

**SOUTHERN GHORS AND NORTHEAST 'ARABAH  
ARCHAEOLOGICAL SURVEY 1986, JORDAN  
A PRELIMINARY REPORT**

by  
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### Introduction

The Southern Ghors and Northeast 'Arabah Archaeological Survey (SGNAS), Jordan, which was a follow-up of a 1985 reconnaissance survey (Koucky and MacDonald 1985), was in the field from October 14 to December 5, 1986.<sup>1</sup> A total of 39 days were spent in actual infield work. The survey team was located in the Jordan Valley Authority housing complex in Mazra' to the north of the survey area. The team consisted of B. MacDonald, director; R. Adams; G.A. Clark; M. Gregory; and M. Neeley. N. Beqa'in acted as representative of the Department of Antiquities of Jordan.

The territory surveyed extends from Ghor eṣ-Ṣafi in the north to Wadi Fidān in the south (Fig. 1). Geomorphologically, this area is easily divided into two sections by the pronounced, fault-bounded escarpment: 1) the north section extends from Ghor eṣ-Ṣafi and the Dead Sea as far south as Wadi Khuneizīr; 2) the south section extends from the edge of the escarpment, immediately south of Wadi Khuneizīr, to Wadi Fidān. From north to south, elevations vary from — 392m northwest of eṣ-Ṣafi to just above sea level at Wadi Fidān. Thus, a rise of ca. 400m over a distance of a little more than 40 kilometers. From west to east, the rise is even more pronounced.

For the purposes of actual infield work, the SGNAS stratified the territory on the basis of the Jordan 1:50,000 scale maps (Series K737) into five regions: 1) agricultural land, farms, orchards and plantations; 2) gravels, gravel/cobble veneer, and colluvium; 3) sandy areas, including dunes; 4) piedmont (the dissected slopes of the wadi edges of the *Graben*); and 5) wadi beds and their ridges. The strata frequently determined the methodology used. Pedestrian transects can be employed quite easily in strata one, two, and three. However, such is not the case for strata four and five. For various reasons, all areas of the territory were not surveyed in the same manner or with the same intensity. The final report on the survey will outline fully the methodology employed, the results, and the conclusions drawn from surveying in each strata.

The SGNAS surveyed a total of 240 sites. These sites were plotted on the Jordan 1:50,000 (Series K737) (Fig. 2) and on the 1:10,000 scale maps where possible.<sup>2</sup> Descriptions of all sites were made and some of the sites were sketched. Photographs were taken of architectural remains. Both ceramics and lithics were collected at 60 (25%) sites; ceramics at 123 (51%) additional sites; lithics at 34 (14%) additional sites; neither ceramics nor lithics could be found at 23 (10%) architectural sites. Besides ceramics and lithics, such

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1. The name for the survey is taken from the modern designation for the area. The Southern Ghors include the area from Wadi Ibn Ḥammad, at the northern edge of the Lisan Peninsula, to Ghor Feifa. The Wadi 'Arabah extends from this area to 'Aqaba (Khoury 1981: 216-18). The survey, as the subsequent discussion will make clear, did not cover the entire Southern Ghors

and Wadi 'Arabah.

2. The Royal Jordanian Geographic Center has prepared 1:10,000 scale maps for use by the Jordan Valley Authority, Mujib and Southern Ghor Irrigation Project. These maps cover part of the Southern Ghors area surveyed by the SGNAS.

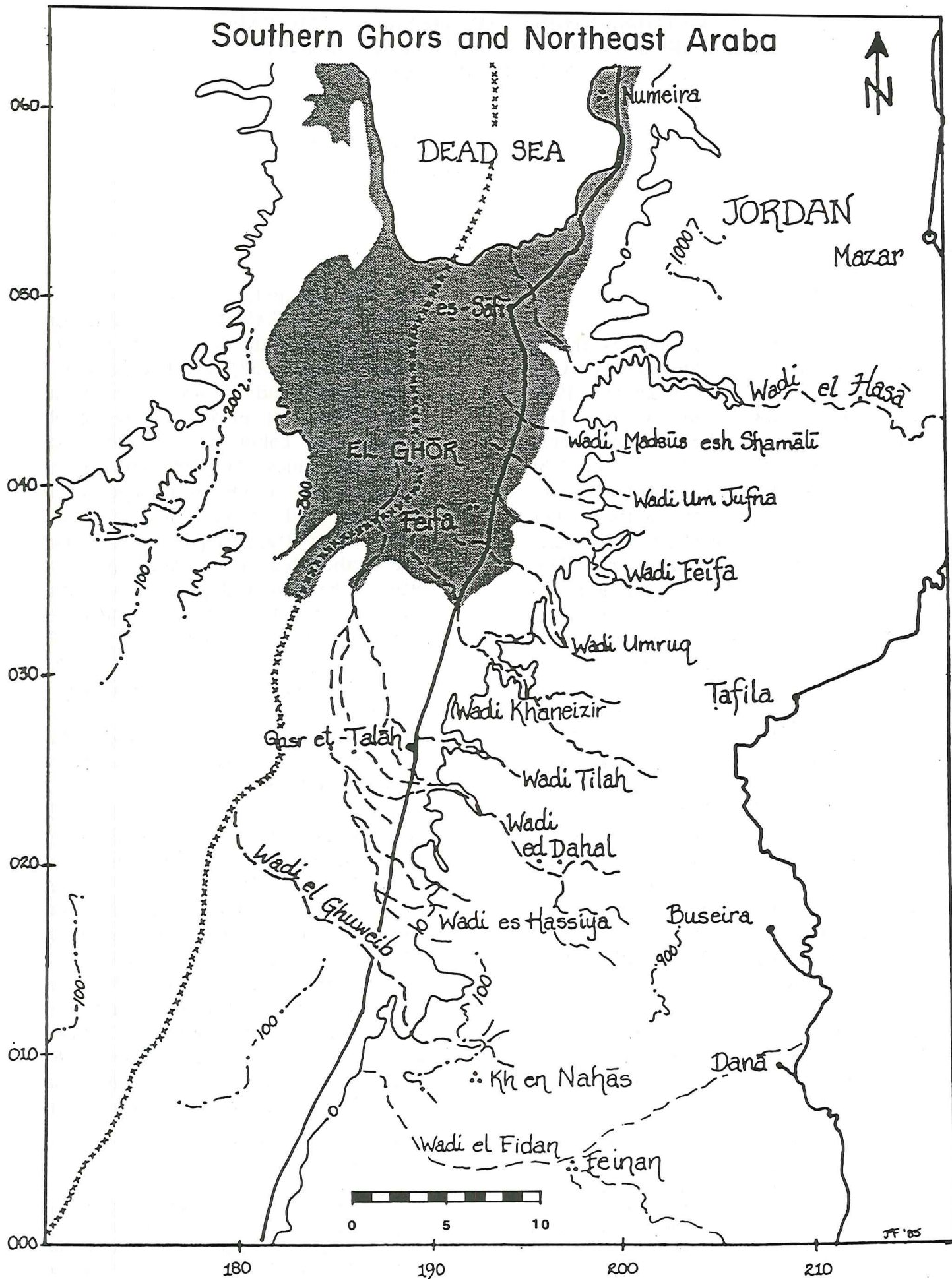


Fig. 1: General map of Southern Ghors and Northeast 'Arabah.



items as coins; glass; pieces of bronze and iron; slag; shell; beads; ivory; bracelet fragments; querns; mortars; basalt and limestone bowl fragments; milling stone fragments; and pieces of marble and tile were collected. All these items, especially the ceramics and lithics, were used to date and assess preliminarily the function of the sites. A preliminary analysis of the materials indicates that they date from the Lower/Middle Paleolithic to the Modern period. However, some periods are not represented in the survey area.

### Lithic Sites

Lithics were collected at 94 or 39% of the sites of the survey. However, as mentioned previously, at 60 or two-thirds of these sites ceramics were also collected. Only five of these sites, namely, Sites 12, 15, 10, 20, and 44, all believed to be roughly contemporaneous and all located in the western extremity of Wadi Fidān, will be described in this preliminary report. The sites selected have all been examined elsewhere (Raikes 1980; 1985).<sup>3</sup> Raikes' examination of the lithic materials from his Fidān "A" (SGNAS Site 12), "C" (SGNAS Sites 15 and 44), and "E" (SGNAS Sites 10 and 20) focused upon the different tool types found at these sites. This report hopes to shed some light on characteristics of the debitage collected from the surface of these sites. Tool types will only be mentioned here as an aid, when possible, in assigning a cultural affiliation.

Site 12 (Raikes' Fidān "A") is located at the mouth of Wadi Fidān on an island. The surface of the island, especially the top, is scattered with thousands of lithics. There is evidence that suggests some depth of deposits (long term or continuous reoccupation) on the northeast side of the site where the wadi has eroded away part of the island revealing cultural deposits near the base of the island. In addition to the lithic materials, there are three or four round structures which measure ca. 2-4m in diameter on the top of the island and the remains of a wall ca. 13m long on the southwest of the site. Quern fragments

along with some shell and bone were also found. Sample collections were taken from the top of the site in three north-south transects and from the northeast portion of the site where the wadi had eroded part of the island. Raikes made two additional collections from the site.

The survey divided Raikes' Fidān "E" into two parts, namely, Sites 10 and 20. The lower part, Site 10, is located on a small terrace and slope just to the south of Wadi Fidān. A low, oval mound with possible stratified deposits and architectural remains is associated with lithics, some crude pottery, and a few pieces of slag. The upper portion, Site 20, is to the west of the lower portion and on a higher terrace. Remnants of wall lines, which could be structural remains, are visible along the south edge of the terrace. Evidence of camping (recent?) and a cemetery are also found. Three samples were collected: one from the lower portion (Site 10); one from the upper portion (Site 20); and one by Raikes which may be a combination of the two areas (Raikes Fidān "E").

The survey also divided Raikes' Fidān "C", like his Fidān "E", into two sites, that of Sites 15 and 44. These two sites are, like Sites 10 and 20, located on the south side of Wadi Fidān. They are on opposite sides of the same hill. The western side, Site 15, contains some remnants of architecture and some crude pottery (see below). The frequency of lithics diminishes as one moves east up the slope of the hill. On the east facing slope of the hill, Site 44, there is a dense scatter of lithics, decreasing as the slope increases but present, nonetheless. Two circular structures are located on the peak of the hill but they may be the result of recent military activity. Lithics were the only artifacts recovered. The survey collected three samples from Site 15 and one sample from Site 44.

