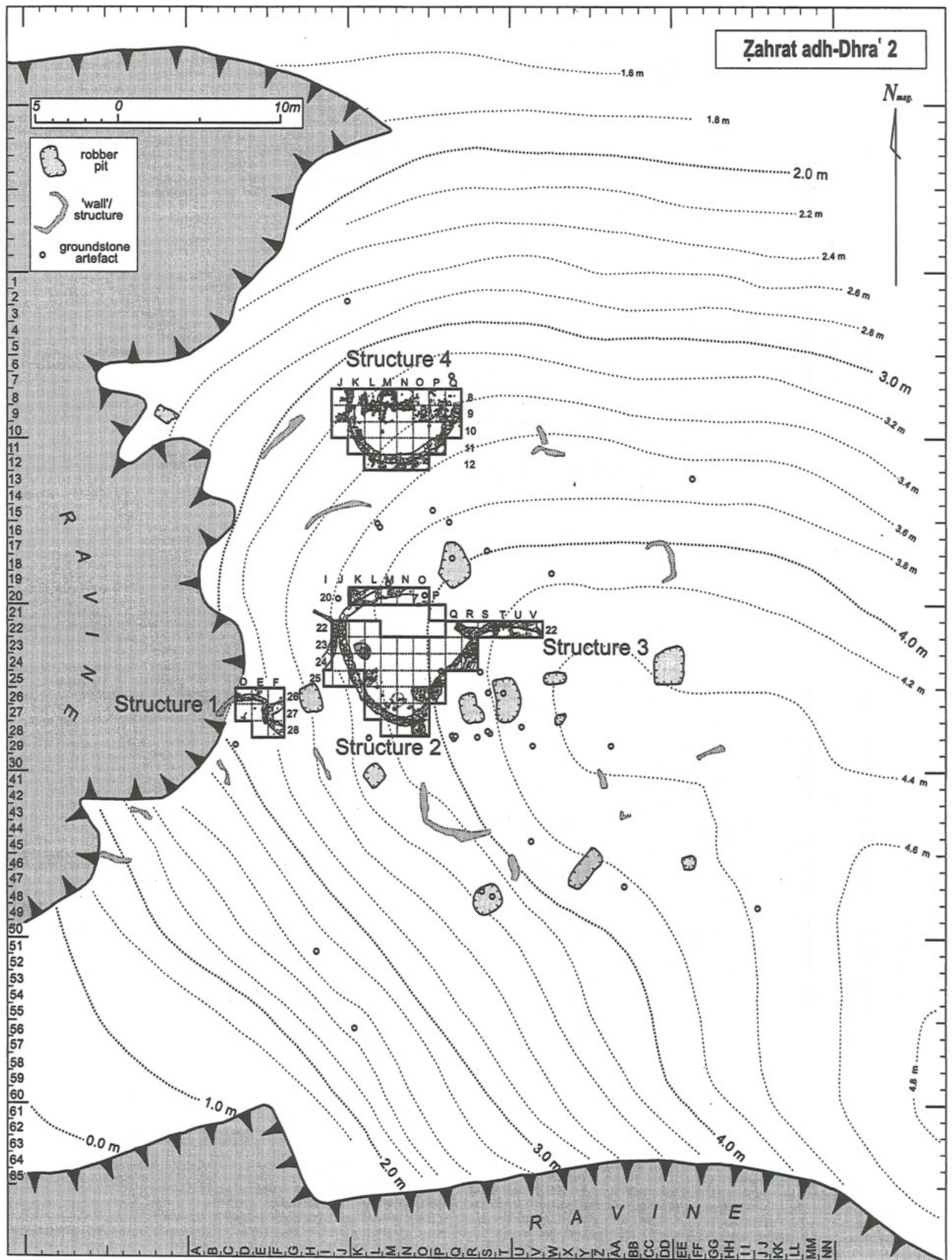
which revealed that the structures are linked by a single long outer wall which follows a sinuous path, first curving to the north-east in Structure 2 and then returning to the south-east in Structure 3. The excavation of Square P21 encountered no architectural remains, thereby strengthening the likelihood of a doorway to Structure 2 in this area (Fig. 10), a possibility first indicated by the abrupt termination of F. 7 in Square Q22.

Excavation of the much shallower deposits in Structure 4 (Fig. 11) continued in a northerly direction this year. The cobblestone floor associated with Wall 1 in 2001 was found to continue over a broad area (Squares L/P-8/11). Wall 1 also continued to the north through Squares J/K-8/10 to the limits of excavation. Three oval to oblong circular stone installations were positioned in Squares L/M-8 (Fs 2-4). The middle one (F.2) consisted of limestone cobbles and fragments fixed with mortar, forming an enclosed ovoid area.

