

THE WĀDĪ AZ-ZARQĀ' / WĀDĪ AḌ-ḌULAYL ARCHAEOLOGICAL PROJECT, REPORT ON THE 1996 FIELDWORK SEASON

by

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INTRODUCTION (G. Palumbo)

The archaeological project in Wādī az-Zarqā' covers approximately 144 km² of territory between Palestine grid coordinates 243.000 and 255.000 East and coordinates 164.000 and 176.000 North. The limits are approximately the northern limits of the city of az-Zarqā', to the south, al-Hāshimiyya and its refinery to the east, the crest of the hills on the right bank of the River az-Zarqā' and Wādī aḍ-Ḍulayl to the north, and the area of Tall al-Bīrah to the west.

The project is jointly conducted by a team from the University of Rome "La Sapienza" and Yarmouk University, Irbid, and is co-directed by Zeidan Kafafi, Gaetano Palumbo, and Paolo Matthiae. Funding for the 1996 season was provided by the Italian Ministry of Foreign Affairs, the National Research Council of Italy (CNR) and Yarmouk University.¹

Previous investigations were conducted by Palumbo and his team from the University of Rome "La Sapienza" in 1993, under the title of 'The Jebel er-Reheil Survey and Excavations Project', whereby over 350 archaeological sites were revealed which ranged in date from the Lower Palaeolithic to recent times (Palumbo *et al.* 1996).

Detailed excavations commenced in 1996 in order to understand the extent of human occupation in this area and the relationships between man and his environment over the millennia, in what it is now a critical en-

vironmental zone of northern Jordan.

The project objectives are outlined below:

1. To conduct an intensive survey of the 144 km² area and compare ground survey results with computer generated models of site distribution and acquire detailed information on archaeological site location;
2. To produce a database of sites at risk (e.g. threatened by urban expansion, agricultural activities and clandestine excavations) and propose an evaluation and management strategy;
3. To understand the nature and extent of occupation from prehistory to recent times and the context in which such occupation was established and subsequently evolved in the az-Zarqā' Basin;
4. To reconstruct the evolution of the Pleistocene landscape in order to recreate the setting for prehistoric human occupation in the area and attempt to determine the relationship between site location and natural resources;
5. To study the evolution of settlement from early prehistory to the late Iron Age, both in terms of settlement hierarchy and exploitation of natural resources;
6. To study the remains of Roman, Byzantine and Islamic occupation within the area and attempt to determine the reasons for site location;
7. To ascertain the function and date of

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wad, the Ambassador of Italy in Jordan, Dr Franco Cerulli, the cultural attaché of the Italian Embassy in Jordan, Mr Giovanni Benenati, and Prof. Emanuele Minardo also of the Italian Embassy in Jordan for their encouragement and support.

cairns and towers which are very common throughout the entire landscape of the az-Zarqā' Basin;

8. To conduct an ethnographic study of the nomadic encampments within the area, which includes the evolution of site location, range of movement, and land-use patterns;
9. The publication of results.

Summary of Fieldwork

This year's fieldwork was carried out over a period of nineteen days during the months of September and October and concentrated on three major activities:

1. Survey of the Pleistocene river terraces which had already been identified by Besançon and his team in 1984-85 (see below), and especially of the upper terrace (ad-Dawqara) formation. 85 terrace sections were analysed and one in particular yielded a quantity of tools and fossilized animal remains, the latter extremely important for establishing an absolute date for the formation.
2. Topographical survey and three soundings at the late Neolithic site at al-Ḥsayyah/al-Wad'ah (JRS Site 8).
3. A detailed non-invasive survey was conducted at the Early and Middle Islamic site at Khirbat Mak'ḥūl (JRS Site 4), which comprised the structural analysis of all extant remains, in order to gain a better understanding of the nature of this site. In addition, a survey was undertaken of the immediate environs of the site to identify any associated features, together with a topographical survey, and a general assessment was made with regard to the overall state of preservation and the extent of 'recent' clandestine activity.

A number of sites were identified during the survey, while intensive collections were conducted at other previously identified sites now threatened by expanding agricultural activities (namely JRS Site 79 - EBII, and Site 90 - possibly Kebaran). A

preliminary survey was also commenced at Tall al-Bīrah (Site 5).

PLEISTOCENE ARCHAEOLOGY AND PALAEONTOLOGY

Introduction and Methodology (F. Parenti and E. Santucci)

An Aschematic outline of the morphogenic evolution of the az-Zarqā'/aḍ-Ḍulayl Valley in the context of a Paleolithic archaeological sequence in northern Jordan was available for reference during the present survey (Besançon *et al.* 1984, Baubron *et al.* 1985, Besançon and Hours 1985, Copeland and Hours 1988).

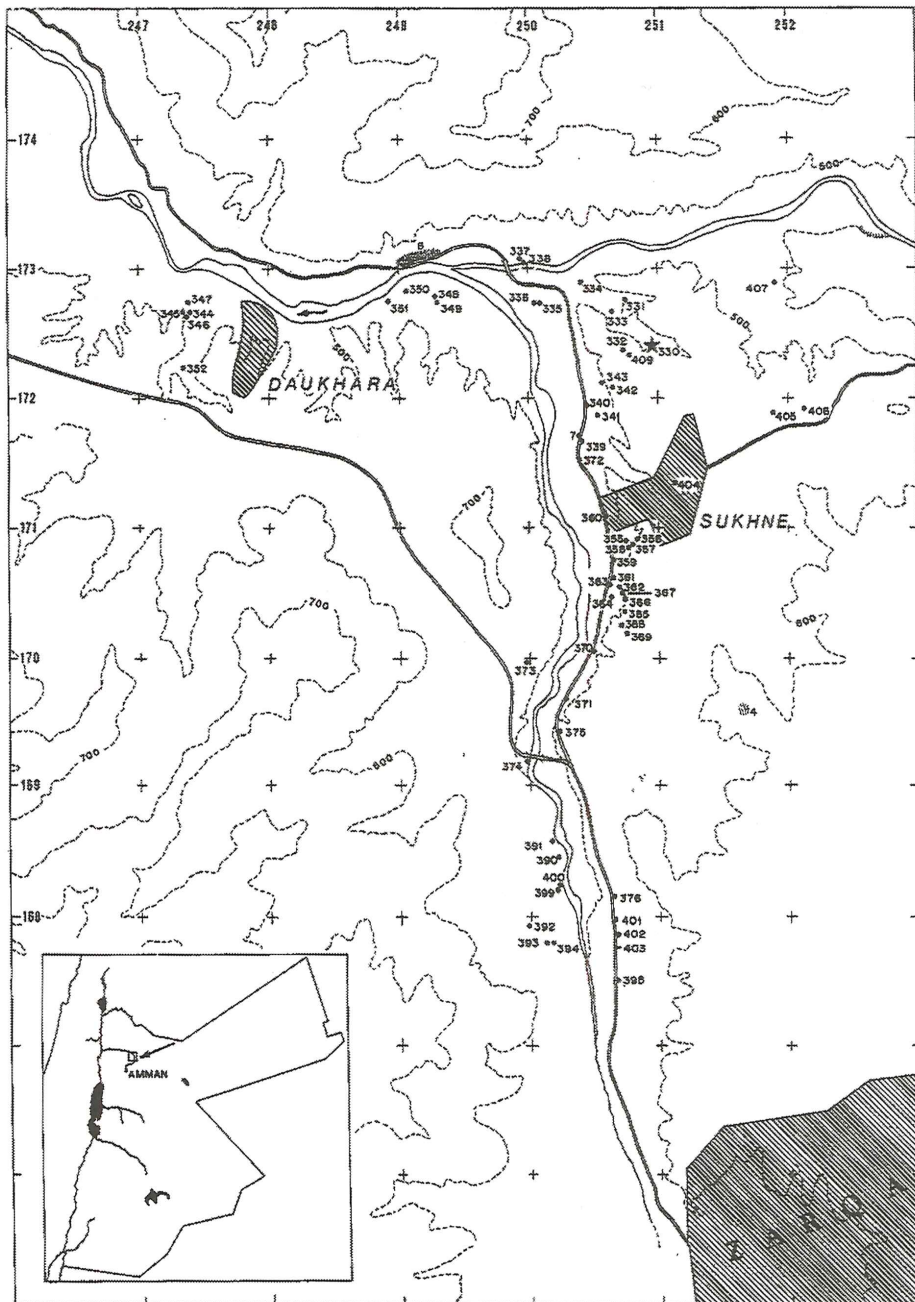
The proposed chronostratigraphy begins with four Pliocene basalt flows, ranging from 7 to 2.2my. The oldest Pleistocene unit, the ad-Dawqara formation, is the highest pediment-terrace and is composed of colluvial and alluvial sediments. It outcrops above the present az-Zarqā'-aḍ-Ḍulayl stream bed between 40 and 50m. Rare "undiagnostic" flakes, without bifaces, were recorded by the French team in some sections. Immediately below, sometimes inter-bedded in the same second terrace, there are at least two Middle Pleistocene alluvial formations: al-Bīrah and Khirbat as-Samrā' sometimes interfingering in the same middle terrace. They contain upper Acheulean and Musterian lithic industries. One or (in some places) two Holocene terraces with Upper Palaeolithic and Bronze Age remains represent the end sequence. No palaeontological remains were recovered in the previous work. The oldest fossilized mammalian fauna in Jordan is reported for the Upper Pleistocene of az-Azraq' basin (Clutton-Brock 1970, Muheisen 1988).