A general description of the debitage from these five sites will now be undertaken along with a look at the frequencies of debitage categories from the tables. It should be noted that there are differences between the survey collections and those made by Raikes, which are probably the result of a collection bias towards tools and

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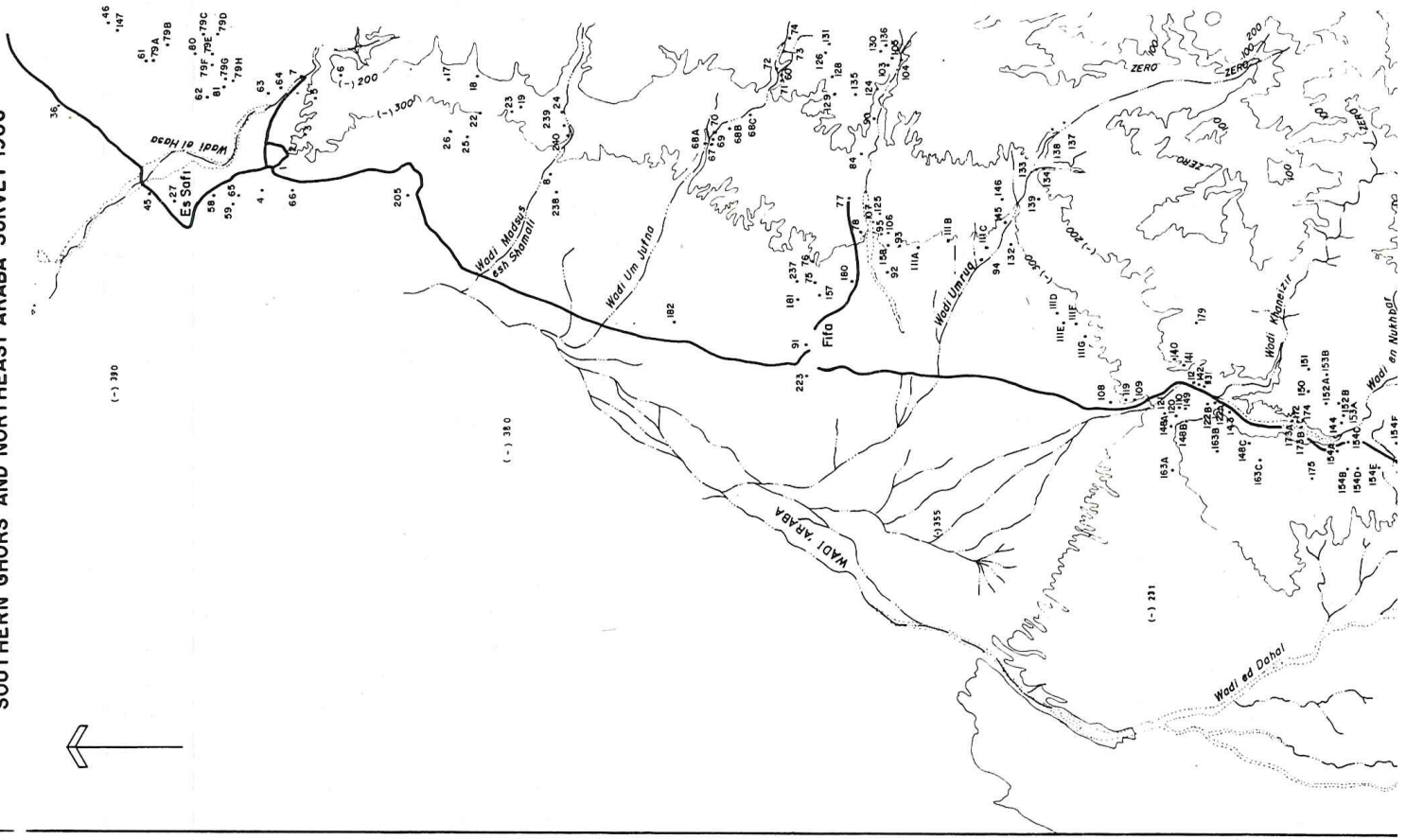
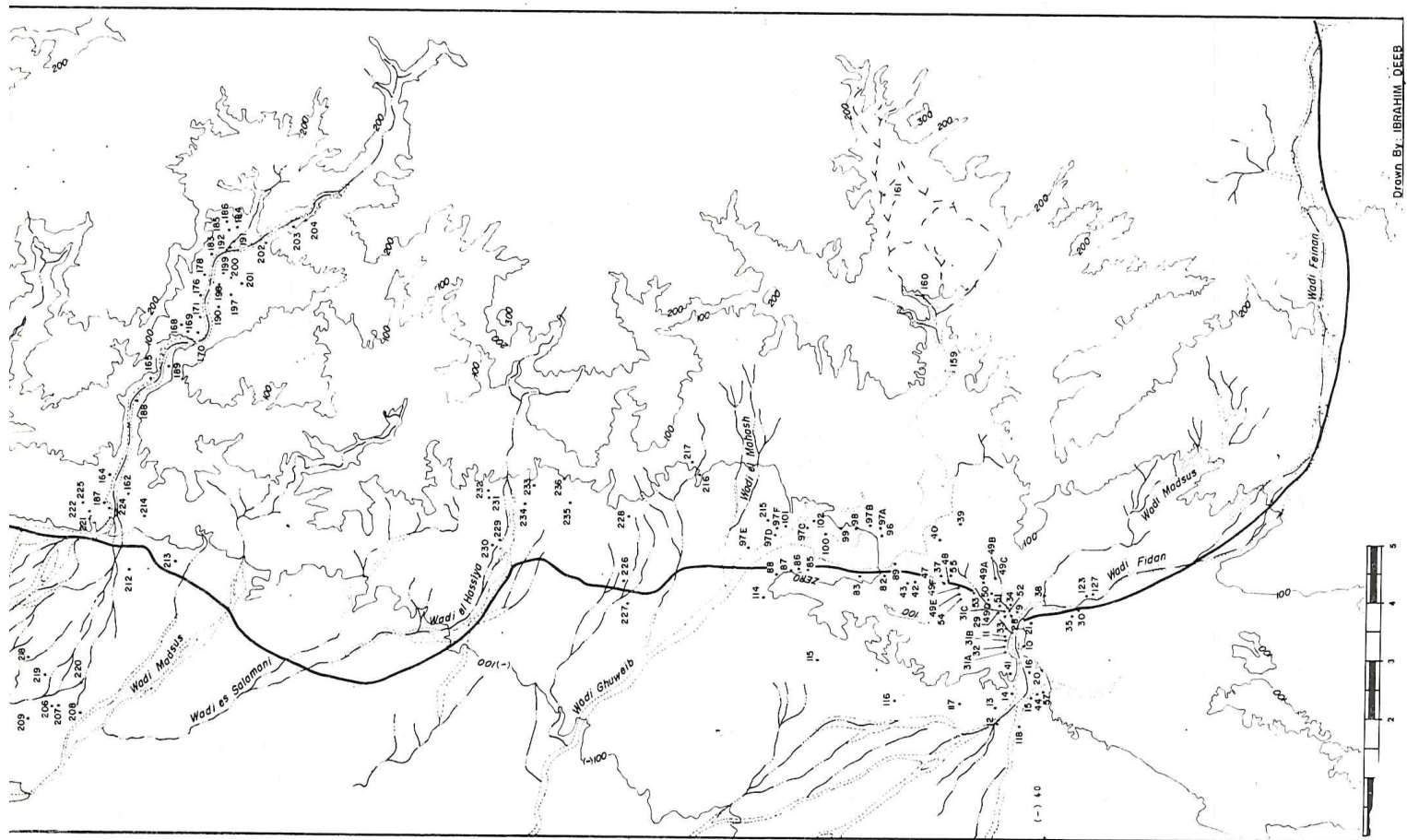


Fig. 2: Sites 1-240 of the Southern Ghors and Northeast 'Arabah Archaeological Survey.





Drawn By: IBRAHIM, DEEB

retouched pieces by Raikes. This point will be discussed further below. There will also be a brief discussion of some of the diagnostic tools and how these assemblages fit into the general chronological scheme of the area (the Levant).

There are four separate sample groups (7-10) associated with Site 12 (Raikes' Fidān "A") (Table 1).<sup>4</sup> Sample 7 consisted of three collections by Raikes which were dominated by blades and retouched pieces. Some of the blades were small and thin. Notched pieces were noticed and some of the cores appeared to be nearly exhausted. Two blade/bladelet cores were noted among the opposed platform cores along with one blade core. Sample 7 may be comparable to that of sample 10, collected by the survey, since both are from the east side and Raikes' rubbish heap may be a midden. Sample 10 is predominantly flakes (49.2%) and very low in retouched pieces (13.9%). Cortical pieces are common and some of the pieces are blocky and chunky, i.e., thick as opposed to thin in profile. Three of the opposed platform cores are flake cores while the other is a blade/bladelet core. Sample 8, also collected by the survey, consists of mainly flakes (58.8%) many of which are large and blocky. Some of these large pieces show evidence of crunching (chopping?) along the edges and many pieces were noted to have many small nicks on them. Such markings may be the result of weathering and incidental contact between the lithics over time. Five multiple platform cores were noted of which only one was identified as a blade/bladelet core. Sample 9, collected by Raikes, is made up primarily of blades (30.1%) and retouched pieces (57.5%). It contains good examples of his

"twiglets" (borers). No identifiable cores were collected.

Sites 10 and 20 (Raikes' Fidān "E") consist of three collections: two by the survey (4-5); and one by Raikes (6) (Table 2).<sup>5</sup> A high proportion of flakes (49.6%) are found among the debitage from sample 4. The flakes are large and chunky with some pieces showing evidence of a dark-brown patina. The material variety appears to be less diverse here than at other sites. Of the recognized retouched pieces (28%), some are on 2DC flakes and blades. The cores found (n=2) were of the single platform variety. Sample 5 is very similar to 4 in that flakes are dominant (63.2%), the pieces are blocky, and the cores are single platform. Retouched pieces are less numerous (13.2%) than in sample 4. Sample 6 is made up of blades (47%) and retouched pieces (47%) although the sample is small (n=17). It should be noted that the blades are rather chunky, fitting well with the debitage from samples 4 and 5. No cores were present in this collection.