#### Artefacts from ZAD 2

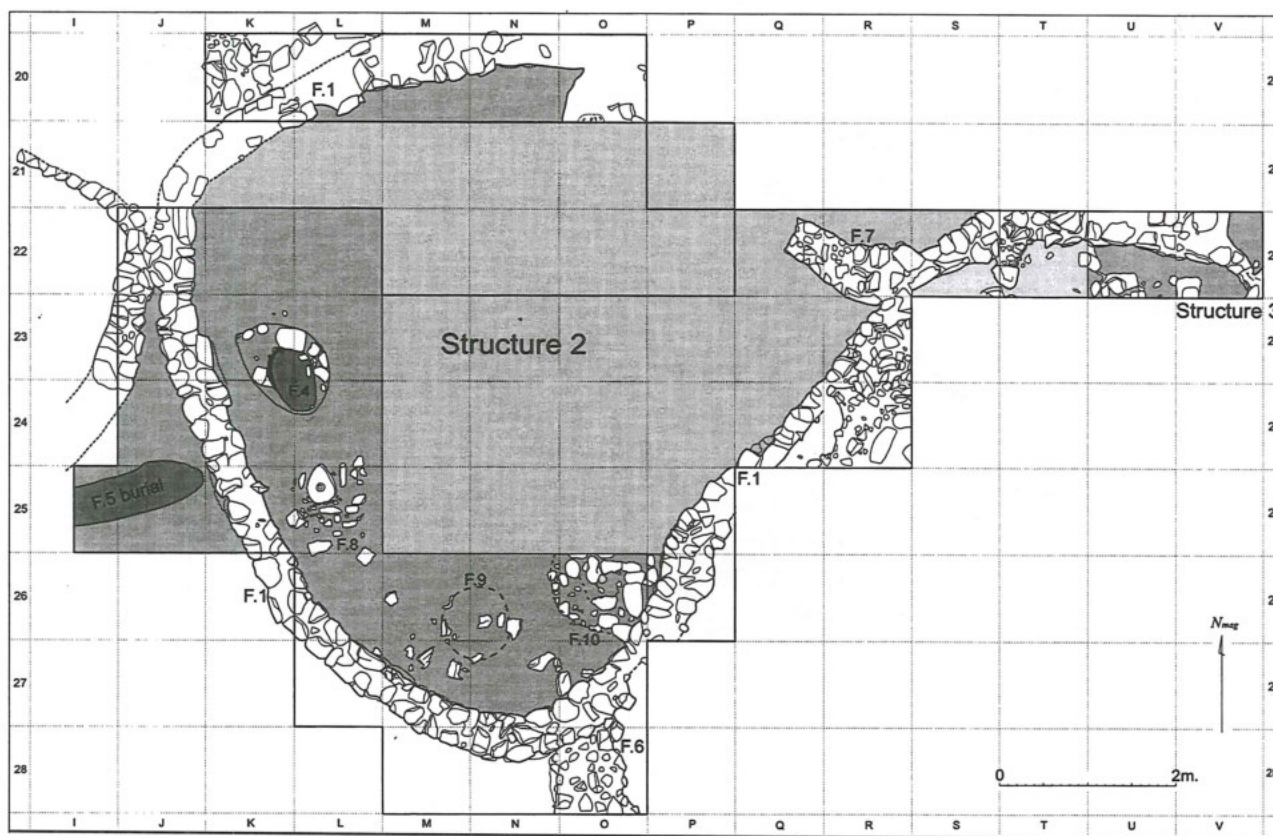
A wide variety of small finds were made in





7. Zahrat adh-Dhra' 2 after three seasons of excavation.





8. Structures 2 and 3, ZAD 2. Darker shading indicates areas excavated to the uppermost (Phase 1) floors. Lighter shading denotes incomplete excavations above these.



9. View of (F. 4) hearth (left) and (F. 8) cuphole mortar (right) in Structure 2, ZAD 2.

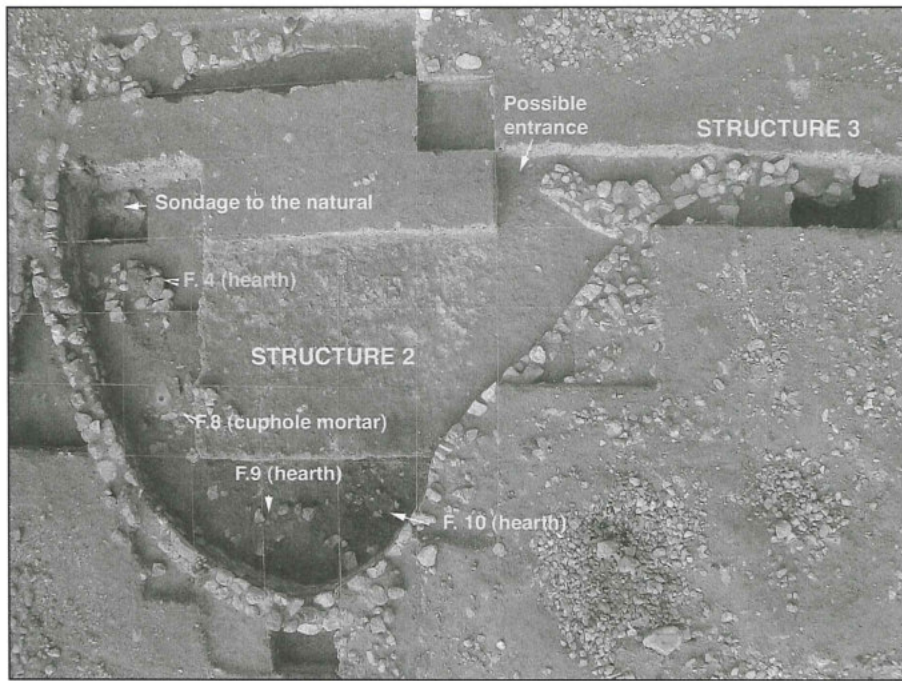
2002, including several types not previously discovered at ZAD 2. Two incised pieces were found; the first a broken limestone fragment (Registration Number [= RN] 02005) etched with five vertical lines pendant from a horizontal line (Fig. 12c) and the second a complete pebble (RN 020060) incised with a cross-hatched design of horizontal and vertical strokes on one face (Fig. 12d). The latter

came from the rich F. 9 feature, which also yielded two shaped but plain limestone pieces in the form of an ovoid plaque (RN 020063, Fig. 12a) and a rectangular piece (RN 020065, Fig. 12b), together with a fragmentary ceramic figurine (RN 020061, Fig. 13). The figurine was incised with a delicate double-band of dashed lines.

