

# THE WĀDĪ AS-SIRḤĀN PROJECT: NOTES ON THE 2002 ARCHAEOLOGICAL RECONNAISSANCE OF WĀDĪ ḤUDRUJ AND JABAL ADH-DHARWA, JORDAN

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This report describes the results of a short archaeological reconnaissance of two areas in the greater Wādī as-Sirḥān basin, the Wādī Ḥudruj gorge in the south and the Jibāl adh-Dharwa in the north. This resulted in the discovery of over twenty new sites, ranging in date from the Middle Palaeolithic to the Early Bronze Age. Analysis of the results exposed significant differences between the two areas. Although northern parts of the Wādī as-Sirḥān basin were clearly exploited throughout much of the late Pleistocene and early Holocene, its more arid south-western margins appear to have remained largely unoccupied until the Chalcolithic / Early Bronze Age.

## Introduction

In June 2002 the authors, assisted by a representative of the Department of Antiquities of Jordan and two students from Whitman College, Walla Walla, undertook an archaeological reconnaissance, with a prehistoric focus, of two areas in the greater Wādī as-Sirḥān basin (Fig. 1). Despite the short duration of this reconnaissance — just six full days were spent in the field — more than twenty new sites, ranging in date from the Middle Palaeolithic to the Early Bronze Age (EBA), were identified. As these contribute to our understanding of the prehistoric archaeology of the Wādī as-Sirḥān basin, an area which is not well known archaeologically (but see Adams *et al.* 1977; Fujii 2000; Garrard *et al.* 1996; Parr *et al.* 1978; Rolston and Rollefson 1982; Betts 1992; Whalen 1999), it was felt worthwhile to describe them in some detail.

## The Survey Areas

Although the greater part of the Wādī as-Sirḥān basin is located in Saudi Arabia, its

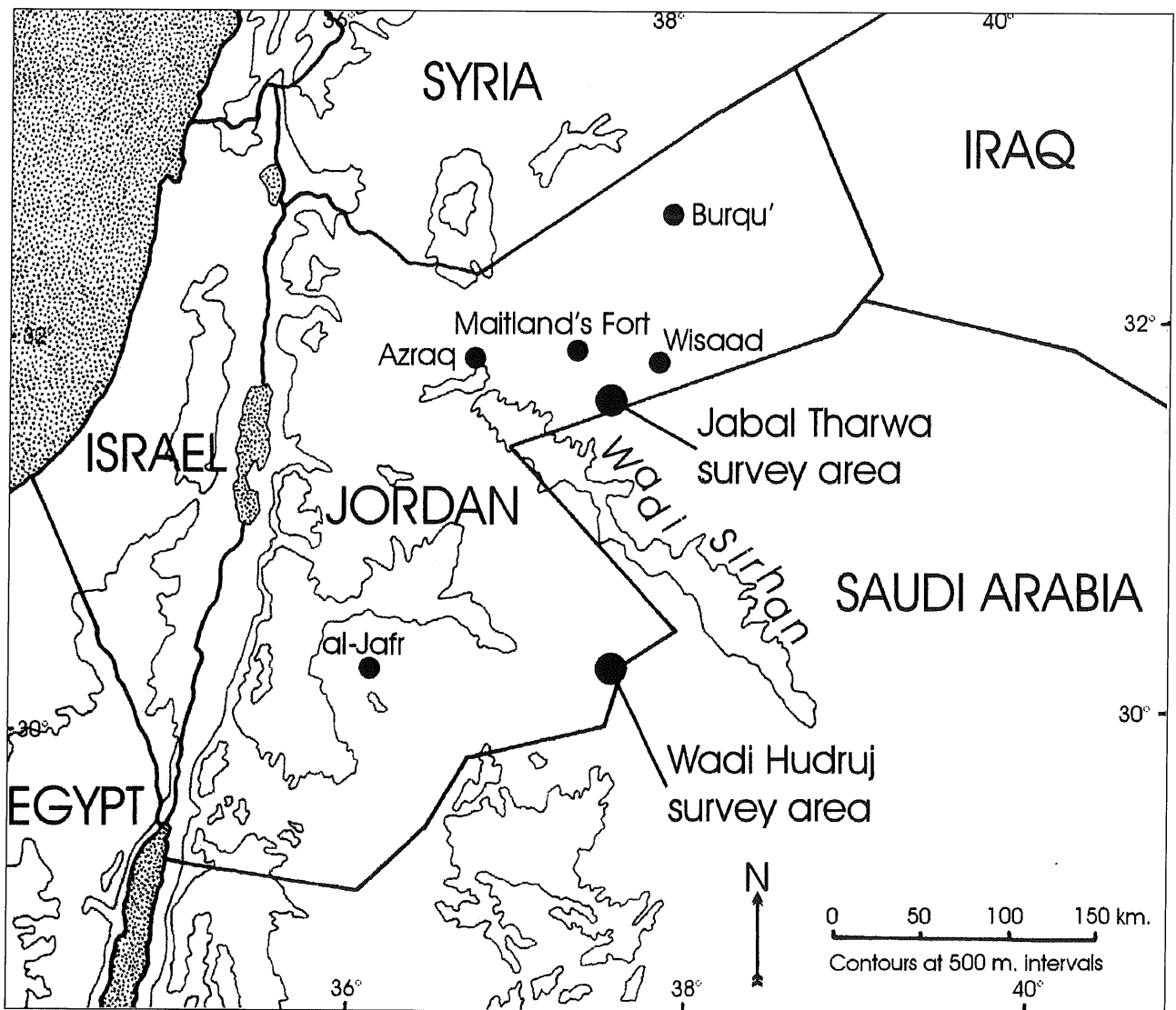
northern extremities and the upper reaches of the tributary wadis which drain into it from the west are located in Jordan. Earlier camping trips to these areas had identified a number of locations which looked as though they might repay closer examination, of which two were selected as the focus of the archaeological reconnaissance described here.