The primary objectives of the 1996 were to test this sequence, take samples for absolute dating and identify suitable sites for further detailed excavation.

The extent of the 1996 survey included the az-Zarqā' aḍ-Ḍulayl valleys between az-

Zarqā' and al-Hāshimīyya upstream and ad-Dawqara downstream. All "visible" sections in the Pleistocene formations were inspected. Fortunately, the valley landscape has an abundance of agricultural and road sections. Whilst a total of 85 sections were examined and recorded, numbers were allocated only to those with stratified archaeological remains. Table 1 is a synthesis of the recorded sections, which can be only provisionally considered as archaeological sites. They are mapped in Fig. 1.

The sections are recorded at 1:100 scale and their altitude was plotted by total station starting from the 485m spot height on Tall as-Sukhna (171.41 N and 250.35 E of Palestine Grid), or derived from the 1:10,000 British topographic map. The description includes sedimentological, stratigraphical and archaeological observations. On the base of these data, we propose a hypothetical attribution of each section to the sedimentary formations as defined in Baubron *et al.* 1985.



1. The az-Zarqā' ad-Dulayl valley with the archaeological locations discovered and studied during the 1996 campaign (Drawing by F. Parenti).

Table 1: Outcrop sections in the az-Zarqā'-aḍ-Ḍulayl valley explored in 1996 field season. Formations: D = ad-Dawqara (Daukara) B = al-Birah (Bireh); KS = Khirbat as-Samrā' (Khirbet Samra).

N	PGN	PGE	H. top	H. bottom	Formation	Artifacts	Notes
7	171.70	250.40	492.88	485.88	B	24	Potential deposits
330	172.37	250.95	506.17	503.17	D	148	
331	172.75	250.75	502.00	498.00	D	3	
332	172.35	250.73	506.71	503.31	D	11	
333	172.65	250.64	493.50	491.50	D/B	2	Potential deposits
334	172.87	250.40	487	about 475.5	?		
335	172.72	250.08	about 475	468	?	4	
336	172.72	250.07			?	3	
337	173.07	249.95	464.70	462.70	?	+	Colluvium
338	173.05	249.95	457.85	455.85	S	-	
339	171.66	250.40	493.14	485.74	B	21	
340	171.95	250.43	493.91		B	-	
341	171.88	250.51	496.17	450.17	D/B	5	Potential deposits
342	172.08	250.63	507.28	501.78	D	19	
343	172.10	250.57	500.46	495.00	D	10	
344	172.66	247.38	about 485		D	3	
345	172.67	247.33		about 485	D	-	Potential deposits
346	172.61	247.36	about 485	481.50	D	6	
347	172.73	247.37	about 481		D	-	
348	172.79	249.28	about 507	about 501.5	D	2	
349	172.74	249.30	509.94	505.94	D	-	Potential deposits
350	172.81	249.07	475.36	470.36	B/KS	5	
351	172.73	248.92	473.64	469.84	KS	72	
352	172.21	247.34			?	1	
355	170.89	250.73	496.70	490.60	B/KS	1	Potential deposits
356	170.90	250.82	501.25	497.55	B/KS	37	
357	170.87	250.74	500.30	497.80	B/KS	4	
358	170.84	250.75	502.13	499.70	B/KS	1	
359	170.77	250.60	488.78	485.00	B\KS	74	Potential deposits
360	171.09	250.58	492.12	488.62	B\KS	-	
361a	170.60	250.65	491.05	488.50	B\KS	14	
361b	170.60	250.65	494.25	491.05	B	11	
361c	170.60	250.65	499.51	496.00	B	23	Potential deposits
362	170.54	250.70	500.88	497.50	B	39	
363	170.57	250.62	495.64	-	?	6	
364	170.45	250.64	501.52	497.52	B?	1	
365	170.35	250.73	523.11	518.61	B	1	Potential deposits
366	170.45	250.73	511.77	509.27	B	1	
367	170.47	250.71	511.77	508.00	B	1	
368	170.25	250.70	513.15	509.65	B	1	
369	170.19	250.74	518.02	509.74	B	1	Section lenght: 81 m

N	PGN	PGE	H. top	H. bottom	Formation	Artifacts	Notes
370	170.04	250.48	497.49	494.00	B/KS	9	Pre-quater. sand-stone?
371	169.67	250.27	503.30	493.29	B/KS	18	
372	171.52	250.37	488.02	482.02	?	-	
373	169.88	249.95	526.00	516.07	D	-	Potential deposits Colluvium B/KS
374	169.20	250.00	494.77	-	S	-	
375	169.42	250.21	510.02	504.42	B	35	
376	168.15	250.61	531.21	524.08	?	21	
390	168.45	250.20	512.70	504.34	KS	5	
391	168.57	250.15	517.70	514.26	B/KS	4	
392	167.96	249.99	550.75	549.25	D	1	
393	167.80	250.12	550.50	544.01	D	8	
394	167.81	250.17	544.00	535.00	?	-	
395	167.51	250.68	534.92	524.08	B	9	
399	168.20	250.20	508.60	506.58	B/KS	25	Potential deposits
400	168.22	250.21	511.35	509.85	B/KS	6	Potential deposits
401	167.97	250.64	529.09	524.33	?	4	Colluvium B/KS
402	167.88	250.66	528.19	526.68	B/KS	2	Colluvium B/KS
403	167.79	250.66	530.74	522.74	?	4	
404	171.35	251.12	about 518	about 516	D	4	
405	171.87	251.87	about 515	about 513	D	9	
406	171.91	252.11	about 513	about 505	D	15	
407	172.87	250.90	about 498	495.15	D	3	
409	172.31	250.79	about 505.5	about 503.5	D	2	

Results of The 1996 Survey (F. Parenti and E. Santucci)

The sequence proposed by Besançon and colleagues was fully confirmed, especially with regard to relative chronology and morphological analysis. In addition, important new results were obtained.