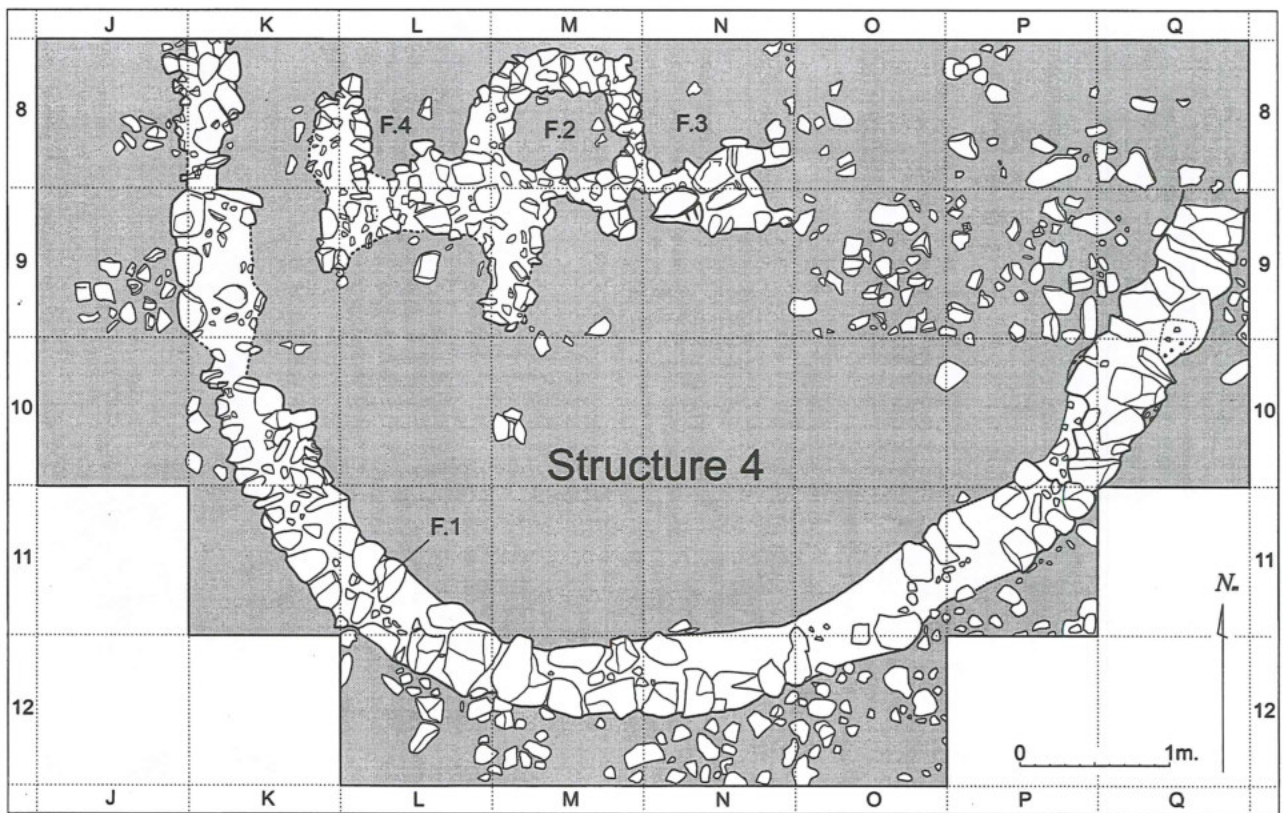
Bone tools were found in numbers at the site for the first time (Fig. 14), in the form of needles (e.g. RN 020082), and a large fragmentary bone shaft, possibly a handle (RN 020081), associated with the nearby hearth, F. 10. Groundstone items included a basalt pestle with a flared termination (RN 020058), and a broken limestone bowl (RN 020011). Rare sickle blades with silica gloss were retrieved, including a broken fragment of a Beit Ta'amir sickle (RN 020015), and an unusual, small backed and bi-truncated example (RN 020088). A newly encountered type was a small, concave-based and bilaterally backed piece that resembles a blunted Salibiya point, but which, alternatively, may represent an unused Hagdud truncation (RN 02007). A complete obsidian bladelet (RN 02009) was the largest obsidian piece yet discovered from the site.

(PCE)





10. Areal view of Structures 2 and 3, ZAD 2.



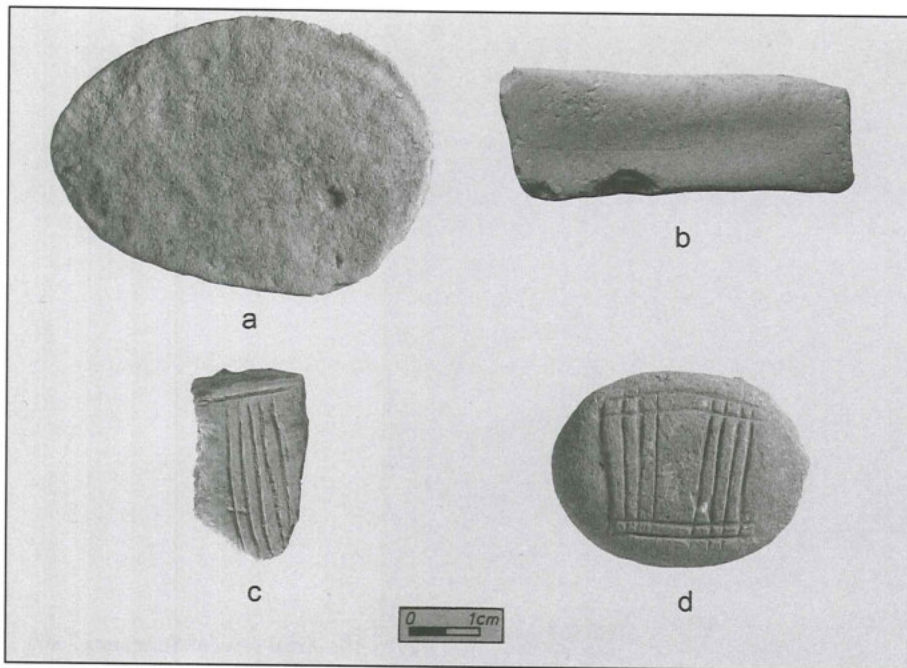
11. Structure 4, ZAD 2.

### Reconnaissance of the Plain of Dhrā'

Between December 10 and 13, 2002 Falconer, accompanied by other project members, reconnoitered an extensive ritual landscape of cairn tombs and monumental features lying south of

Wādī al-Karak (وادي الكرك) and extending east and southeast of Potash City, which had attracted our attention during the previous excavation seasons at Ḥahrat adh-Dhrā'. The only previous systematic reconnaissance of the southern portion of the Plain