Sites 15 and 44 (Raikes' Fidān "C") are made up of 10 sample areas which can be further reduced into five groups: 1) 2 and 18; 2) 1; 3) 13 and 14; 4) 16; and 5) 11, 12, 15, and 17, which represent the five major sample collection areas on the site (Table 3).<sup>6</sup> Samples 2 (Site 44) and 18 (Site 15), collected by the survey and Raikes respectively, are believed to represent the east slope of Fidān "C". Both samples are represented by a high percentage of blades (37.9% and 40.2% respectively). The flakes in sample 18 are even somewhat blade-like, i.e., they are near the "border" between flake and blade. Retouched pieces are numerous in sample 18 (46%) but no cores were collected. On the other

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3. Raikes generously gave his collected lithic material from the Fidān region to the SGNAS for further analysis before leaving Jordan in the summer of 1986.

4. Sample locations for Site 12 (Fidān "A"): 7 - rubbish heap on east side; 8- top of the mound, north-south transects; 9- general; 10- from the river cut through the middens, northeast side.

5. Sample locations for Sites 10 and 20 (Fidān "E"): 4- above and to the west of the lower terrace; 5-

on the terrace below 4; 6- general (mix of Sites 10 and 20?).

6. Sample locations for Sites 15 and 44 (Fidān "C"): 1- general; 2- lithic scatter on east side of hill; 11- from high up and the rubbish heaps; 12- upper slope blade cluster, northeast of west slope, small area; 13- bottom of hill on west side; 14- lower collection, terrace on west side; 15- up the hill (west side?); 16- rubbish heap; 17- upper slope collection on west side; 18- bottom of hill on east side (same as Site 44 ?).



**Table 1: Site 12**

<i>Sample Numbers</i>	7		8		9		10	
	#	%	#	%	#	%	#	%
Flakes	26	10.3	183	58.8	18	9.6	67	49.2
flake, 1DC	1	0.3	19	6.1	1	0.5	2	1.4
flake, 2DC	7	2.7	60	19.2	7	3.7	20	14.7
flake, plain	18	7.1	97	31.1	8	4.3	42	30.8
flake, trimming	0	0.0	3	0.9	2	1.0	2	1.4
flake, nat. backed	0	0.0	4	1.2	0	0.0	1	0.7
Blades*	110	43.8	49	15.7	56	30.1	44	32.3
blade, 1DC	1	0.3	1	0.3	1	0.5	1	0.7
blade, 2DC	18	7.1	15	4.8	13	6.9	18	13.2
blade, 1	30	11.9	12	3.8	22	11.8	17	12.5
blade, 2	57	26.6	31	9.9	30	16.1	20	14.7
blade, nat. backed	3	1.1	2	0.6	2	1.0	2	1.4
bladelet	12	4.7	5	1.6	3	1.6	6	4.4
Cores	7	2.7	7	2.2	1	0.5	4	2.9
Discoidal								
full	1	0.3						
partial								
Single Platform								
flake								
blade								
bladelet								
mixed			1	0.3				
Opposed/Mult. Platform								
flake							3	2.2
blade	1	0.3						
bladelet								
mixed	3	1.1	5	1.6			1	0.7
Other	2	0.7	1	0.3	1	0.5		
Shatter	0	0.0	7	2.2	4	2.1	2	1.4
Retouched Pieces	118	47.0	65	20.9	107	57.5	19	13.9
<b>Total Pieces</b>	<b>251</b>		<b>311</b>		<b>186</b>		<b>136</b>	

\* In computing the percentages for the blade debitage pieces, the blade 2DC's have been counted three times, once as a 2DC, naturally backed, and as a blade 1 or blade 2. To get the proper blade percents, subtract blade 2DC and naturally backed percentages from the blade total. The actual number of 2DC's in either blade 1 or blade 2 categories are noted on the tables.

**Table 2:** Sites 10 and 20

<i>Sample Numbers</i>	4		5		6	
	#	%	#	%	#	%
Flakes	62	49.6	43	63.2	1	5.8
flake, 1DC	4	3.2	1	1.4	1	5.8
flake, 2DC	25	20.0	15	22.0	0	0.0
flake, plain	33	26.4	21	30.8	0	0.0
flake, trimming	0	0.0	5	7.3	0	0.0
flake, nat. backed	0	0.0	1	1.4	0	0.0
Blades	24	19.2	9	13.2	8	47.0
blade, 1DC	0	0.0	0	0.0	0	0.0
blade, 2DC	6	4.8	5	7.3	2	11.7
blade, 1	10	8.0	3	4.4	0	0.0
blade, 2	12	9.6	5	7.3	6	35.2
blade, nat. backed	1	0.8	0	0.0	1	5.8
bladelet	2	1.6	1	1.4	2	11.7
Cores	3	2.4	2	2.9	0	0.0
Discodial						
full						
partial						
Single Platform						
flake						
blade	1	0.8				
bladelet						
mixed	1	0.8	2	2.9		
Opposed/Mult. Platform						
flake						
blade						
bladelet						
mixed						
Other	1	0.8				
Shatter	1	0.8	5	7.3	0	0.0
Retouched Pieces	35	28.0	9	13.2	8	47.0
<b>Total Pieces</b>	<b>125</b>		<b>68</b>		<b>17</b>	



**Table 3: Site 15**

<i>Sample Numbers</i>	11		12		1		18	
	#	%	#	%	#	%	#	%
Flakes	35	25.1	19	14.0	8	4.9	9	13.4
flake, 1DC	2	1.4	0	0.0	2	1.2	0	0.0
flake, 2DC	7	5.0	5	3.7	1	0.6	4	5.9
flake, plain	24	17.2	13	9.6	4	2.4	5	7.4
flake, trimming	2	1.4	1	0.7	1	0.6	0	0.0
flake, nat. backed	0	0.0	0	0.0	0	0.0	0	0.0
Blades	54	38.8	66	48.8	62	38.2	27	40.2
blade, 1DC	0	0.0	0	0.0	0	0.0	0	0.0
blade, 2DC	11	7.9	10	7.4	9	5.5	1	1.4
blade, 1	11	7.9	18	13.3	6	3.7	8	11.9
blade, 2	34	24.4	27	20.0	39	24.0	11	16.4
blade, nat. backed	4	2.8	1	0.7	0	0.0	0	0.0
bladelet	9	6.4	21	15.5	17	10.4	8	11.9
Cores	1	0.7	3	2.2	1	0.6	0	0.0
Discoidal								
full								
partial								
Single Platform								
flake								
blade								
bladelet								
mixed			1	0.7				
Opposed/Mult. Platform								
flake								
blade								
bladelet								
mixed			2	1.4				
Other	1	0.7			1	0.6		
Shatter	5	3.5	7	5.1	3	1.8	0	0.0
Retouched Pieces	44	31.6	40	29.6	88	54.3	31	46.2
<b>Total Pieces</b>	<b>139</b>		<b>135</b>		<b>162</b>		<b>67</b>	

**Table 3: Site 15 (Continued)**

<i>Sample Numbers</i>	13		14		15		16	
	#	%	#	%	#	%	#	%
Flakes	6	21.4	74	35.7	3	15.7	6	11.1
flake, 1DC	0	0.0	2	0.9	1	5.2	0	0.0
flake, 2DC	0	0.0	19	9.1	0	0.0	0	0.0
flake, plain	6	21.4	52	25.1	2	10.5	6	11.1
flake, trimming	0	0.0	1	0.4	0	0.0	0	0.0
flake, nat. backed	0	0.0	0	0.0	0	0.0	0	0.0
Blades	8	28.5	66	31.8	7	36.8	23	42.5
blade, 1DC	0	0.0	0	0.0	0	0.0	0	0.0
blade, 2DC	0	0.0	8	3.8	1	5.2	2	3.7
blade, 1	2	7.1	16	7.7	4	21.0	6	11.1
blade, 2	4	14.2	35	16.9	2	10.5	13	24.0
blade, nat. backed	0	0.0	0	0.0	1	5.2	0	0.0
bladelet	2	7.1	15	7.2	1	5.2	4	7.4
Cores	0	0.0	4	1.9	1	5.2	0	0.0
Discoidal								
full								
partial			1	0.4				
Single Platform								
flake								
blade								
bladelet								
mixed			2	0.9	1	5.2		
Opposed/Mult. Platform								
flake								
blade								
bladelet								
mixed								
Other			1	0.4				
Shatter	1	3.5	10	4.8	1	5.2	0	0.0
Retouched Pieces	13	46.4	53	25.6	7	36.8	25	46.2
<b>Total Pieces</b>	<b>28</b>		<b>207</b>		<b>19</b>		<b>54</b>	



**Table 3: Site 15 (Cont'd) and Site 44**

<i>Sample Numbers</i>	<i>17 (Site 15)</i>		<i>2 (Site 44)</i>	
	<i>#</i>	<i>%</i>	<i>#</i>	<i>%</i>
Flakes	59	56.1	85	30.6
flake, 1DC	3	2.8	6	2.1
flake, 2DC	14	13.3	19	6.8
flake, plain	41	39.0	58	20.9
flake, trimming	1	0.9	1	0.3
flake, nat. backed	0	0.0	1	0.3
Blades	15	14.2	105	37.9
blade, 1DC	0	0.0	2	0.7
blade, 2DC	0	0.0	17	6.1
blade, 1	6	5.7	38	13.7
blade, 2	8	7.6	61	22.0
blade, nat. backed	1	0.9	1	0.3
bladelet	0	0.0	4	1.4
Cores	8	7.6	11	3.9
Discoidal				
full			1	0.3
partial				
Single Platform				
flake	2	1.9	3	1.0
blade	1	0.9		
bladelet				
mixed	2	1.9	1	0.3
Opposed/Mult. Platform				
flake			1	0.3
blade	1	0.9		
bladelet				
mixed	1	0.9		
Other	1	0.9	5	1.8
Shatter	2	1.9	20	7.2
Retouched Pieces	21	20.0	56	20.2
<b>Total Pieces</b>	<b>105</b>		<b>277</b>	

retouched pieces (20.2%) and there are some blocky flakes and blades included in the collection. Cores are present including four single platform cores and five unidentified core fragments.