The first was the Wādī Ḥudruj gorge (Fig. 1), a tributary of the Wādī as-Sirḥān which eventually drains into it from the west. It is located approximately 140km east of al-Jafr, immediately adjacent to Jordan's border with Saudi Arabia. It is the southernmost part of the greater Wādī as-Sirḥān basin that lies within Jordanian territory and was selected on that basis. The second location was the Jabal adh-Dharwa area (Fig. 1), located approximately 80km east-southeast of al-Azraq oasis, close to the western edge of the *ḥarra* which delineates the Wādī as-Sirḥān to the east. It was selected because it is the only part of the (relatively) better-watered east side of the basin lying within Jordanian territory. Thanks to the support of the Department of Antiquities of Jordan, permission to carry out an archaeological reconnaissance of the two survey areas was soon obtained.

## Methodology

Given the limited time available and the preliminary nature of the work to be carried out, the methodology employed was unashamedly un-systematic. The two survey areas were reached by Land Rover, traversing country that has hitherto received little archaeological attention.

Once the survey areas had been reached, they were explored on foot and by Land Rover, targeting obvious vantage points and the edges of mudpans (*qā'* pl. *qī'ān*) which experience has



1. Regional map showing survey areas and sites mentioned in text.

shown were favourably regarded by humans in the past. When sites were identified, detailed records were made on standardised survey forms and timed collections of surface artefacts were carried out. Often the discovery of one site resulted in the discovery of several more, as the team fanned out across the landscape from the initial find-spot. Washing, sorting and recording of the artefacts was subsequently carried out at the American Centre for Oriental Research (ACOR) in 'Amman. Finally, the results from the two survey areas were compared and contrasted.