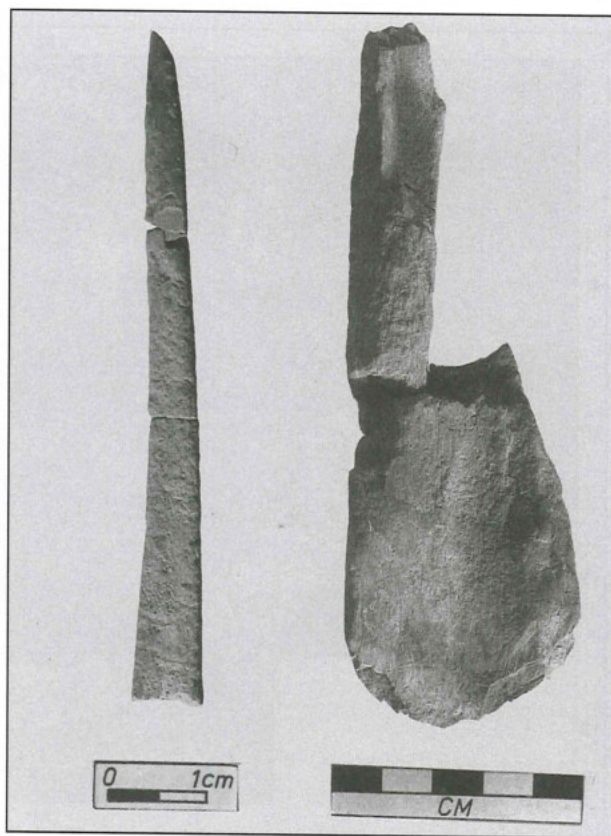




12. Objects associated with the hearth (F. 9) in Structure 2; (a) Plain ovoid plaque RN 020063, (b) shaped rectangular limestone piece RN 020065, (c) Broken, incised limestone plaque RN-02005; (d) incised limestone pebble RN 020060.



13. Obverse and reverse views of fragmentary ceramic figurine (RN 020061), associated with the hearth (F. 10) in Structure 2.



14. Bone tools associated with the hearth (F. 10) in Structure 2; (left) bone point (RN 020082) broken into three fragments and (right) fragmentary bone handle (RN 020081).

of Dhrā', a survey of the proposed Potash City town site in 1977 (McCreery 1977/78; Clark 1979), characterized the roughly 60 hectare expanse of the townsite as a 'necropolis' probably dating to the Chalcolithic Period. This survey, an outgrowth of the Bāb adh-Dhrā' (باب الذراع) excavations, had special interest in any possible evidence of Early Bronze Age burials, since "the southern boundary of the Bāb adh-Dhrā' cemetery has never been defined" (McCreery 1977/78: 150). The sur-

vveyors noted that most surface pottery lay in the northern portion of the township, most notably in two concentrations of Chalcolithic and Early Bronze I-II sherds at its northernmost periphery,



about one kilometer south of Bāb adh-Dhrā' (McCreery 1977/78: 151; Clark 1979: 57). However, in contrast to the charnel houses and subterranean shaft tombs that constitute the Bāb adh-Dhrā' cemetery (e.g., McCreery 1977/78: 161; Schaub 1981: 45; Schaub and Rast 1989), this burial ground featured 30 poorly preserved, above-ground tumuli or cairn tombs. These tombs had one or two central burial cavities defined by one or two concentric stone rings ranging between two and six meters in overall diameter (McCreery 1977/78: 154; Clark 1979: 61-67). All but one of the tombs lay south of an enigmatic one meter-wide, east-west stone wall that was traced for more than two kilometers. Both ends of this wall were eroded or disturbed, so its full length remained uncertain (Clark 1979: 58). The most prominent features of this cemetery were two large stone circles (Clark's "Ring 1" and "Ring 2"), each measuring approximately 25 meters in diameter, bisected by two parallel lines of stones and punctuated with two to three tumuli along their perimeters (McCreery 1977/78: 154-155, fig. 3; Clark 1979: 70-73, fig. 10; Worschech 2002: abb. 17.2).

Our 2003 reconnaissance suggests that this ritual landscape once extended over a much larger area between the foot of the mountains of Karak to the western edge of the Plain of Dhrā', positioned south of Wādi al-Karak, and to the south and southeast of present-day Potash City. Isolated cairn tombs were located north and northeast of ZAD 1 and 2, some not far from the Wādi al-Karak's south bank. More numerous tombs lie over an area extending two to three kilometers south and southeast of Potash City, especially along prominent ridgelines (Fig. 15). Falconer visited at least 50 tombs

beyond Potash City that clearly represent an extension of the cemetery reported previously by McCreery and Clark. In keeping with their published descriptions of the Potash City cemetery, these additional cairns include one or two concentric stone circles, usually defining a single central chamber, occasionally a double chamber, running the gamut of Worschech's (2002: 107) R2A, R2B and R3 cairn typology. A clear bisecting wall marks the double-chambered tombs. The most monumental of the cairns lies atop a large basalt ridge south of Potash City. With two clear concentric wall alignments of massive stones and an exterior diameter of 10 meters, it would have been a topographically prominent edifice. Virtually all the tombs visited in 2003 have been eroded or robbed, most reveal poorly preserved human bone fragments, and very few provide material culture.

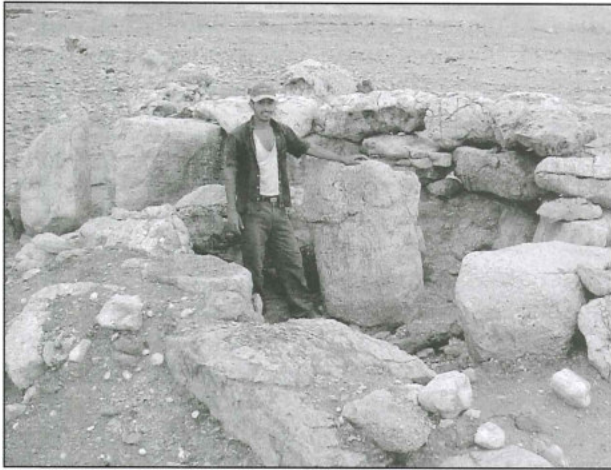
The most notable feature among these newly reported tombs is a large stone oval lying approximately 1 kilometer south of the Mazra'a-Karak road. This oval, measuring approximately 80 by 100 meters, is a larger version of Clark's Rings 1 and 2. Its northern arc incorporates a single-chambered cairn measuring five to six meters in diameter (Fig. 16). To the east-southeast of this oval lies a very rubbly large square structure with sides roughly defined by four pairs of parallel walls. Regrettably, both this structure and the stone oval with its cairn tomb provided no surface material culture.

In conjunction with these cemetery explorations, Falconer and Christopher Day visited the Monolithic Pillar Site reported by Körber (1993) roughly 500 meters south of the Wādi adh-Dhrā' at the foot of the mountains of Karak. Although



15. Cairn tombs along a ridgeline south of Potash City. Note tomb in foreground and upright stones of two tombs on the horizon, facing west.