Samples 13 and 14 are collections by Raikes and the survey respectively. The former is small ( $n=28$ ). Thirteen of these lithics are retouched. The remaining pieces are nearly evenly divided between flakes and blades. The latter is a large collection ( $n=207$ ) in which flakes are slightly more common among the debitage than blades (35.7% to 31.8%). Some of the material is blocky and some bladelets are present (7.2%). Two single platform cores are present along with a partial disk core. Retouched pieces account for 25.6% of the collection.

Sample 1 is comprised of three collections by Raikes. It is high in blades (38.2%) and retouched pieces (54.3%). There appears to be evidence of heated material and the one core may be an exhausted one. Bladelets make up 10.4% of all the blades.

Sample 16, which is also a Raikes' collection, consists of blades (42.5%) and retouched pieces (46.2%). No cores are present.

The final cluster, namely, samples 11, 12, 15, and 17, makes up various collection areas on the west slope of Fidān "C". Samples 11 and 15 were collected by Raikes while samples 12 and 17 by the survey. Sample 11 contains a slightly higher percentage of blades (38.8%) than flakes (25.1%). Blade 2s are the most common blades by more than a three-to-one margin. No cores were identified. Sample 12 contained a large number of bladelets (15.5%) and small blades. Overall, blades made up 48.8% of the collection, more than three times as many as flakes (14%). In general, the collection consisted of small pieces and was found in a spatially limited area, ca. 9 x 9 m, on the slope. Two multiple platform blade/bladelet cores and one single platform flake/blade core were found. Sample 15 is a small collection ( $n=19$ ) that is mainly blades and retouched pieces. The one core

single platform blade/bladelet core. Sample 17 is overwhelmingly made up of flakes (56.1%) in comparison to blades (14.2%) and it also contains the lowest percentage, along with sample 2, of retouched pieces (20%). Plain flakes and large chunky flakes are common. Five single platform cores and two multiple platform cores were found.

In regard to diagnostic retouched pieces, e.g., arrowheads, as cultural and chronological indicators, there are several things to be said. Arrowheads are probably the most commonly used artifact in assigning cultural affiliation to preceramic and ceramic cultures (see Bar-Yosef 1981). An extensive examination of the retouched pieces was not the goal of this report and only those obvious diagnostics will be mentioned. Some form of dating these sites via diagnostics has been done by Raikes (1980).

Site 12 (Fidān "A") yielded a possible point and a blade exhibiting sickle sheen from samples 9 and 7 respectively. The point bears some resemblance to a Byblos point (Bar-Yosef 1981: 560) but the shoulders are barbed (Fig. 3: 7 and 8). The sickle blade does not exhibit the classic notch-like retouch, but is more of a continuous nibbling along the edge. The gloss from the sheen is clearly visible along the edge. According to Bar-Yosef (1981: 563, fig. 3), the Byblos point would occur ca. 7,000 B.C. and be associated with the PPNB. In Moore's scheme (1982), this would be Neolithic 2 (PPNB) or Neolithic 3 (PN).

Fidān "E" (Sites 10 and 20) contains two tabular scrapers, e.g., Ghassulian (Fig. 3: 11), and a chopper tool. It also contains more bulkier blanks than the other sites. Tabular flint tools are most commonly associated with Chalcolithic and Early Bronze sites but are noted in Moore's (1982) Neolithic 3 stage and found at a late Neolithic site by Rosen (1984). Choppers are traditionally associated with Lower Paleolithic sites but Solecki (1985) notes that they reappear in the late Epipaleolithic and Neolithic periods. This evidence along with that of a Chalcolithic/

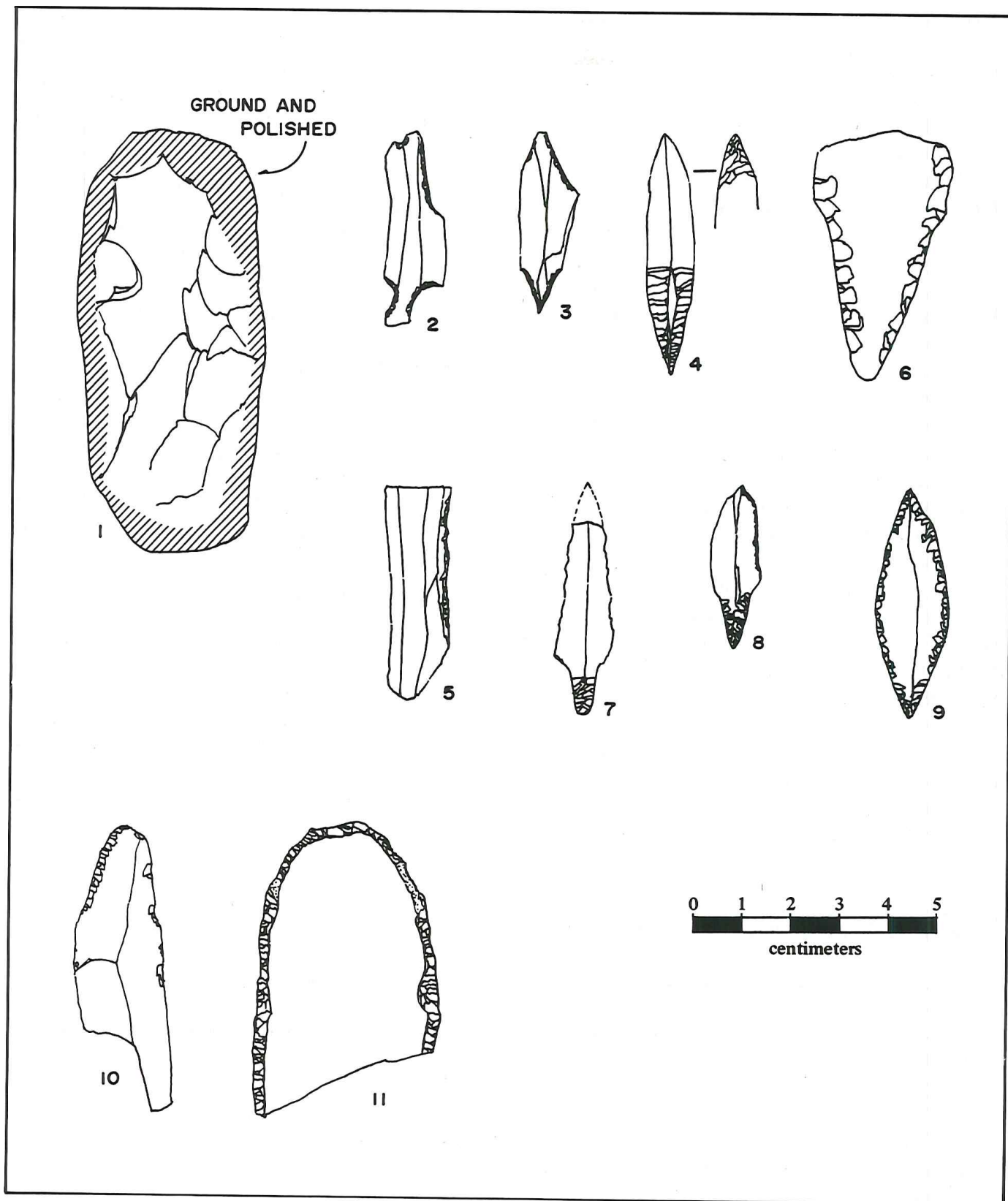


Fig. 3: 1. Chipped, then ground and polished axehead (Site 15 R6 #118); 2. Notched blade (Site 15 R5 #117); 3. Perforator or borer (Site 15 R5 #117); 4. Amuq point, diagnostic of PPNB; note thinning on the ventral surface (Site 15 R5 #117); 5. Blade segment showing sickle sheen, edge damage (Site 12 R12A #130); 6. Biface (knife?) on a tabular flake/blade (Site 15 R5 #117); 7. Byblos point, broken at the tip (Site 12 R9 #127); 8. Byblos point, broken at the tip (Site 12 R9 #127); 9. A typical Amuq point (Site 44 S46 #64); 10. Continuously retouched blade fragment (Site 20 S60 #122); 11. Ghassulian scraper made on a tabular flake (Site 20 S60 #122).

R = Raikes collection

S=SGNAS collection



possible late Neolithic/early Chalcolithic date (see below).

Fidān "C" (Sites 15 and 44) contains the most retouched pieces and probably some of the best diagnostic ones. Included here is an Amuq point (Fig. 3: 4 and 9) which is probably associated with the PPNB (Bar-Yosef 1981: 563) and Moore's (1982) Neolithic 2 and 3. These type of points were found at 'Ain Gazal (Rollefson 1984) and Nahal Issaron (Goring-Morris and Gopher 1983). Another possible Amuq point was found at Site 44 in sample 2. Numerous other tools (picks; axes; burins; bifaces; tabular flint tools; and core tools) were found at various locations about the site. The pieces here suggest a late PPNB/early PN occupation.

Finally, there are some problems which should be taken into consideration. As may be apparent, the collections made by Raikes appear to be largely biased towards the collection of retouched pieces and blades. In these collections 47% are retouched pieces as compared to 21% for the survey collections. These collections exclude flakes for the most part and probably do not give an accurate representation of the total debitage present. The survey collections appear to be somewhat

awareness of cores and flakes. This reduction in tool numbers may also reflect the time constraint of the collections in which selectivity was low, i.e., what cultural debitage was seen was taken regardless.

The conclusions that can be drawn about the material are limited by the fact that it consists of surface collections which were not collected in a totally systematic manner. Many types of debitage may be under represented due to their small size and a general bias on the collector's part in looking for certain pieces. It should also be mentioned that studies on the retouched pieces have yet to be done. More often than not, it is the percentage of tool types rather than debitage frequencies that are used in assigning cultural affiliation to such sites — a practice that has recently been questioned.