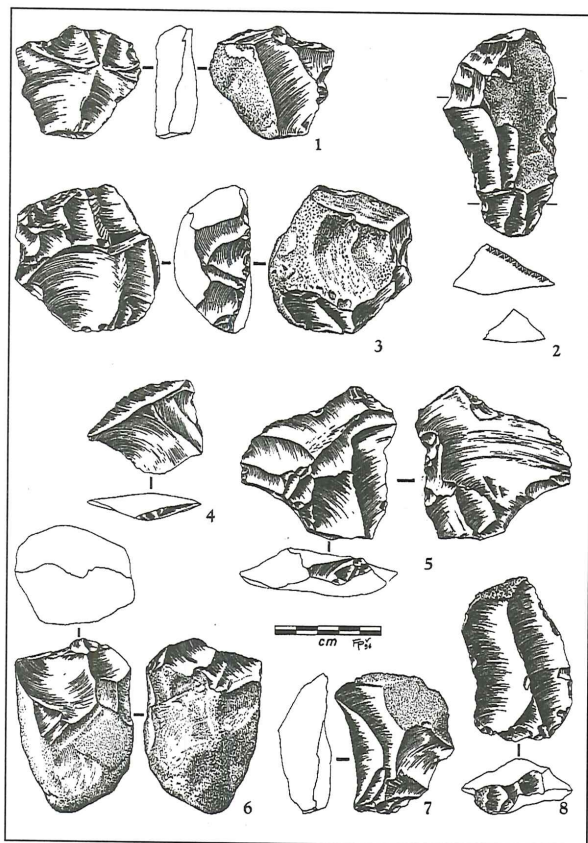
Lithic Assemblages

Contrary to what has been previously reported, the ad-Dawqara formation is indeed a rich source of archaeological material. At 12 sections inspected in the immediate environs of the villages of as-Sukhna and ad-Dawqara, some 250 undisputable artifacts, mainly flakes and cores, were recovered. Hand-axes are completely absent, which confirms the first attribution to the pre-Acheulean Lower Paleolithic. The artefacts

are in more abraded and rolled conditions than in the more recent formations. In these ones the average abrasion index (Shackley 1974) is 3,31 for the al-Birah formation and 2,99 for the Khirbat as-Samrā' formation. In ad-Dawqara the average is as high as 3,80.

Judging from the actually available data, possible chronostratigraphic attributions for the ad-Dawqara formation span between the final lower Ubeyidiye formation in Israel, (Guérin *et al.* 1993) and Middle Pleistocene (*Latamné* formation or terrace III in Syria, Besançon *et al.* 1984). Along with the artefacts of Abū Hābil and Abū al-Khas (Muheisen 1988), this is, at present, the oldest (and most consistent) lithic assemblage in Jordan recovered from a stratified deposit (Fig. 2).

The remnants of Middle and Upper Pleistocene formations (al-Birah and Khirbat as-



2. Selection of Early Acheulean flakes and chipped stone tools from the ad-Dawqara formation. N.6 is a chopper (Drawings by F. Parenti).

Samrā') were examined in the other sections cutting the terraces. They yielded about 600 artefacts, which range from Late Acheulean to the final Palaeolithic-Neolithic, with an impressive presence of Lower-Middle Palaeolithic flake industry. The same industries constitute the "background noise" previously attested from surface collections in the region (Palumbo *et al.* 1993) and pertain to the widespread surface final Acheulean.

In all the formations the composition in terms of artefacts classes is roughly the same, that is the relative proportion of core-tools, debitage, retouched and chunks do not show any striking variation, the only difference being the presence of handaxes in al-Birah formation.

Several sections in which stone tools were recovered in fine-grained strata seem specially favoured for further research: sections 332, 342, 343, 375, 399, 400.

SITE 330 (as-Sukhna North: 172.37 N, 250.95 E)

In view of the recovery of fossilized teeth of extinct mammalian fauna along with stone tools on the lower strata, the whole preserved surface on this section (30 m length x 3 m height) was cleaned (Figs. 3-4). The stratigraphy was recorded in detail at 1:20, and the sedimentological, palynological and palaeontological samples plotted. 148 artefacts were recovered from the section, providing the most important lithic assemblage of the ad-Dawqara formation. An absolute date will be possibly obtained by ESR (Electron Spin Resonance) on tooth enamel of equid teeth.

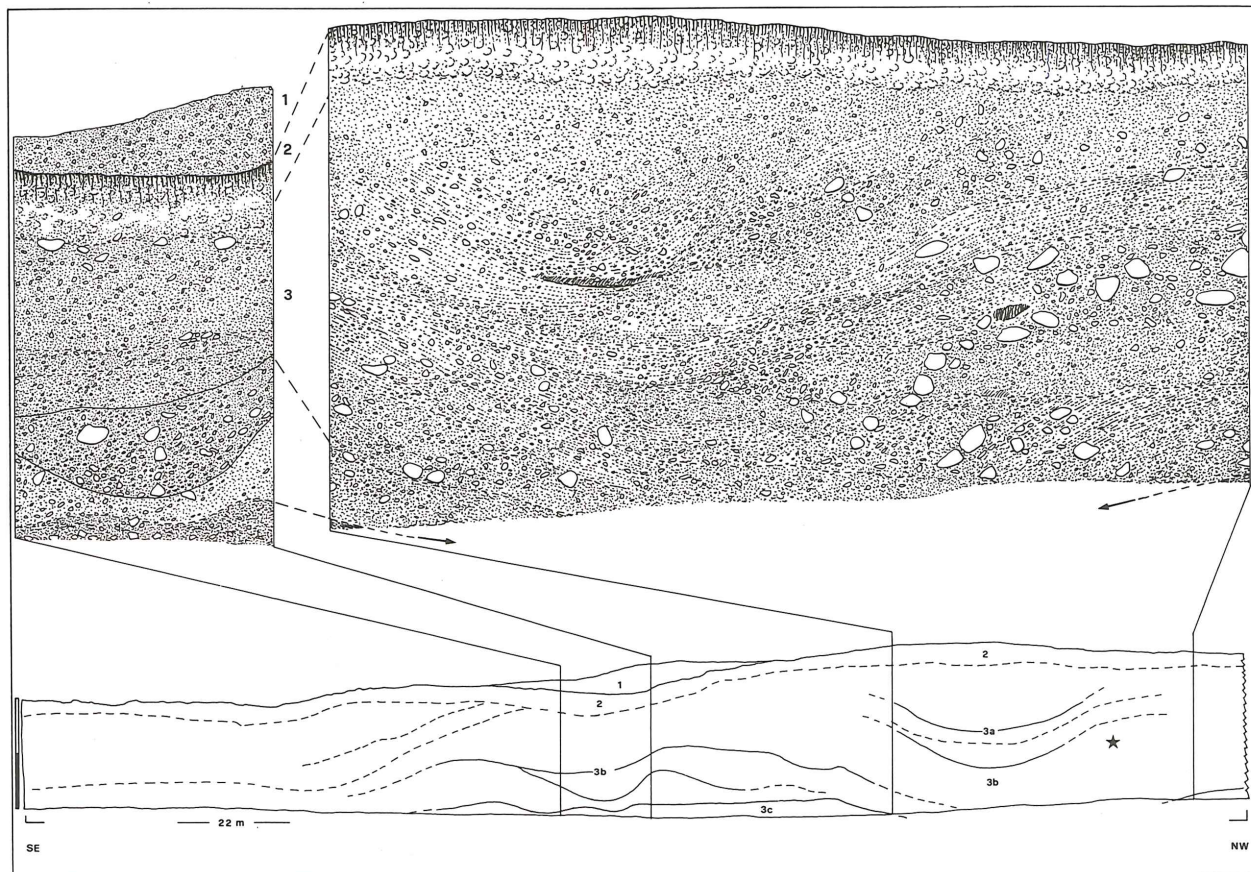
The abrasion of lithic remains vary between fresh (2,74 %), slightly abraded (30,82 %), abraded (40,41 %), heavily abraded (19,86 %) and very heavily abraded (6,16 %). The average abrasion on the site is 3,96, which is somehow higher than the average of ad-Dawqara formation. This is possibly due to the fresher condition of the assemblages of the other sections, included within the uppermost crust or in the fine grained strata immediately below.