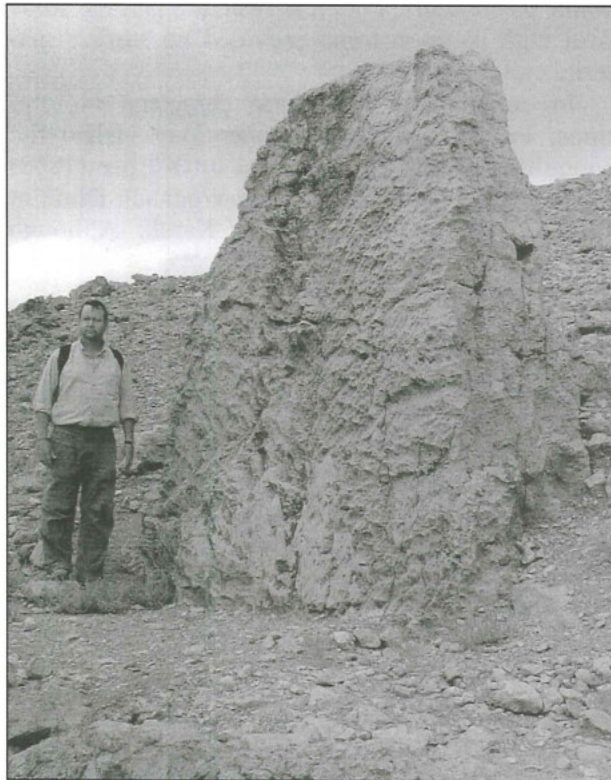
16. Yunis Salameh Abu Arqub standing in a circular cairn tomb incorporated into the northern arc of the large stone circle south of Potash City. Note central pillar and stones of large circle in the background; view east.



18. View north to a portion of the 400-metre long wall associated with the Monolithic Pillar Site.

Körber coined the site's name from a nearly three meter tall stone monolith (Fig. 17), its most substantial feature is a nearly 400-meter long stone wall that descends to the west along a ridgeline toward the Plain of Dhrā' between two small but severely incised wadis (Fig. 18). Körber (1993: 551) described tumuli associated with the wall, including a semicircular stone structure "pieced on to the monolith." Our visit identified another circular

stone alignment at the foot of a second standing stone erected to the north of the wall. We also noted that the site's wall still stands up to three courses high, with well-laid flat faces. Abundant large rock fall suggests this wall once stood considerably higher. It is tempting to speculate that this boundary marker may have once linked with the east-west wall reported by McCreery and Clark. At the very least these walls clearly are integral features of a varied and widespread ritual landscape on the Plain of Dhrā'.



17. Christopher Day standing next to the Monolithic Pillar reported by Körber (1993); view southeast.

The dating of this landscape and its integration with the ancient communities of Dhrā' remains elusive. The Potash City survey excavated 14 cairns and three soundings along the two kilometer east-west wall that produced a modest ceramic collection made up primarily of small body sherds (Clark 1979: 73). Unfortunately, no pottery figures from this survey have been published (although Clark refers in his article to a pottery figure which remained inadvertently unpublished, but which he has since graciously allowed us to inspect). McCreery (1977/78: 161) summarizes the Potash City pottery as unpainted coarse ware "with large calcite inclusions and ... steep angled, simple rims, rope molding decoration and loop handles." Clark describes it as "poorly made," low fired, "hand-made and very coarse with much grit tempering," and points to a major diagnostic characteristic of "applied bands of finger-moulded clay" (Clark 1979: 73-74). Both McCreery and Clark (1993: 552) propose a Chalcolithic date for this pottery, and by extension the entire Potash City burial complex, based especially on its coarse, heavily tempered ware and finger impressed rope molding. Körber similarly labels the pottery associated with



the Monolithic Pillar Site as Chalcolithic and Early Bronze Age without discussion or illustration. These chronological inferences must have considered the apparent absence of local settlement from the Middle Bronze Age through the Hellenistic Period (e.g., McCreery 1977/78: table 1; McConaughy 1981; Rast and Schaub 1974; Schaub and Rast 1989: 45), but they offer at least two clear caveats. McCreery (1977/78:161) notes that Jim Sauer, a leading authority on the pottery of ancient Jordan, considered the assemblage to be "atypical," presumably for the Chalcolithic. In addition, Clark (1979: 77) suggests prudently that "so little is known of the Chalcolithic material remains in this region that it would be rash to speculate too far at this stage".

Several other threads of evidence suggest that this presumed Chalcolithic date should be reconsidered. First, Schaub and Rast (1989: 489, fig. 283) raise the possibility of an alternate date for Tomb B1, a circular tumulus in Area B along the Karak road east of Bāb adh- Dhrā'. They note, "an unusual sherd [unavailable] recorded from the area around Tomb B1 was part of a cooking pot with simple vertical rim and small holes around the side just below the rim. The type is illustrated in Megiddo Stratum XVI [Loud 1948: pl. 7:11], and dates to the early part of MB II" (Schaub and Rast 1989: 489). Second, Worschech (1985: 28-34, figs. 7-9) reports approximately 50 circular tumuli along the Wādī Jarra, about five kilometers north of Wādī al-Karak, which he interprets as similar to the tombs described by Clark (1979). Worschech's excavation of one tomb and exploration of about 30 others produced no chronologically diagnostic material culture. While acknowledging the lack of conclusive evidence, he dissents from Clark's suggested Chalcolithic date for the local tombs of this type, suggesting "a date to the MB period seems more likely" (Worschech 1985: 31). Third, Clark (1979: 67) describes pottery "mingled" with human bones inside Potash City Cairn 1 that belonged "to the same vessel, or one very similar, as a number of sherds which were found on the surface outside the cairn." He posits that these sherds were either broken in the cairn at the time of burial or already lay on the ground at the time the cairn was built over them, "finding their way into the chamber when the burial was made" (Clark 1979: 69). In either case, as Clark notes, the sherds provide a *terminus post quem* for the burial. Two of these sherds (to have been illustrated in Clark 1979: fig. 11) are described as pieces of a handmade "pithos-type" vessel with walls 7-11 millimeters thick and a "flat" rim, below which are "a

series of deep finger impressions" and "a raised applied clay band" (Clark 1979: 73). This description and our subsequent inspection of drawings of the pottery excavated from Cairn 1 (courtesy of V. Clark) suggest the strong possibility that these sherds represent Middle Bronze Age cooking pots similar to those excavated in abundance from Zahrat adh-Dhrā' 1 (Edwards, et al. 2002: fig. 24), therefore implying that Cairn 1 dates to the Middle Bronze Age at the earliest.