#### Ceramic Period Sites of the Survey

As mentioned previously, ceramics were collected at 183 or 76.25% of the 240 sites surveyed. At 60 or 25% of these 183 sites, however, lithics were also collected. Many of these sites are not only multiperiod from a ceramic and lithic point of view but also within the ceramic assemblage (Table 4). This preliminary report can

**Table 4:** Ceramic sites of the SGNAS\*

<i>Period</i>	<i>#</i>	<i>%</i>	<i>Period</i>	<i>#</i>	<i>%</i>
Neolithic	5	2.73	Nab	25	13.66
N1/Chal	6	3.28	Rom	27	14.75
Chalcolithic	8	4.37	Nab/Rom	2	1.09
Chal/EB	28	15.30	LRom-Byz	2	1.09
EB I-III	5	2.73	Byz	65	35.52
EB IV	16	8.74	LByz/Umy	1	0.55
Early Bronze	28	15.30	EIsl	4	2.19
Iron I	12	6.56	Ayy/Mam	11	6.01
Iron II	23	12.57	Ott	13	7.10
Iron	19	10.38	Isl	18	9.84
Hell	6	3.28	Mod	21	11.48

\* This listing is based on a preliminary analysis of the ceramic materials. Sites at which the field reading for a particular period was possible, probable, or questionable are not included in the table. Many of the sites, as mentioned in the text, are multiperiod.



only treat the most important of the ceramic sites.

Sherds from the Neolithic period are concentrated, with one exception, in the Wadi Feifa area, both north and south of the wadi. The well-known Early Bronze site of ancient Feifa (Sites 75 and 76) (Rast and Schaub 1974: 11-12, 17-18) produced significant numbers of sherds from the period under discussion. Small numbers of Neolithic sherds were collected at Site 21 along the south side of Wadi Fidān. This is consistent with the lithic material, as mentioned above, at Sites 10, 20, 15, and 44, in the same area.

Neolithic/Chalcolithic sherds are found high in the mountains between Wadi Madus esh-Shamali and Wadi Umm Jufna in association with an enclosure, Site 177.<sup>7</sup> Sherds from the same period are also found in the Wadi Feifa region at Sites 76, 92, and 182. The first two of these sites also produced Neolithic period sherds. Site 134, another enclosure which measures ca. 8 x 5 m, is located on a plateau along the south side of Wadi Umruq. It also yielded sherds from this period.

At the majority of sites at which Chalcolithic sherds were collected the density of Chalcolithic sherds is low (1-3). The heaviest concentration (n=55) is at Site 133 which is located just to the northwest of Site 134. It consists of an enclosure measuring ca 16m in diameter and the remnants of a rectangular building measuring ca. 17 x 4 meters. The rectangular structure is located ca 55m to the south of the enclosure and it has a door facing it. There are at least two other smaller structures located between the two above-mentioned structures.

Chalcolithic/Early Bronze pottery is found throughout the survey area. Once again, there is a concentration in the Wadi Feifa region where Sites 75, 76, 84, 92, 95, 157, and 181 yielded sherds from the periods. Moreover, many of these sites also yielded sherds from the ceramics periods discussed above. Along Wadi ed-Daḥal, four sites, namely Sites 169, 171, 187, and 189, mostly of a campsite/sherd

scatter nature, yielded sherds from the period. Further south, Chalcolithic/Early Bronze sherds are associated with sites along both Wadi el-Ḥassiya and Wadi Ghuweib. In the Wadi Fidān region, heavy concentrations of sherds from the period were collected at Sites 10, 14, 15, 20, 29, and 30. Three of these sites, namely Sites 10, 15, and 20, have been discussed in the section on the lithic materials of the survey. Site 29 is located where the "Old Road" meets Wadi Fidān. What appears to be robbed graves, along with ash and bones, were noted (Raikes 1980). Site 117 is located to the northwest of Wadi Fidān. It consists, for the most part, of wall lines, possibly for houses, tents, and/or retaining walls. It yielded 58 sherds from the period under discussion.

Early Bronze I-III period sites are known from the work of Rast and Schaub (1974) in the Southern Ghors at such sites as eṣ-Ṣafi, Site 2 (1974: 15-16), and ancient Feifa, Sites 75 and 76 (1974: 17). Site 2, eṣ-Ṣafi, is located on a ridge immediately to the south of Wadi el-Ḥasa and immediately to the southeast of Ṭawaḥin es-Sukkar, Site 1. Today, a Jordan Valley Authority housing complex is located at one of the highest points on this ridge and a modern military encampment is located along the southwest segment of the site. A great deal of looting of the tombs, which appear to be all cist tombs built of cobble stones with a large flat stone over the top, has taken place over the years. Moreover, erosion has exposed many tombs. Most of the sherds collected at the site came from these looted or eroded tombs. A large amount of restorable pottery, mostly EB IB, was collected.

Sites 75 and 76, ancient Feifa, which have been mentioned previously, are adjacent to one another on a ridge along the north side of Wadi Feifa (Rast and Schaub 1974: 11-12, 17). Site 76 is actually the eastern extension of Site 75. It is essentially an Early Bronze cemetery which extends over a southern, central, and northern ridge system. It covers an area of at least 1.0 x 0.5 kilometers. The tombs, like at

7. Site 177 is off the map (Fig. 2), high in the mountains to the east of the Southern Ghors.



many have been looted while others have been disturbed by military trenching.

A surprise of the 1986 season was the number of EB IV sites in the survey territory. Pottery from this period was collected from as far north as Site 126, which is located just south of Wadi Umm Jufna, to Sites 30, el-Munbaṭeḥa, and 9 at the southern extremity of the survey area. However, the greatest concentration of sites from this period is in the Wadi Khuneizir-Wadi en-Nukhbar region. The cist tombs on the southwest slope of site 108, Rujm Khuneizir (Glueck 1035: 10-11), have EB IV pottery associated with them. Sites 109 and 119, immediately to the south, appear to have been also the location of EB IV graves. Now, however, the area is bulldozed and badly eroded. Across Wadi Khuneizir to the southwest, there are several sites, namely Sites 110, 120, 122, and 148, at which EB IV pottery was collected. Most of these sites appear to be graves which, for the most part, have been looted.

Perhaps the most important EB IV site in the Wadi Khuneizir-Wadi en-Nukhbar region is Site 141, Abu Ishrib-sheh, a habitation site. It is located at the base of a high mountain to the east and high above Wadi Khuneizir. It consists of at least 50 structures spread over an area of ca 2 kilometres. The structures vary in size from ca 7-14 x 2.5-3.0 meters. They do not appear to have any definite orientation. The structures, which appear to be dwellings, are built of unhewn stone. Many of them are still well preserved with walls still standing two to five courses or 1m high. It is difficult to locate their entrances. The predominate pottery associated with the site was EB IV (Fig. 4).

Further south, between Wadi Khuneizir and Wadi en-Nukhbar, there is another important EB IV site, namely Site 174. The eight, main structures which constitute the site are what the SGNAS is presently calling "platforms". Some of these "platforms" measure as much as 21 x 5m and still stand ca 1-2m above ground level. They could be graves and/or houses.

More EB IV sites were surveyed west

regions of Wadi ed-Daḥal and in Wadi Fidān. One of these EB IV sites is Site 30, el-Munbaṭeḥa, which has been mentioned previously. It is a smelting site located ca 0.50 km north of 'Ain Fidān (Raikes 1980: 55; Hauptmann, Weisgerber and Knauf 1985: 171).

This evidence of EB IV presence in the survey area is extremely important for the archaeological history of the region. It links up well with the evidence for EB IV occupation at Bab edh-Dhra' (Johnston and Schaub 1978) to the north and in the Judean Hills and Central Negev Highlands to the west and northwest (Cohen and Dever 1979 a; b; and c; Dever 1973; 1975; 1980; Gitin 1975). A preliminary analysis of the pottery puts it in Dever's EB IVC, Family S category (1980; Richard 1980).

What the SGNAS is calling simply Early Bronze pottery was collected at many of the sites at which Chalcolithic/Early Bronze, EB I-III, and EB IV sherds were collected. Therefore, its presence at these sites is understandable. Because of the lack of better diagnostic pieces, this is the best designation that can be given this pottery. Other sites at which Early Bronze sherds were collected are located close by major EB I-III and EB IV sites and could, therefore, be associated with them.

Neither Middle Bronze nor Late Bronze pottery was identified in the area. This is keeping with the traditionally held view of lack of occupation in the area during the periods in question (Glueck 1935: 138).

Iron I period pottery was collected at sites between Wadi el-Ḥasa and Wadi ed-Daḥal as well as within Wadi Ghuweib. The locations at which this pottery was collected are cemeteries, camps, sherd scatters, and major smelting sites.