The lithic toolkit is composed by cores (7,48 %), debitage (65,31 %), retouched (15,65 %), chunks (0,66 %) and undeterminate (10,2 %). Among the 23 surely retouched tools the most abundant types are retouched flakes (*sensu* Bordes) and notches.

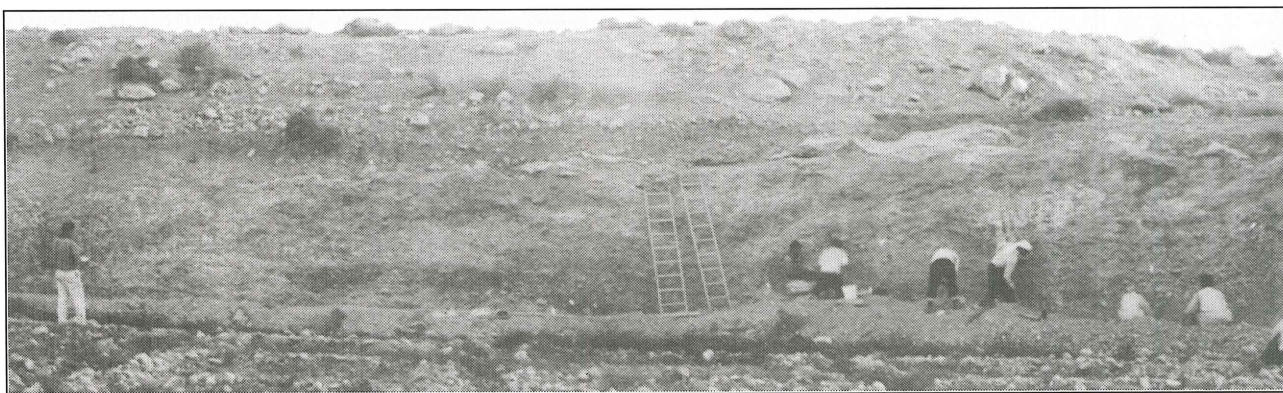
The overall density of artifacts is of about 17 tools per cubic metre, which is something intermediate between a sporadic occurrence and a real archaeological site, in terms of corresponding Acheulean cultural level (Isaac 1977: 80). Distribution of the artifacts and fossils in the section is widespread, with a slighter concentration in the lowermost metre.

SITE 360 (as-Sukhna West 171.09 N., 250.58 E)

A flint-knapping 'atelier' of the Middle Paleolithic period was discovered in section



3. Site 330: section. The enlarged parts show details of the stratigraphic sequence. The star shows the location of the elephant tooth. Total section length is 22m. Scale at left of section is 2m (Drawing by F. Parenti).



4. Site 330: cleaning of section (Photo by Yoshiko Iino).

360, alongside the road from az-Zarqā'. It is embedded in the filling of a small paleo-channel, possibly the talweg of an eastern tributary of the az-Zarqā', cut into the earlier al-Bīrah alluvial formation. Some 150 debitage remains, all in very fresh condition (cores, flakes and chunks) were recovered from a small concentrated area (about one square meter). The proximity of a house

above the section prevents anything other than the careful cleaning and stratigraphic recording of the section. A date could be obtained from a small bone fragment associated to the lithic remains.

SITE 90 (Jabal Bākiyah 172.70 N, 253.40 E)

In the 1993 survey a flint-knapping area of Epipalaeolithic / Neolithic period was

plotted on the southern edge of Jabal Bak-yie. A further inspection on October 1st, 1996, revealed that the site is partially damaged by agricultural activities on the northern side of the plateau. In order to recover a minimum representative sample of the most threatened area, an intensive surface collection in three delimited and mapped areas produced about 2,000 artefacts.

Fossil Remains (Abdel Halim Al-Shiyab)

Site 330 has produced a few fragments of fossilized bones during the 1996 survey. These bones are: one lower premolar of *Equidae*, three upper molars of *Bovidae* (two of them are milk), a small long bone fragment of a small ruminant (gazelle?) and a big fragmented tooth of an elephant. The latter has been identified by C. Guérin (p.c. and appendix in Parenti *et al.* 1997) as belonging to *Mammuthus meridionalis*. This is the first evidence of mammoth found in Jordan. The date of extinction of this species, commonly placed at 0.9 my, is also very important because this makes it a *terminus ante quem* for the dating of the deposit.

Equidae

The exact position of an isolated equid tooth is difficult to be identified, particularly P3-M2. The specimen belongs to *Equus* sp. and is probably the first molar (M1). Given its dimensions and indices can probably be identified with a species identified at al-'Ubaydiyya, *Equus* cf. *tabeti* (Parenti *et al.* 1997)

Bovidae

We describe here the only permanent tooth. It is a well-preserved upper first molar tooth of *Bovidae* (M1). The measurements of this tooth are almost within the range of the Aurochs (*Bos primigenius*).

The small fragment of long bone of small ruminant is undeterminable, although it is possible that this shaft femur could belong to *Gazella* sp.

Elephant

Guérin has shown that the measurements of this tooth are within the range of *Mammuthus meridionalis* and very similar to those of a specimen found at al-'Ubaydiyya. Only the height is larger than at al-'Ubaydiyya, indicating that the as-Sukhna elephant is a more advanced and thus recent one. The range for the species *M. meridionalis* is between 2 and 0.9 million years. The al-'Ubaydiyya specimen is dated at 1.4 million years, thus on the basis of the palaeontological evidence the Sukhna specimen can be dated at about one million years.

Because of the bad preservation of the tooth fragment, it is impossible to assign it to one or another defined subspecies of *Mammuthus meridionalis*, which is already known in the Levant (Guérin in Parenti *et al.* 1997).

Al-Ḥsayyah Survey and Environs (Z. Kafafi)

The site of al-Ḥsayyah (P.g. 249.16E 173.14N) was explored in previous work done by Palumbo and identified originally as al-Wad'ah (Site JRS 8) (Palumbo *et al.* 1996). However, the inhabitants of a house built just over the site reported that Wad'ah identifies a large area, and that al-Ḥsayyah is a more appropriate name for the site. This is located on the main road leading from as-Sukhna to the village of al-Qanyyah, just about 2 km NW of the village of as-Sukhna. It overlooks the junction of Wādī az-Zarqā' and Wādī aḍ-Ḍulayl from the north (Fig. 5). The entire area has been damaged by extensive road works and embankments, and successively by agricultural terracing. During the 1993 campaign Neolithic flint implements and Neolithic, Byzantine, and Umayyad period pottery was collected in the sections opened by the road and agricultural terraces.