During our 2003 reconnaissance we inspected abundant sherds in the vicinity of the Monolithic Pillar Site, and very little pottery anywhere else. Associated with the pillar and its wall we found one clearly Roman sherd, one modern jar fragment and numerous generically Bronze Age sherds, but nothing diagnostic of a specific period. Otherwise our wide-ranging visits to the cairns south of Potash City produced a total of two to three Roman sherds and a handful of possible Bronze Age ceramic fragments.

The identification and excavation of Zahrat adh- Dhrā' 1 (Edwards et al. 2001; 2002) now dispels the presumption that the Plain of Dhrā' was uninhabited during the Middle Bronze Age. It now seems clear that the Dhrā' cairn tombs are unlikely to date to the Early Bronze Age and that at least some of them (e.g., Tomb B1, Cairn 1) probably date to the Middle Bronze Age. Moreover, the published descriptions of pottery associated with these cairns coincides remarkably with our analyses of the major pottery components excavated from Zahrat adh-Dhrā' 1: coarse-tempered, plain rim, straight-sided, flat-bottomed cooking pots (Edwards et al. 2001: 152-153; 2002). The ZAD 1 assemblage clearly dates to Middle Bronze II A and early Middle Bronze II B. These tantalizing lines of evidence raise the distinct possibility that an elaborate ritual landscape, perhaps dating to the Middle Bronze Age and involving the occupants of Zahrat adh-Dhrā' 1, was a major expression of Bronze Age life and death on the Plain of Dhrā'.

(SEF)

### Investigations into the Roman/ Nabataean Complex at Qaşr al-Bulayda

A number of architectural complexes and surface features located at Qaşr al-Bulayda (QB) reveal an extensive Nabataean and Roman (ca. 312 BC- 324 AD) presence nestled under the steeply rising Jordan Valley margin on the north bank of Wādī al-Karak (Fig. 1). Qaşr al-Bulayda ('the country palace [or] fort') includes a small hamlet comprising the remains of three fortified architectural complexes that have not been previously

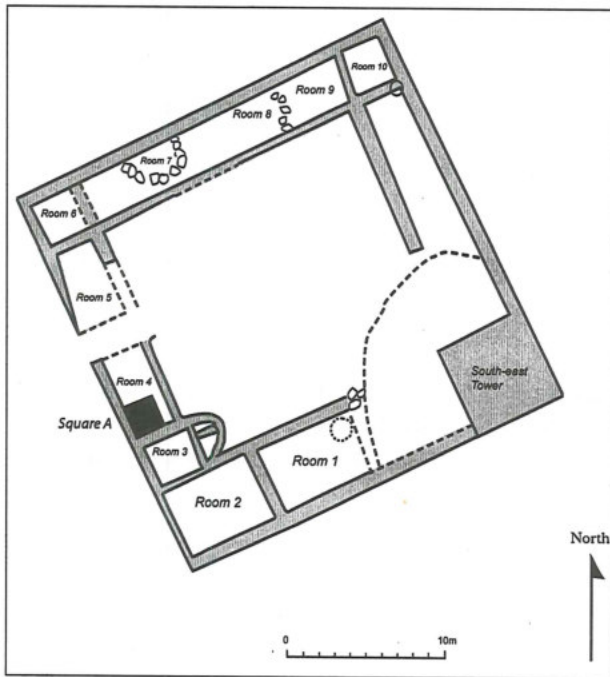


investigated, as well as a number of other features positioned within a one and a half square kilometre area. Even though the QB complexes have not been intensively studied, they were nevertheless subject to a survey in 1983 and 1984 by Worschech (1985) as part of the 'Northwest Ard Al-Karak Project'. Worschech referred to the three structures in question as 'Sites 45', '46' and '47', terms which have continued in use as part of this investigation.

The aims of this fieldwork season were to plan and record in detail the three complexes; to survey the QB localities to produce a base map making clear the exact position of the complexes in relation to the natural landscape, to each other, and to additional man-made features such as ancient roads, dams, aqueducts and terraces; and to combine surface survey with small-scale excavation.

*Qaşr al-Bulayda Site 45*

Site 45 is a square building measuring 26.7m x 26.4m located in the middle of a dry and arid plain immediately below the final escarpment of the edge of the Jordan Valley (Fig. 19). Site 45, the best preserved of all three structures, features a tower (6.1 x 5.9 m) in the southeast corner which stands five to six courses high, with the lintel of the entrance visible above rubble from the tower's collapsed upper section (Fig. 20). The rectangular stone blocks are well-dressed with small limestone chips filling the interstices, rendering each course balanced and symmetrically aligned. On the west-



19. Plan of Site 45, Qaşr al-Bulayda.



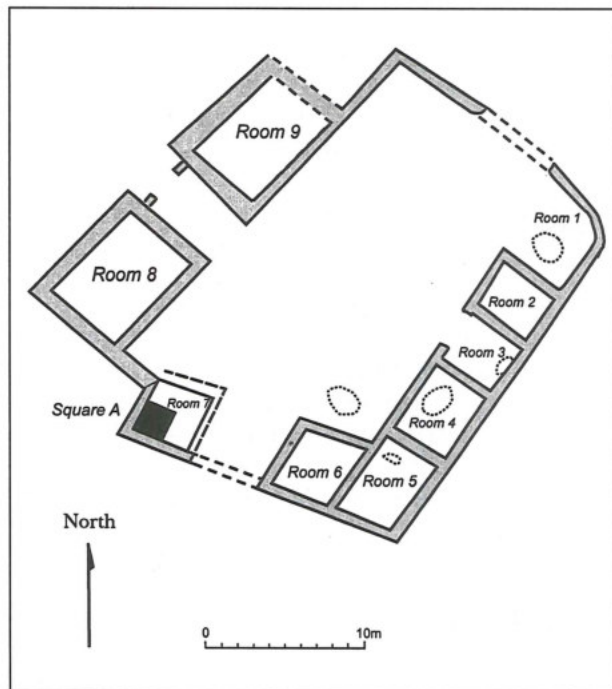
20. Tower located at the southeast corner of Site 45, Qaşr al-Bulayda.