In the Wadi Ghuweib region, Sites 159 (Khirbet en-Naḥās) and 161 (Khirbet Ghuweib) are important Iron I period sites. Both sites has been studied extensively (Musil 1907; Frank 1934; Glueck 1935; Bachmann and Hauptmann 1984; Hauptmann, Weisgerber and Knauf 1985). Site 159, Khirbet en-Naḥās, is a major smelting site on the south bank of Wadi



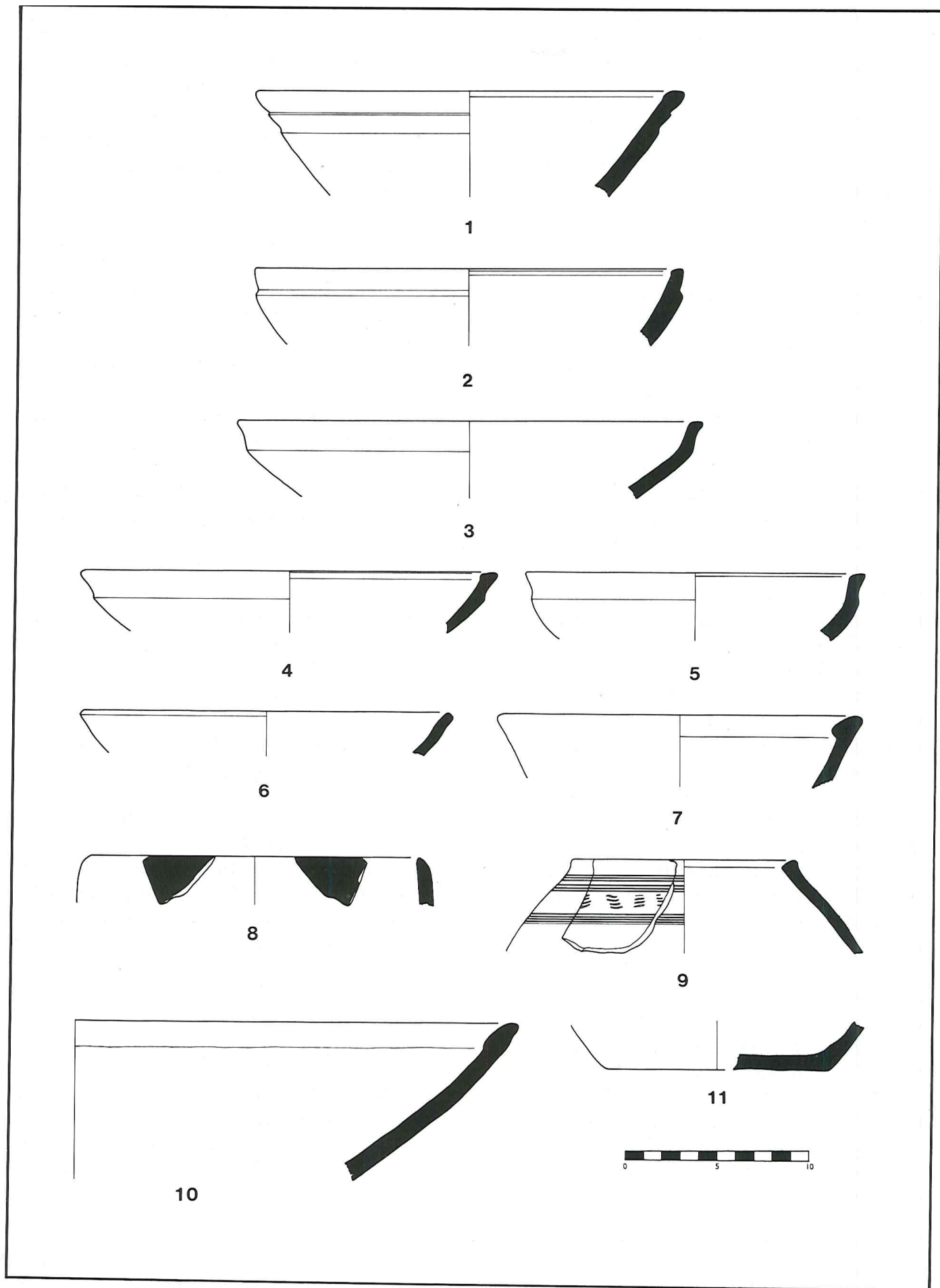


Fig. 4: EB IV pottery from Site 141, Abu Ishrubsheh.

the northeast. It is also a smelting site located on both sides of Wadi Ghuweib. It appears, however, to be also a village. Many wall lines and piles of stones are visible.

Iron II pottery, on the other hand, is found throughout the survey area. Some of the sites at which this pottery is found are substantial.

An interesting and as yet unreported site from the Iron II period is Rujm Umm Jufna, Site 73, a tower measuring *ca* 15m in diameter and standing *ca* 4-5m high. The tower, which is on the south bank of Wadi Umm Jufna, commands a good view of the entire Southern Ghors region as well as the area to the west.

Site 75, the western extremity of ancient Feifa, has generally been associated with the Early Bronze period (Rast and Schaub 1974: 11-12, 17). There are undoubtedly Early Bronze remains at the site. However, the major structure at the site may just date to a later period, namely Iron II. This structure appears to be a large enclosure, possibly a fort, which measures *ca* 90 (E-W) x 60 (N-S) meters. Within, there is a tower which stands higher than the walls of the enclosure. On the aerial photographs, which date to 1977, the enclosure and the tower are quite distinct. Now, however, modern military activity and bulldozing have caused damage to the structure. Iron II period pottery is associated with the structure. Excavations at the site will help solve the date of its construction.

Rujm Khuneizir (Glueck 1935: 10-11; Rast and Schaub 1974), Site 108, has been mentioned previously in relation to the Early Bronze period sites of the survey. It has been generally associated with this period (Rast and Schaub 1974: 18). However, some of the sherds associated with the *rujm* itself, which still stands *ca* 3-4m high and provides a good vantage point for watching movement in the South-

to the Iron II period. Here again, as for Site 75, only excavations will settle the question as to the period when the *rujm* was built.

Further south, in Wadi ed-Daḥal, Iron II pottery was collected at five sites. This appears normal since the wadi leads up to the important Iron II site of Buṣeira on the Edomite plateau (Bennett 1971; 1973a and b; 1974; 1975; 1976; 1977).

Site 29 is located on the north side of Wadi Fidān. It yielded Iron II period sherds. It has been discussed previously in the treatment of the Chalcolithic/Early Bronze period sites.

Due to lack of better diagnostic pieces, what the SGNAS is calling Iron Age pottery was found throughout the survey territory. About half of these sites are those at which Iron I and/or Iron II period pottery was also collected. The presence of Iron Age pottery at four sites in Wadi ed-Daḥal provides more evidence for the position that this wadi was used for communication purposes during the period under discussion.

Hellenistic period pottery was collected at Sites 73, 94, 139, 143, 154, and 237. These sites, however, are restricted geographically. They are all located in the central segment of the survey territory in the area between Wadi Umm Jufna and Wadi en-Nukhbar.

Nabataean period pottery, as is expected, was found throughout the area. The sites associated with this pottery range from very large architectural sites to sherd scatters.

Umm eṭ-Ṭawabin, Site 6, is a Nabataean/Roman fortress located to the southeast of eṣ-Ṣafi and the Wadi el-Ḥasa gorge (Kitchener 1884: 216-17; Mallon 1924: 438; Abel 1967: 466).<sup>8</sup> It is composed of several segments. A wall, built for the most part on a natural rock ledge and measuring *ca* 2.50 km., encircles the site. There are small circular structures, which

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8. The name Umm eṭ-Ṭawabin was given to the SGNAS by D.W. McCreery who did a survey of the Ghor eṣ-Ṣafi area for the Jordan Valley Authority in 1979. McCreery got the name from

locals. However, from the cited works, the name appears to be Khirbet Labrush/*el-Ebrosh*, probably a corruption of *el Bourj* (Abel 1967:466).



measure ca 2-3m in diameter, both within the outside the wall. Several, much larger structures, are found within the wall. The "citadel" segment of the site provides a sweeping panorama of the entire area south of the Dead Sea. Nabataean pottery was collected from all segments of the site. On the basis of a preliminary analysis of the pottery collected at the site, it dates from the last decades of the first century B.C. to the middle of the second century A.D. (Fig. 5).

Site 94, Rujm Umruq, appears to be another Nabataean watchtower. It is located at the entrance to Wadi Umruq and probably monitored traffic entering and leaving the wadi.

Qaṣr eṭ-Ṭilah, Site 155, is a well known Nabataean/Roman caravanserai located at the mouth of Wadi eṭ-Ṭilah (Musil 1907: 209-14, fig. 214 and 147 ff; Frank 1934: 213-15, Pl. 13; Glueck 1935: 12-17; Alt 1935: 4). There are extensive agricultural fields associated with the fort and reservoir (Pl. LXIV, 1) at the site.

Khirbet el-Ḥassiya North, Site 229, is probably another Nabataean caravanserai (Frank 1934: 215, Taf. 30A, Pl. 14; Alt 1935: 4). It is comprised, for the most part, of a large rectangular structure with rooms on at least the south and west sides. One room on the west side has been looted. The pottery collected from this "digging" is exclusively Nabataean.

Roman period pottery was found, in small quantities, throughout the territory from north of Wadi el-Ḥasa at Sites 46 and 79 to the southern extremity of the area at Site 30, el-Munbaṭeḥa. As is normal, Roman period sherds were associated with major Nabataean period sites such as Site 6, Umm eṭ-Ṭawabīn, described previously; Site 66, a predominantly Nabataean-Byzantine sherd scatter in a plowed field just southwest of Site 1, Ṭawāḥīn es-Sukkar; and Site 155, Qaṣr eṭ-Ṭilah. However, Roman sherds were also collected in Wadi eḍ-Ḍaḥal where Nabataean pottery is, for the most part, absent. Moreover, Roman sherds were collected at many of the Byzantine sites which will be described later. One such site which is of great importance for Roman presence in

the area is Site 30, el-Munbaṭeḥa, a smelting site located ca 0.50 km north of 'Ain Fidān. It has been mentioned previously in relation to the Chalcolithic/Early Bronze and EB IV period sites.

Byzantine period pottery and sites were predominant in all segments of the area. The sites range from major architectural ones to sherd scatters at which only a few Byzantine sherds were found. Only the major ones can be mentioned here.

Site 46, Deir 'Ain 'Abaṭa, appears to be a Byzantine monastery/church complex located half-way up a mountain north of Wadi el-Ḥasa (MacDonald n.d.). It consists of the remnants of a number of structures (Pl. LXIV, 2) with associated fragments of columns, capitals, tiles, and marble. One red sherd, the base of a plate/bowl, bears a stamp. The stamp consists of a "cross with a double outline" (Hayes 1972: 365-67 and fig. 79, #'s 71 and 72). Under the arms of the cross, there are the Greek letters *alpha* and *omega*.

Khirbet Sheikh 'Isa, Site 4, is generally identified as the site of the Christian Zoara of the Madaba Map (Albright 1924: 4; Mallon 1924: 437; Frank 1934: 204-5, pls. 8 and 9A; Glueck 1935: 8-9; Abel 1967: 201). However, the SGNAS' surface collection at the site was almost exclusively Mamluk. Thus, it will be treated later.

One site of particular interest is that of Site 66, a medium sherd scatter in a plowed field to the southwest of Site 1, Ṭawāḥīn es-Sukkar. There is a good possibility, on the basis of the number of Nabataean-Umayyad sherds collected, that this was once an architectural site. A large number of the sherds collected at the site date to the Byzantine period.