The sections trimmed along the agricultural terraces in 1996 aimed at as-



5. al-Wad'ah basin: general view (Photo by Yoshiko Iino).

certaining the nature and depth of the deposits, at establishing the chronology of the site, and assessing the overall presentation and potential of the site. A preliminary topographical survey (Fig. 6) was followed by four section cleanings. The preliminary results of these are presented here.

Sections 1-2

These are located directly on the northern edge of the paved road. Combined, they measure 7.5 m (E-W) and it is 1.8 m high (Fig. 7). Several layers have been excavated, the uppermost, just below the plough zone, contained ancient and modern artifacts. Lower layers contained no pottery, but a very large amount of debitage and flakes, in addition to faunal remains consisting of *Ovis/capra* and *Gazelle*. In terms of architecture, the remains of two walls built of stone boulders were uncovered. The first one appeared in the eastern part of the sounding and consisted of two rows of stones, with an E-W orientation and continuing into the eastern balk. The second has a N-S orientation, just half

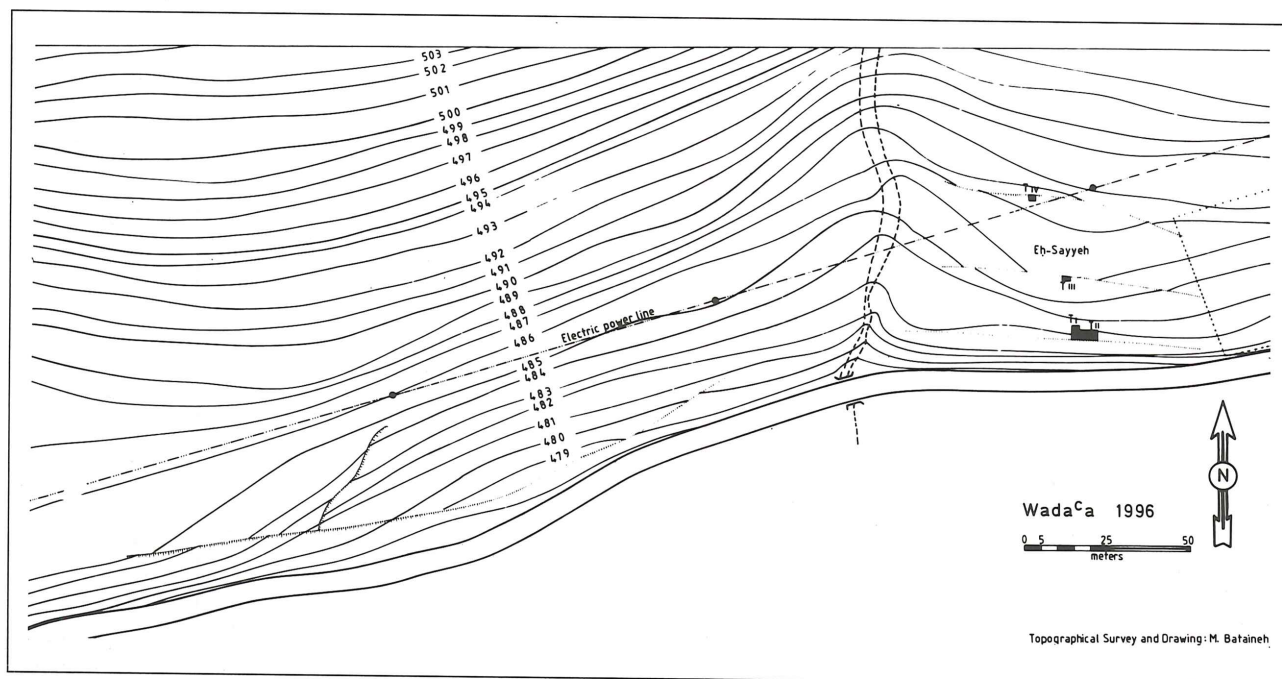
a meter below surface, and partially continuing in the western balk. A very crude plaster layer, probably a floor, was found to the east of it.

The date of these walls and associated layers, on the basis of the flint industry and wall construction techniques is possibly the PPNC. More extensive investigations are needed, however, in order to understand the chronological sequence in this part of the site.

Section 3

This section was trimmed on the second terrace. It measures 2m (E-W) and it is 2m high.

Only one occupational level was recognized in this section. The upper stratum yielded pottery sherds, flint debitage and animal bones, but no clear association with any structure. The lower layer (Locs 1.55-1.63) consisted of a compact soil with a stony layer and a chalky compact layer. Directly on top of a compact surface, possibly a floor, an arrow head of the Byblos type was found.



6. Topographical survey of al-Hsayyah (Drawing by M. Bataimeh).



7. al-Hsayyah sections 1-2 (Photo by Yoshiko Iino).

Section 4

This section was investigated on the third terrace above the road. It measures 2.3m (E-W) and it is 2.4m high. 24 loci were identified, belonging to three phases:

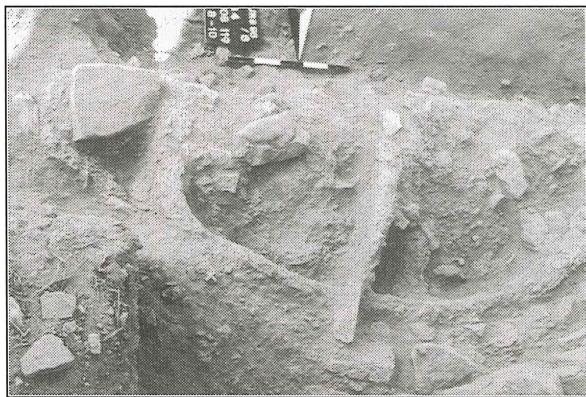
Phase I: Wall 113, just below top soil, and laid above a fill.

Phase II: Apsidal wall 108 and associated (?) floor 124

Phase III: It is divided into two sub-phases. IIIa is characterized by a stony installation on mudbrick foundations (120) and located inside the apsidal structure 108. IIIb is a clay installation (111 and 119), lo-

cated inside the apsidal structure and following its profile. It is divided into several smaller spaces, 4 of them visible during the soundings. Floor 124 was associated. No known parallels are available for this structure (Figs. 8-10).