ern face of this tower, the exterior surfaces of the stone blocks are carved in 'boss' relief. An inscribed single letter, either Thamudic or Nabataean, was recorded on the exterior surface of a limestone block on the tower's northern face. The perimeter wall lines (0.95m-1.05m in width) are symmetrically aligned and are composed of irregular-shaped medium to large sized blocks of undressed limestone and pink sandstone measuring 0.87m x 0.38m to 0.48m x 0.35m in size. These enclosure walls are two to three courses high and reveal an interior open courtyard around which rooms of varying sizes (ranging from 3.8m x 3.1m to 6.6m x 6m) are positioned. Lining the southern perimeter wall, one of these rooms contains an intact olive or wine press (1.4m in diameter) that suggests this area may have been used for industrial purposes. Since rooms with similar dimensions to the SE tower are positioned in each of the other corners, it is likely that these were also corner towers built to heights of at least two stories. Along with the thick and solidly built enclosure walls, it is clear that Site 45 was well fortified and may have served a defensive purpose. There are many Nabataean/ Roman potsherds scattered over the site and three coins were found on the surface.

*Qaşr al-Bulayda Site 46*

Site 46 is situated approximately 1 kilometre to the south of Site 45 in an open area presently surrounded by cultivated plots of land (Fig. 21). It is positioned on a slightly elevated artificial mound where traces of terracing are visible to the north and west of the structure. Site 46 is not well-preserved: the centre of the complex has been flattened, removing the middle sections of the east and west perimeter walls and displacing the stones so that these, as well as other interior walls, are not in situ. There are also a number of circular and ovoid-



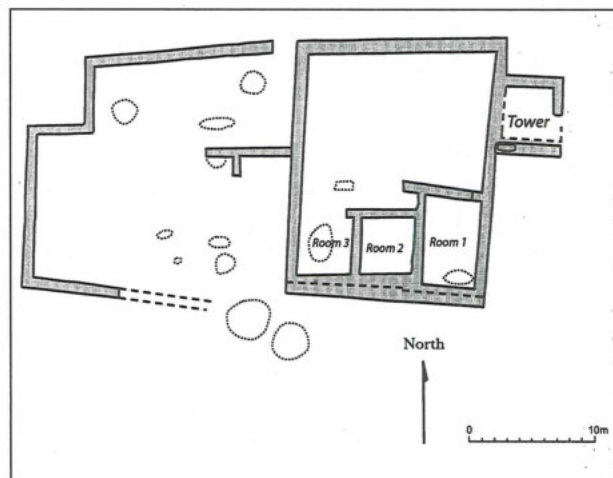


21. Plan of Site 46, Qaşr al-Bulayda.

shaped pits and depressions dotted throughout the structure that may be graves of a more recent date. Site 46 measures 26m x 24m in size and is slightly irregular in plan. The perimeter walls are 0.75m to 1.15m wide, comprised of medium and large-sized blocks of undressed limestone, chert and pink sandstone (0.4 x 0.6m to 0.45m x 0.65m) that stand two to three courses high. Like Site 45, small limestone chips fill the interstices of the walls so that the courses appear even and straight. A series of interior rooms of similar size (5m x 5.5m to 5.05m x 6.4m) are built against the south and west perimeter walls (the eastern part of the structure is too damaged to trace any wall lines). In the northern part of the complex are two large rectilinear rooms measuring roughly 9m x 7m that flank the building's entrance (3.7m wide) and a passageway that leads to an internal open courtyard. There may be two occupational phases at Site 46 as evidenced by differences in the types of masonry used in certain sections of the structure; for example, the southern boundary wall of Room 9 is constructed with small stones (0.10m x 0.15m) rather than the medium and large-sized blocks used elsewhere at the site. The surface pottery scattered across the site has been identified as Nabataean/Roman and two coins were recovered at surface level. Like Site 45, it is clear from the ground plan and masonry that Site 46 was well-fortified with the addition of possible watchtowers, but its function remains a matter of conjecture.

#### Qaşr al-Bulayda Site 47

Located about 400m to the southeast of Site 46 and 150m to the north of Wādī al-Karak on a slightly raised artificial mound is Site 47 (Fig. 22), a fortified complex with much evidence of post-occupational disturbance. There are a number of circular and ovoid-shaped pits and depressions throughout the site which may be graves of a more recent date (there is also a grave in east-west alignment situated near an adjoining tower in the northeast and constructed from the tower's southern boundary wall) and some modern walls built from reused stone blocks. Site 47 features solidly-built encasement walls (0.75m- 0.87m in width) in regular alignment which stand three to four courses high in some places, as well as a northeast tower two courses high and measuring 5.5m x 5.3m in diameter. There appear to be two phases of construction at Site 47: the main rectilinear complex (measuring 15.9m x 14.55m in diameter) with the tower, an interior courtyard and three rooms of varying sizes (5.3m x 6.4m to 5.65 x 8.2m) lining its southern perimeter wall; and an (earlier?) complex positioned on a slightly lower, plateau-like area immediately to the west and measuring 21.7m x 21.1m in diameter. Here, the perimeter walls are in different alignment to the main structure, with the southern wall running to the south of this complex. Only one internal contemporaneous wall line is visible within the central enclosure which is surfaced with a gravely deposit. The walls are composed similarly to Sites 45-46 and the main structure of 47 stands one to two courses high, with a maximum width of 0.77m. The surface material scattered throughout Site 47 is Roman with very little Nabataean pottery identified. Given its architecture and its location next to Wādī al-Karak, it may be that Site 47



22. Plan of Site 47, Qaşr al-Bulayda.



served a defensive purpose and is possibly later in date than Sites 45 and 46.