Site 205 is a possible kiln located in a sandy area between Wadi el-Ḥasa and Wadi Madsus esh-Shamali. It yielded Nabataean, Roman, and Byzantine sherds. However, the predominant pottery is Byzantine.

Within Wadi eḍ-Ḍaḥal, Byzantine sherds were collected at seven sites. This provides more evidence for the use of this wadi during the various periods represented in the survey territory.



There are a number of Byzantine hamlet/village sites in the survey area. Site 211, Khirbet eḍ-Ḍaḥal, is a village site located on both sides of Wadi eḍ-Ḍaḥal and immediately west of the modern Mazra' to 'Aqaba highway. It consists of several multiroom structures which are probably houses. They measure as much as 17-18 x 7-8 meters. There are smaller, one room structures as well in the complex. Between Wadi el-Ḥassiya and Wadi Ghuweib, there are five more of these sites, namely, Sites 232, 233, 228, 216, and 215, from the Byzantine period. The sherds collected at these sites is almost exclusively from the period under discussion.

All these sites, especially the hamlet-village sites, testify to a large population during the Byzantine period. Such is consistent with previous findings in Jordan.

Small quantities of Early Islamic pottery were found at such sites as Sites 66, 205, 73, 75, 76; and 91 within the Southern Ghors. All these sites have been treated previously in relation to earlier period sites of the survey.

El-Rujoum, Site 45, is a major Mamluk site, probably a village, just south of Wadi el-Ḥasa. However, the sherds collected date from the Abbasid to Mamluk period. The site appears to be associated with the sugar cane industry (Albright 1924; Mallon 1924).

Ṭawahīn es-Sukkar, Site 1, is, as the name indicates, a sugar mill (Albright 1924: 4; Mallon 1924: 433, Fig. 15; Frank 1934: 205-07, Pl. 8; Glueck 1935: 8, Fig. 1). It is located immediately east of the Early Bronze cemetery at eṣ-Ṣafi, Site 2. Segments of the mudbrick building which once constituted the complex still stand ca. 3-4m high (Pl. LXV, 1). The site presently consists of remnants of aqueducts, spillways, and the main buildings used for milling and storing purposes. Ceramics, especially in the form of sugar pots, were abundant at the site.

An associated site is Khirbet Sheikh 'Isa, Site 4, which is located immediately to the northwest of Ṭawahīn es-Sukkar (Albright 1924: 4; Mallon 1924: 432-36; Frank 1934: 205-07, Pl. 8; Glueck 1935:

8-9). As was previously stated, it has been identified for many years as the site of Christian Zoara. It was once an imposing mound (Albright 1924: 4; Mallon 1924: 434, Fig. 16; Frank 1934: 205). Now, however, it has been bulldozed for agricultural purposes. Column base fragments were noted in the southeast corner of the field while column drums were noted in the northeast corner of the field. A great deal of pottery, mostly Mamluk, was collected in the field. Pottery wasters were also collected from a midden in the center of the field. This is possibly the location of an ancient kiln.

Site 91 is another sugar mill located in the modern village of Feifa. The milling stone is still in place as are remnants of mudbrick buildings which were probably part of the mill (Glueck 1935: 9, Fig. 2). However, the mill is not as well preserved as at Ṭawahīn es-Sukkar, Site 1. The ceramic material collected is, as for Sites 45, 1, and 4, predominantly Mamluk (Fig. 6).

Ottoman period sherds were collected, but generally in low density (1-6 sherds) and, for the most part, from the Southern Ghors. The same can be stated about the Islamic sherds, without further precision, in the survey territory.

There are always sites in any archaeological survey which cannot be dated. Two such architectural sites are sites 77 and 112 (Pl. LXV, 2). They are both, well-preserved aqueducts located in Wadi Feifa and Wadi Khuneizīr respectively. The construction of both is similar. Four sherds were collected at Site 77 but none were found at Site 112.

## Conclusions

The nature of this report is preliminary. Thus, it only touches on the highlights of the survey's findings. Further work, the results of which will appear in a final report, will result in a fuller analysis of the findings of the survey. This further work will include more complete work on the lithics, sherds, glass, coins, shell, and other artifactual findings. Sketches of some of the more important architectural sites of

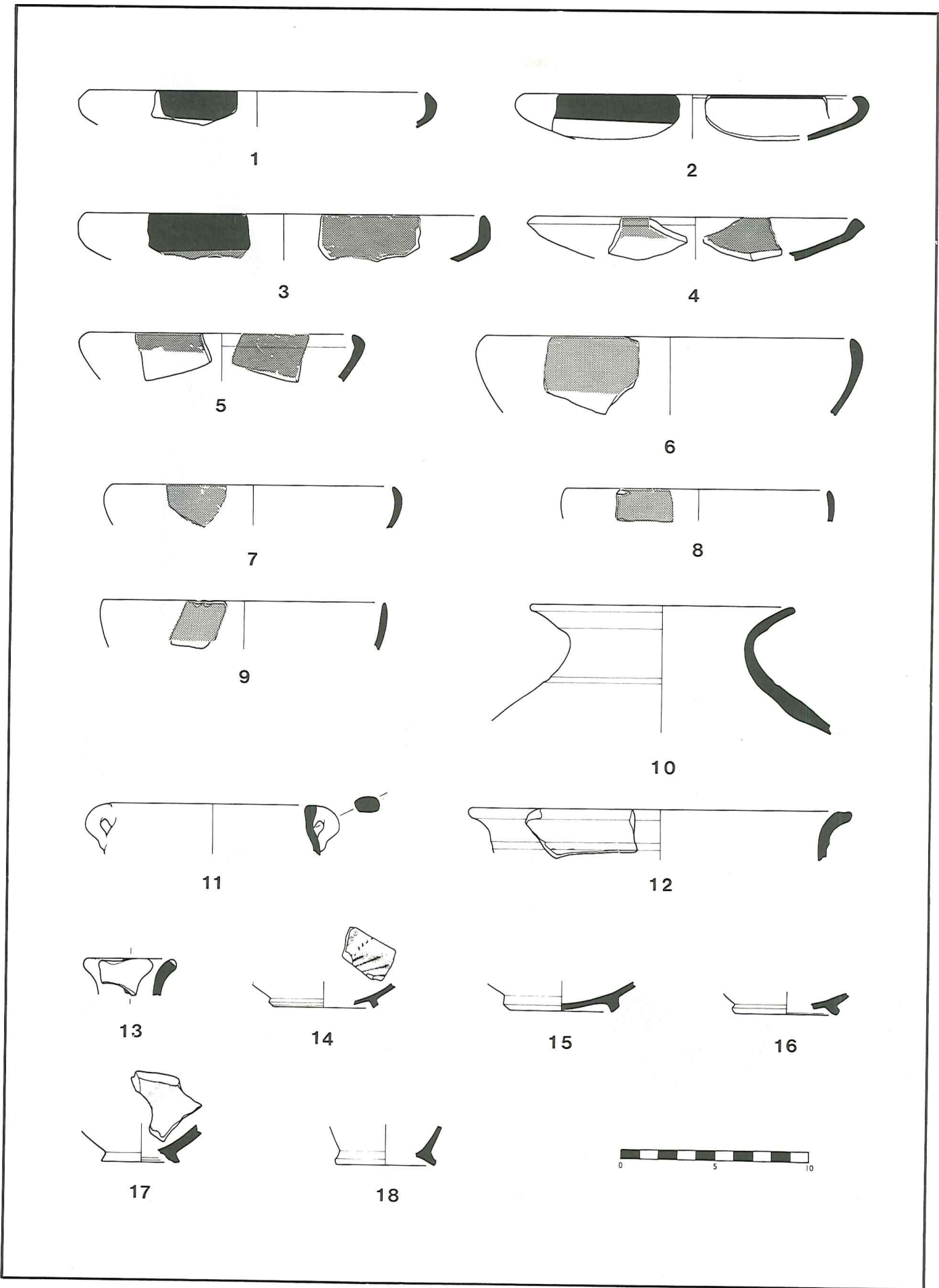


Fig. 5: Nabataean pottery from Site 6, Umm eṭ-Ṭawabīn.