In summary the soundings at al-Ḥsayyah showed a rich density of material culture re-

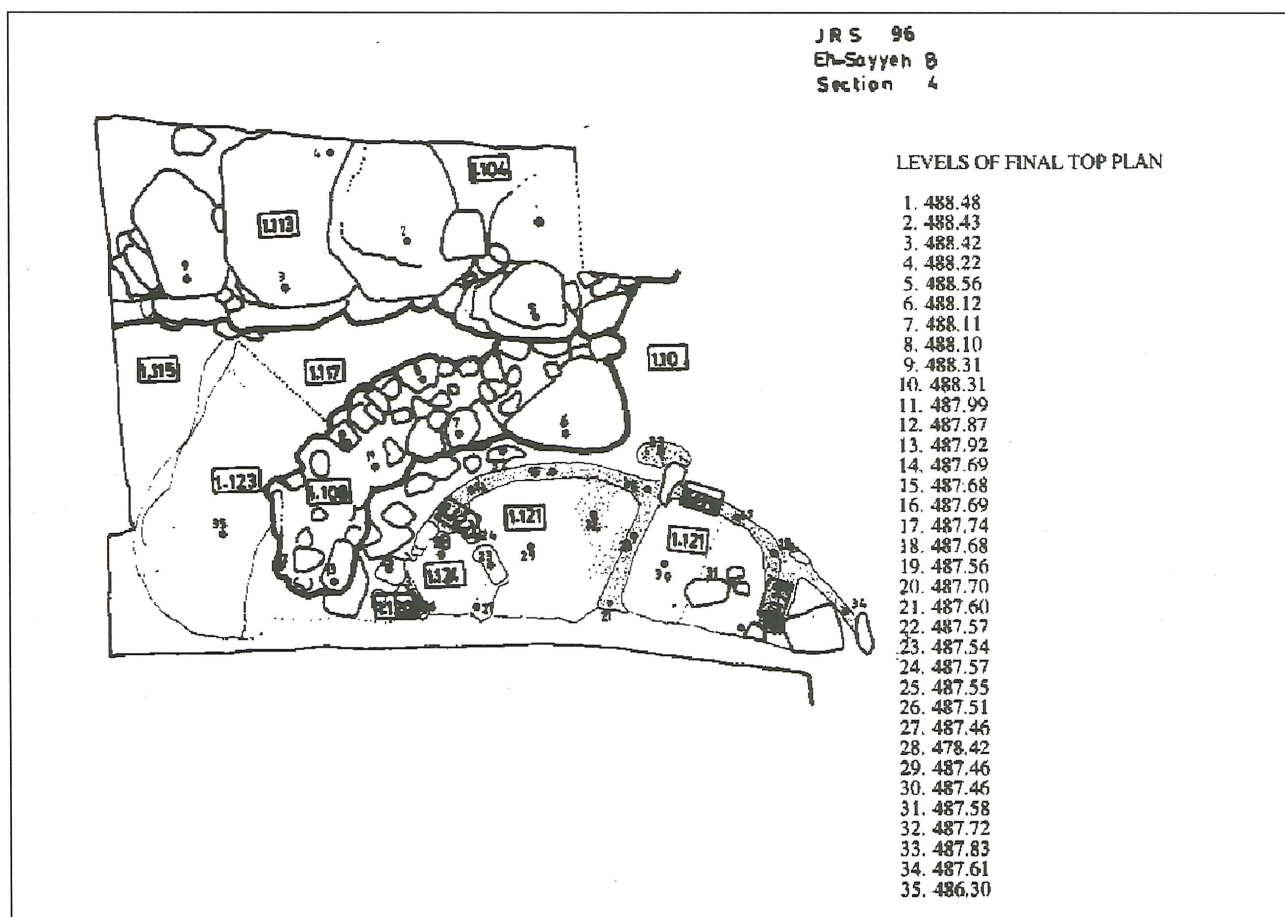


8. Al-Ḥsayyah, section 4. View over structure 111/119 (Photo by Yoshiko Iino).

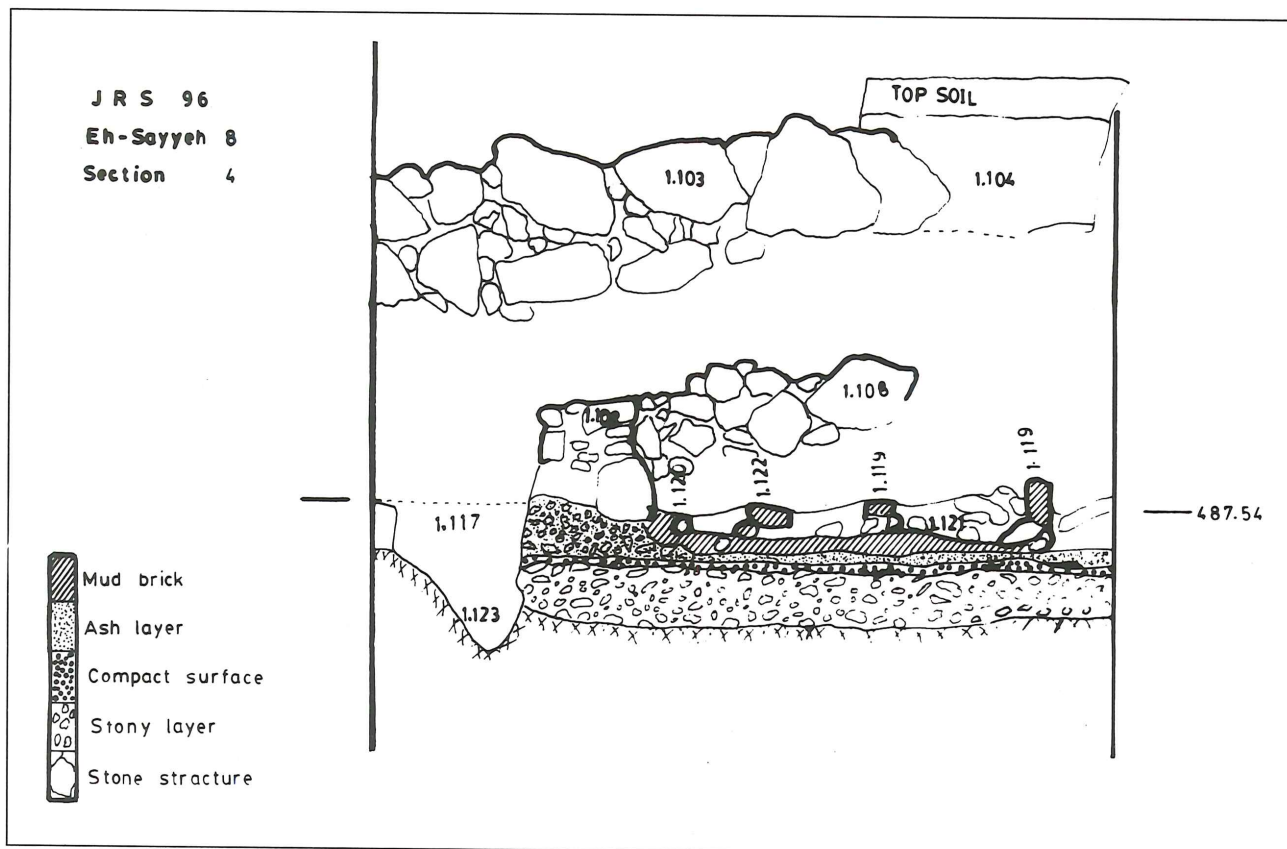
mains (Figs. 11-12). Faunal remains include goat (*Capra hircus*), sheep (*Ovis domesticus*) and a smaller percentage of gazelle (*Gazella dorcas*). Samples for C14 dating have been collected at all soundings, but dating has not been conducted yet. While Yarmoukian pottery has been collected on the surface in 1993 and 1996 (Fig. 13), no clear Yarmoukian layers have been identified in the sections, which exhibit material remains belonging to the late PPNB or PPNC period. It is possible, however, that Yarmoukian occupation may be found at other locations within the vast area covered by this site.