(AA)

### Additional Sites and Features at Qaşr al-Bulayda

A number of other archaeological features and sites have been surveyed and documented in the QB locality. These include the remains of an aqueduct built with large, dressed limestone and sandstone blocks (1.03m x 0.70m) and measuring 1.4m-2.16m in width with traces of plaster visible on its upper exterior surface. This aqueduct can be followed, in sections, following a narrow wadi to the west and south of Site 45 and then along the bottom of a ridge to the east of Sites 46 and 47 where it runs in a north-south direction. It terminates at the edge of Wādī al-Karak next to the remains of a possible dam. Along the north and south ridges of Wādī al-Karak to the east of Site 47 are a number of complexes which may be broadly dated to the Roman period and which can be assigned a defensive or military function on the basis of their location, architectural form and surface scatter material. Site 47.1 is located about 1 km from Site 47 on the upper northern ridge of the *Wadi* and appears to be a watchtower (5m x 5m) consisting of four neatly aligned walls (0.65m in width) standing four to five courses high with the same type of masonry as the other QB sites. A further 700m along this ridge on a flat plateau is a large L-shaped structure with solid encasement walls and a tower standing four to five courses high. The walls of Site 47.2 are 1.03m-1.12m in width and are composed of large square and rectangular limestone boulders (0.4 x 0.6m) arranged in straight courses. There is a dense concentration of Nabataean and Roman pottery scattered over the surface. As this site occupies a strategic position with a clear view looking down Wādī al-Karak, it seems certain that it served in antiquity as a small fort.

Further along the northern ridge of the wadi is a possible Nabataean aqueduct cut into the sandstone face. The surface of the aqueduct is well-finished in some portions and some stones bear the characteristic Nabataean oblique-angled dressing. On the south side of Wādī al-Karak near Site 47.2 is a rectilinear structure (Site 47.3) with solid walls (0.75m in width) built from very large irregular limestone boulders (1m x 0.56m) that stand five courses high and encircle four interior rooms. Site 47.4 is situated about 50m to the west and features a number of interrelated wall lines over a 150 square-metre area scattered with many sherds (Bronze Age and Roman). Its walls are preserved

from one to three courses high.

Site 47.4 appears to be the same site identified by Körber (1993: 553) as "a major Early Bronze Age II/III city" lying "on the southern bank of the mouth of Wadi el-Karak into the Ghor." Körber named the site "Buleda," though Worschech's survey apparently did not encounter it. Our inspection of the settlement and its surface pottery corroborated an EB II-III date, with the more reserved suggestion that this settlement was a moderately sized village. Today this site perches on the steep southern cut bank of Wādī al-Karak, with no nearby plain of flat, potentially arable land such as that found on the north bank around sites 45, 46 and 47. This site location suggests a higher stream level during the Early Bronze Age, with subsequent severe downcutting.

(AA and SEF)

### Excavations at Qaşr al-Bulayda

#### *Qaşr al-Bulayda Site 45*

A 2m x 2m trench was laid out alongside the southern and western boundary walls of Room 4 in the best preserved complex, Site 45, to obtain an occupational history of the site. Five layers of heterogeneous natural and cultural deposits were encountered, contained 385 Nabataean/Roman sherds (38 diagnostic), five coins, two beads, glass and (animal) bone fragments and deposits of mudbrick and charcoal. Traces of an occupational surface of hard compact clay associated with Wall 1 were identified. Of interest, this excavation showed that Site 45 has at least two phases of construction: the southern boundary wall of Room 4 (Wall 1) is an earlier wall built directly on top of the natural bedrock surface, while the western perimeter wall of Site 45 (Wall 2) was built from a higher surface, and thus belongs to a later constructional phase.

#### *Qaşr al-Bulayda Site 46*

A 2m x 2m trench was also laid alongside the northern and southern boundary walls of Room 7 in Site 46. Five layers were excavated, which yielded 367 sherds (39 diagnostic) of Nabataean/Roman date, as well as two coins, *ṭābūn* fragments, glass and animal bone fragments and charcoal that, together with some soil samples, have been collected for post-excavation analysis. A compact clay occupational surface was identified that appeared to be contemporaneous with Walls 3 and 4. These walls were engaged and built directly on top of the underlying natural gravel sediment.

#### *Qaşr al-Bulayda Site 47*

A sample of surface pottery was collected from



Site 47 for post excavation analysis, as there was no time to conduct a small excavation during this fieldwork season. Two samples of diagnostic material (mainly Roman) were collected from the main complex (11 sherds), as well as the 'west plateau' structure (26 sherds) to assess whether these parts of Site 47 are contemporaneous in date to Sites 45 and 46.

(AA)

#### **Carbonized Plant Remains from Qaşr al-Bulayda Sites 45 and 46**

Carbonized plant material was recovered from the excavation trenches effected at Site 45 and Site 46 at Qaşr al-Bulayda. A total of twelve liters of sediment, from two sample localities: QB 45, Area A, Locus 4, bag 1 (3.5 liters) and bag 2 (3.5 liters); and QB 46 Area A, Locus 3, bag 1 (3 liters) and bag 2 (2 liters), was processed by water flotation at ACOR in Amman. After measuring the sample volume, each sample was poured into a bucket of clean water and then gently mixed by hand to loosen the plant material from the soil matrix. A clean piece of cloth (mesh 0.5mm) fitted over a strainer was used to collect the buoyant seeds and plant fragments. This was repeated until all plant material was collected. The dried flotation samples were then sorted under low magnification (10-40X) at Arizona State University.

A modest number of seeds, wood fragments and snail shells were found in these samples. The results of the seed analyses document that cereals and legumes were components of the diet of the inhabitants of Qaşr al-Bulayda (Table 4). Food plants include bread wheat, emmer, and hulled barley seeds, as well as both lentil and pea. Field weeds and wild grass seeds suggest the presence of local fields. The most common wild seed is *Aizoon*. *Aizoon hispanicum* is common on saline and gypseous soils, characteristic of the Dead Sea region (Zohary 1973: 443, 466).

(PLF)

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**Table 4:** Carbonized plant remains from Qaşr al-Bulayda sites 45 and 46.

Plant material	Sample	
	QB:46 3.0A	QB:45 4.0A
Nutlet fragments	4	-
Cultivated legume fragments	2	-
Lentil ( <i>Lens esculenta</i> )	-	1
Pea ( <i>Pisum sativum</i> )	2	1
Bread wheat ( <i>Triticum durum/aestivum</i> )	-	1
Emmer ( <i>Triticum dicoccum</i> )	1	-
Undifferentiated wheat ( <i>Triticum</i> sp.) fragment	1	-
Hulled barley ( <i>Hordeum</i> ) fragment	-	1
Cereal grain fragment	1	-
<i>Phalaris</i> sp.	1	-
Undifferentiated wild grass	1	-
<i>Aizoon</i> cf. <i>hispanicum</i>	11	3
<i>Chenopodium</i> sp.	-	1
Unidentified seeds	2	-
Volume of sediment floated	5 liters	7 liters

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