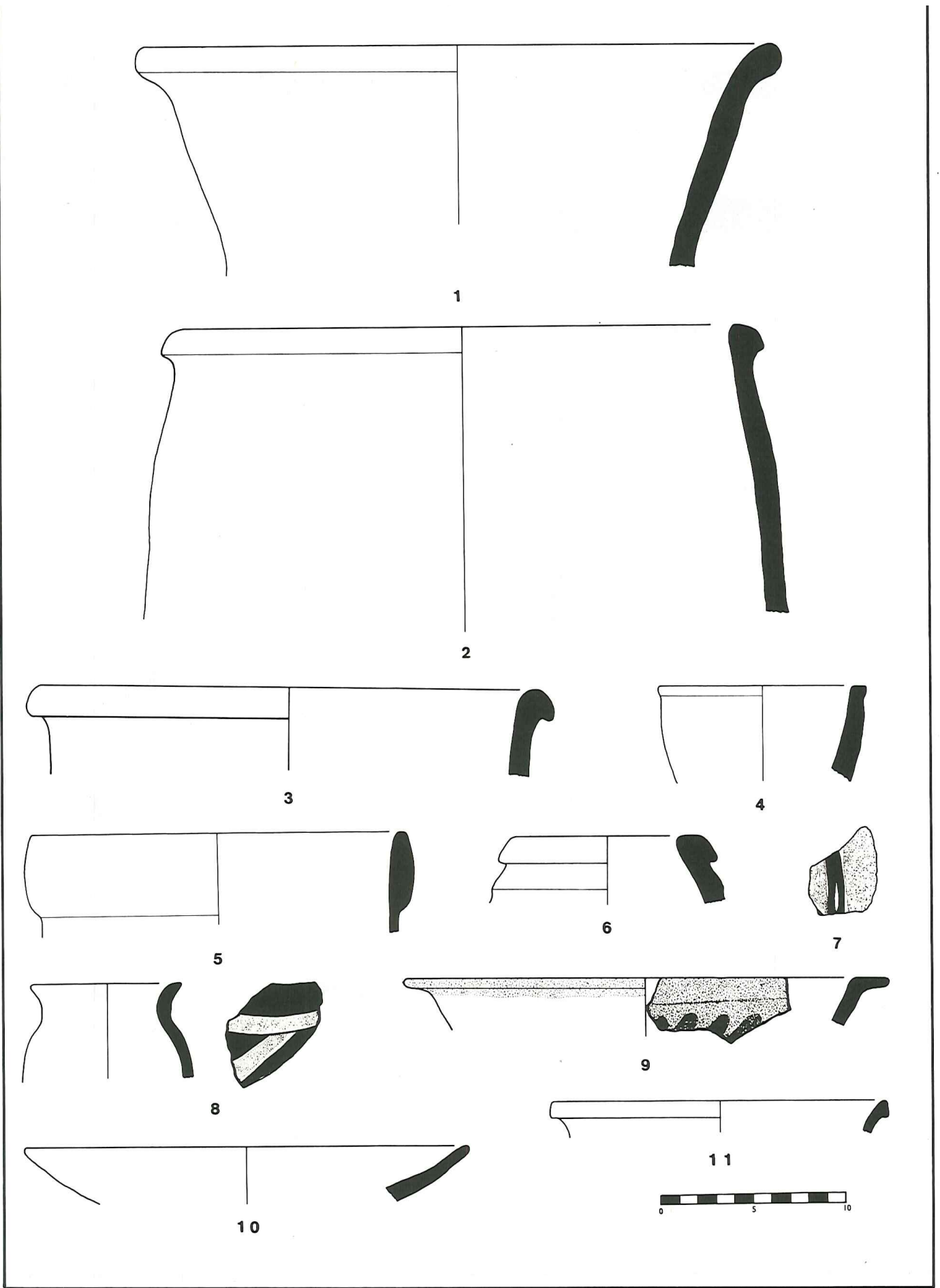


Fig. 6: Mamluk pottery from site 1, Ṭawaḥin es-Sukkar; Site 45, el-Rujoum; and Site 91, Feifa.



the survey will be made. More information will be provided on the environmental zones surveyed and the conclusions that can be drawn from the methodology employed. Settlement pattern maps will be published and conclusions drawn for the various periods represented in the survey territory.

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Burton MacDonald  
Geoffrey A. Clark  
Michael Neeley  
Russel Adams  
Michael Gregory

SOME THOUGHTS ON THE  
SOUTHERN EXTENT OF THE LISAN  
LAKE AS SEEN FROM THE JORDAN  
SIDE

It looks to me like the escarpment at ca. 30 Vertical/22 Horizontal on the Fifi Sheet 3051 I (Series K737) was formed by erosion of marls at ca. -300m by Wadis Umruq and Khuneizir. Prior to this erosion, I think there was a fairly continuous sheet of marls, ca. 40m thick (-300 to -340m) throughout a large part of the southeast end of the (current) lake basin. These marls have been largely destroyed by erosion in the central part of Wadi 'Araba. However, there is a marl shelf to the northeast of eṣ-Ṣafi which is accordant with the -300m contour. In general, the marls in this part of the basin are characterised by accordant, flat tops at ca. -300 metres. In many places they are covered with a surface veneer of colluvial debris derived from the slopes of the west edge of the Jordan Graben, located some few kilometres to the east. Also at -300m are a series of more or less linear 'shelves' or 'cornices' which might represent some kind of remnant terrace formation (or even wave-cut nicks and narrow platforms), perhaps corresponding to a major stillstand of the lake level. Insofar as the tops of a major episode of marl formation also lie at this elevation, the two lines of evidence tend to support each other. Fig. 7 shows the hypothetical sequence of erosional and depositional events in the vicinity of the escarpment at the mouth of Wadi Khuneizir.

Based on field survey, the maximum elevation of marl units in the western end of Wadi el-Ḥasā in the vicinity of eṣ-Ṣafi is at -160 meters. We saw no traces of marls above that elevation anywhere in the survey area. Since the maximum elevation of marls on the West Bank is at -180 m, this suggests that the Jordan Graben has been upthrust somewhat (ca. 20m) vis-a-vis its more stable western counterpart since the period of marl deposition corresponding to the maximum water level in the Lisan

Lake. This has been well dated to ca. 20,000 BP, just prior to the last glacial maximum (Schuldenrein 1983). The Lisan Lake was in existence from ca. 60,000 to ca. 12-15,000 BP. Since it was apparently saline to hypersaline from start to finish, its terminal date is largely arbitrary. At its maximum, it extended from the Sea of Galilee 220 km south beyond the present limits of the Dead Sea depression. The Rift Valley from the Gulf of 'Aqaba to the Sea of Galilee 220 km south beyond the present limits of the Dead Sea depression. The Rift Valley from the Gulf of 'Aqaba to the Sea of Galilee is still very active today, and has been active in the recent past (i.e., over the past 4000 years) as shown by evidence of extensive shear faulting on both sides of Wadi 'Arabah.

Some effort was expended to determine the maximum southerly extent of evaporites in Wadi 'Arabah in the area surveyed. This work is still going on, and these notes should not be taken as anything other than a preliminary 'first approximation'. In general, evaporites peter out at about 20 Vertical/18 Horizontal of Fifi Sheet 3051 I, Series K737). They evidently continue somewhat further south on the Palestinian side of the line (Begin, *et. al.* 1974). Whatever their maximum southern extent, these evaporites probably indicated shallow arms of the lake, probably no more than a few meters deep, and representative of its less-alkaline transgressive phases. There must have been considerable short-term fluctuation in lake boundaries over the ca. 50,000 years of its existence. These southern evaporites probably are deposits laid down during periodic transgressions of the lake during wet intervals at ca. 70-50,000 BP and then again at ca. 22-12,000 BP. We follow Begin, *et. al.* (1974) here. It should be noted that there is a contrasting, almost diametrically opposed paleoclimatic interpretation (Neev and Emery 1967).



There are no thick marl deposits beyond about 30° 50'N. latitude (at least none that I could see, and we drove as far south as Wadi Salamanieh). A more detailed study of the former extent of the Lisan Lake, and

its relation to the distribution of Late Pleistocene sites in the northeast 'Arabah is currently in progress (Clark n.d.)

G.A. Clark

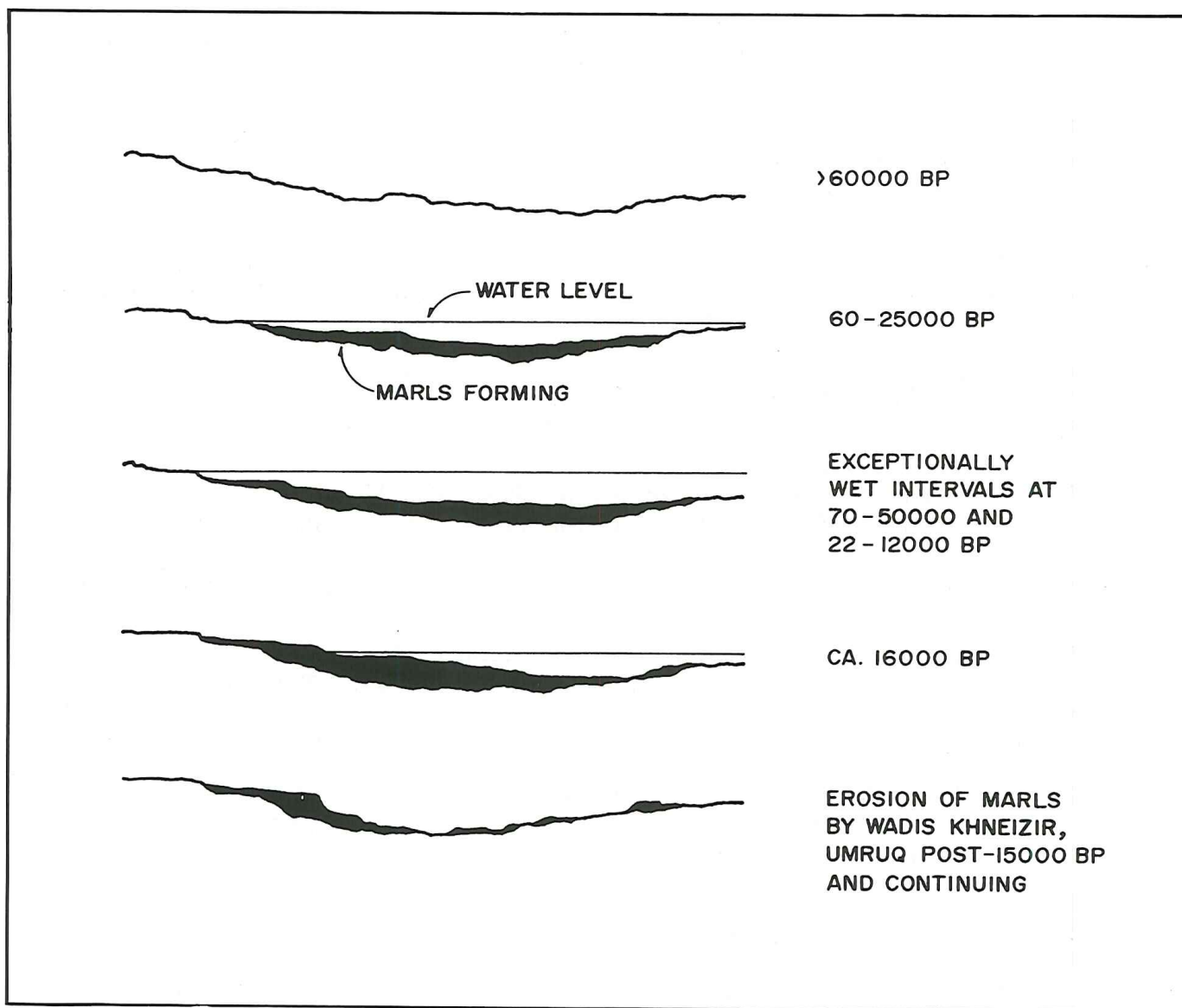


Fig. 7: Schematic north/south cross-section of the escarpment at the *debouchements* of Wadis Umruq and Khuneizir, showing the development and subsequent erosion of the marls from ca. 60 kyr BP until ca. 12 kyr BP. Only major transgressive episodes are indicated.

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