Investigations at Khirbat al-Mak'hūl (M. Hatamleh and M. Wilson)

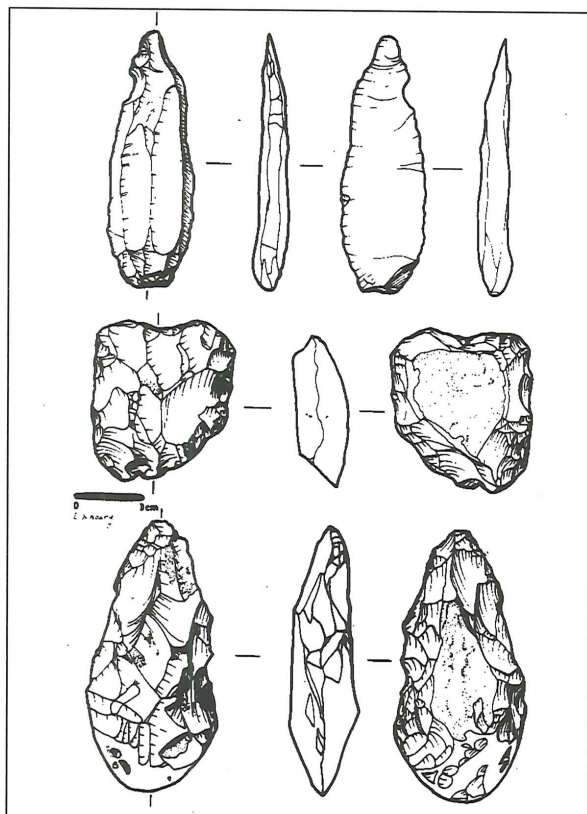
Khirbat al-Mak'hūl (site JRS4, P.G. 251.62E 169.60N) is located on a hilltop south of the village of as-Sukhna (Figs. 14-



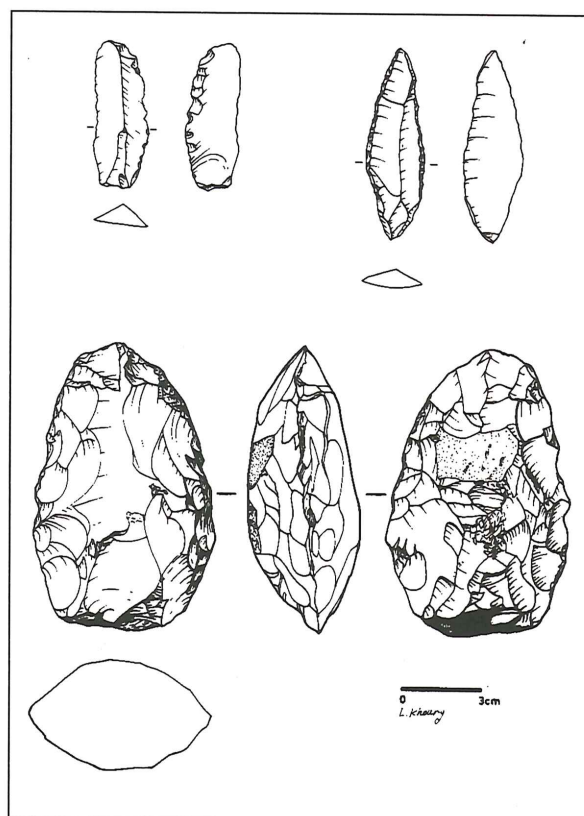
9. Al-Ḥsayyah, section 4. Final top plan.



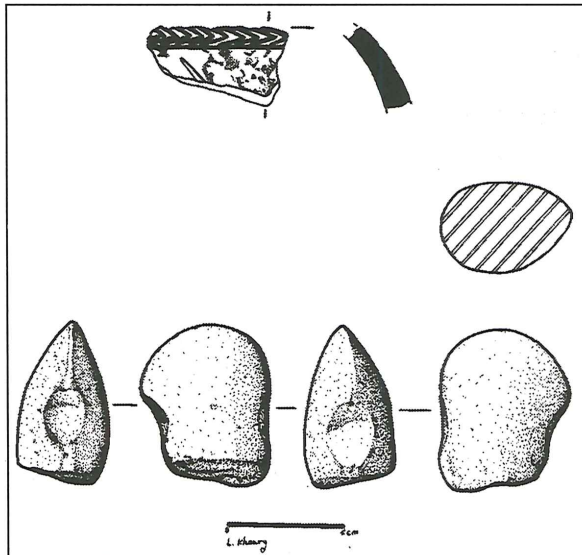
10. al-Hsayyah, section 4. Section.



11. al-Hsayyah Sample of chipped stone tools (Drawings by L. Khoury).



12. al-Hsayyah. Sample of chipped stone tools (Drawings by L. Khoury).



13. al-Ḥsayyah. "Yarmoukian" pottery and polished stone axe (Drawings by L. Khoury).

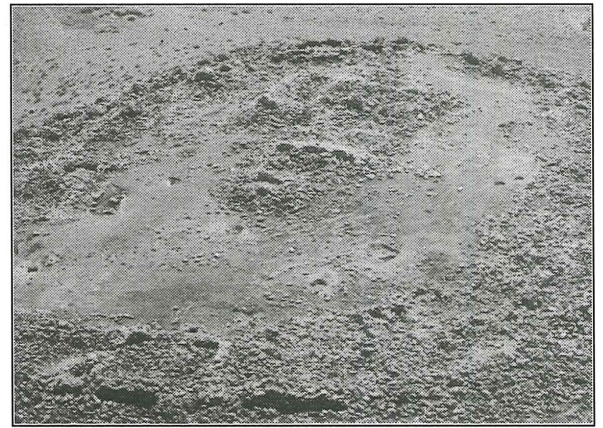
16). Originally described by Nelson Glueck (1951: 209,212), the site has been subject to a first topographical survey in 1993 (Palumbo *et al.* 1996). This year a detailed non-invasive survey was undertaken over a period of four days. This comprised the structural analysis of all extant archaeological remains.

Methodology

For ease of description, the site was divided into discrete spatial units (represented by structural agglomerations) according to appearance in plan. Individual structural components were given a unique numerical identifier which is to be referred to in future detailed investigations and soundings, and where subsequent divisions were observed, an alphabetical affix is used. A description of the characteristics of each individual component (i.e. cells, passages, open areas) was made within the parameters of archaeological visibility, with regard to dimensions, trajectories of entry, construction, significant features, aspect and the state of preservation. The database forms part of the project archive.

Survey Results

On the basis of this analysis it is possible



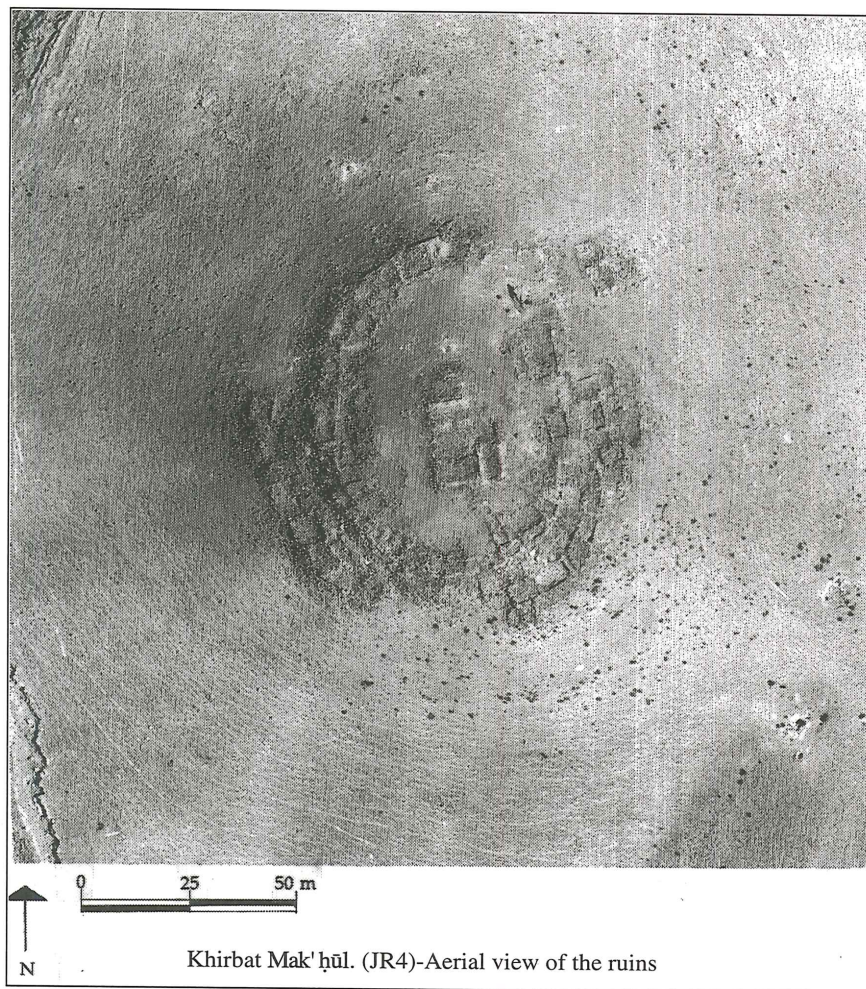
14. Khirbat al-Mak' ḥūl. Aerial view of the ruins from north-west (Photo by G. Palumbo).



15. Khirbat al-Mak' ḥūl. Aerial view of the ruins from east (Photo by G. Palumbo).

to conjecture that at least three periods of occupation are apparent in the extant remains, when major construction phases took place. The hilltop location with its panoramic and commanding views above the az-Zarqā' and aḍ-Ḍulayl Valleys would have presented an attractive and easily defensible location for settlement.

The site comprises at least 110 individual and largely interconnected structures, or cells, the majority of which are arranged in rows and follow the hilltop contours (between 655m and 661m), producing a roughly oval plan. The outer walls of the inner agglomerations stand for the most part upon a platform comprised of roughly-hewn limestone blocks which have been placed within a recess in the hillslope. This platform is considered to represent the remains of an



16. Khirbat al-Mak'hul. Vertical aerial view of the ruins (Photo by G. Palumbo).

earlier curtain wall, perhaps of early Islamic or even pre-Islamic origin. The ground level remains of semi-circular (or circular) towers are located either side of the main access to the north of the site, and are considered to be contemporary with the curtain wall, as indeed may be the ephemeral traces of numerous walls at ground level in this area.

An enclosed central agglomeration which has two barrel-vaulted structures and a vertical-walled structure arranged around a courtyard, is most certainly of Islamic construction; this is reflected in the Middle to Late Islamic ceramic material from surface collections and evidenced in areas of clandestine excavations. It is likely that a mosque was comprised as an integral part of the central agglomeration. One of the bar-

rel-vaulted structures (103), which is on a north-south alignment, is the likely candidate; however, the density of rubble overburden denied the location of a *mihrāb*.

The individual structures within each concentric agglomeration suffer from differential erosion whilst each of those in a particularly poor state of preservation are noted to have the longitudinal axes respecting the hill contour. It is suggested that the roofs of most structures were vaulted, but the evidence for such was only positively identified in cells 29 and 41, where the longitudinal axes are perpendicular to the contour; in the case of the latter structure, the walls are visible to a height of 3m.

The western inner agglomeration (1 to 17b) comprises an arc of largely interconnected cells which stand above the cur-

tain wall and lack the solidity of the rubble-core construction found elsewhere. Despite the extremely poor state of preservation, it displays a regularity in plan, which contrasts with the piecemeal appearance of other agglomerations. It is assumed, from the near-uniformity of the cells, that they represent accommodation, perhaps of a *cara/vansera*, and also represent a later phase of activity.

The present survey included an investigation of the immediate hinterlands, whereby various possible associated sites were recorded including the rubble remains of several circular and square kerbed tomb structures and two large cisterns, the latter located at the foot of the escarpment, on the ridge to the north and south of the hill crest. In addition, a topographical survey was completed of the lower ridge to the north.

Future Work

During the present season a future excavation strategy was devised, in order to establish site status and chronology.

Soundings at al-Mak'hūl may prove to be not only an important element for the establishment of a stratigraphic sequence for the Middle and Late Islamic periods of northeastern Transjordan, but also may provide a more extensive construction typology. It has been stressed that due to the lack of clarity in the identification of locally manufactured ceramic forms of Early Islamic date in the az-Zarqā' Valley, the development and application of a stratigraphic dating mechanism would greatly enhance the study of this period (Peruzzetto and Wilson p.28, in Palumbo *et al.* 1996).

The Anthropological Project (M. Shunnaq)

The research area contains numerous human settlements that center around the az-Zarqā' valley, such as Sukhna and the local administration of the Banī Hāshim villages (ad-Dawqara, Abū az-Zīghān 'Ayn an-Nimr, and ar-Raḥīl). The topographic variations of

this heavily populated area include the desert, in the eastern sector, the river az-Zarqā' banks, which are irrigated and cultivated, while the rocky hills above the banks are used as pasture. Hence, the population in these areas practise a variety of economic activities that depend on the nature of the geographical area.

Certain clans in this area, such as the Banī Ḥassān, depended on pastoralism in the rocky, irregular areas and dominated the area of study during the second half of the nineteenth century and the beginning of the twentieth until Chechenian clans were forced out of Imperial Russia and emigrated to this area. They made use of the land, starting cultivations, and registering the land as private property. They raised cattle around the az-Zarqā' river and cultivated the fertile land by planting fruit trees and sowing corn, wheat, and barley. Toward the mid-twentieth century the area witnessed another flood of refugees: the Palestinians.

Palestinians arrived in the area after their displacement following the Arab-Israel wars of 1948 and 1967. These people introduced different cultivation techniques as they irrigated large basins to cultivate summer vegetables such as cucumbers, tomatoes, potatoes, lettuce, spinach up to four times annually.

The anthropological study of this area will mainly be concerned with the changes that occurred in land ownership, the economic activities practised by the population, and its changes over time. It will also try to elucidate whether the presence of a large river affected the size and form of property and if the type of crops cultivated changed over time.

The study will also attempt to outline the process of dividing the irrigated land and shed light upon the problem of water distribution.

The structure of the past and present bedouin presence will be investigated, and the changes in the relationships between pas-

toral and farming groups, with both the increase of political control and changing composition of the sedentary component.

Perspectives for the 1997 Campaign (G. Palumbo)

The following issues requiring follow-up have been identified:

1. A detailed examination of the Pleistocene deposits (Site 330), which provide the earliest chronological indices in the research area, is considered a research priority, since the potential information from this investigation is not only both of regional and national importance, but carries international implications in the study of early hominid evolution.
2. It is clear that sites 'at risk' will remain a priority of the project and initially three major sites have been identified for future soundings: JRS Site 8, al-Ḥsayyah; JRS Site 4, al-Mak'hūl; and JRS Site 90, Jabal al-Bakiyya. Each of the above fields of investigation are to be executed under the aegis of the Wādī az-Zarqā'/Wādī aḍ-Ḍulayl Archaeological Project yet to develop in a co-ordinated and

semi-independent manner in order to maximise both efficiency and information retrieval.

3. The interdisciplinary approach is to be maintained as a vital scientific component of the project, whereby specialist assistance and advice is to be called upon as appropriate in each area of investigation and research.

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