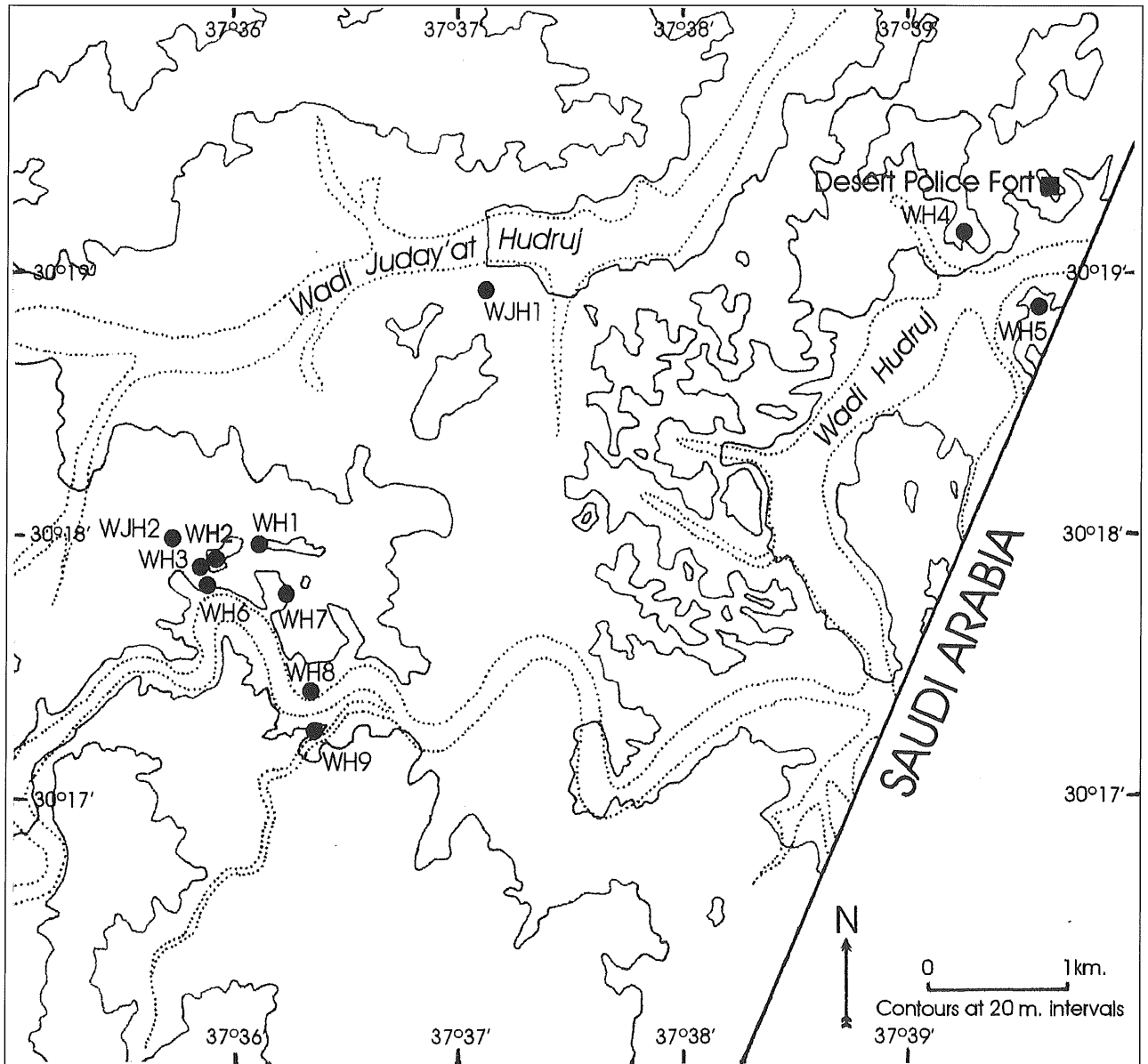
Sites were named on the basis of the nearest topographical feature. Where more than one site was identified in the vicinity of a single topographic feature, a number was added to the top-

onym (e.g. Wādī Ḥudruj 1, 2, 3 etc.). If it was necessary to differentiate between zones within a 'site', a letter would simply be added to the sequence (i.e. Jabal adh-Dharwa 1a, b, c etc.). In addition, each site was given a unique WS (Wādī as-Sirḥān Project) survey number, by which it was known until toponyms could be ascertained.

No attempt was made to achieve total area coverage within the two rather loosely defined survey areas; many more sites undoubtedly remain to be identified within and beyond them.

#### Wādī Ḥudruj: Physical Description

The Wādī Ḥudruj gorge (Fig. 2) is located in the extreme south-east corner of Jordan 140km east of al-Jafr, just before the Wādī Ḥudruj cross-



2. Map of Wādī Ḥudruj survey area.

es the Saudi Arabian border en route to the Wādī as-Sirhān basin approximately 50km downstream to the east. A Jordanian Desert Police fort, Mushāsh Ḥudruj, is located on a bluff overlooking the wādī where it crosses the border.

The area is dominated by small marl and limestone *mesitas* rising from the undulating gravel plains, into which the Wādī Ḥudruj has cut a meandering gorge around 30m deep and 100 to 300m across. Although no reliable rainfall data could be obtained for the area, local informants assured us that it was drier than the Jordanian 'panhandle' some 150km to the north in which the Jabal adh-Dharwa survey area is located, which receives an average of around 50 to 100mm rain-

fall per year (Betts 1998: fig. 1.7). This would be in accordance with the general trend across Jordan, which sees average annual rainfall dropping off from north-west to south-east.

### Wādī Ḥudruj: Results

The results of our archaeological reconnaissance of the Wādī Ḥudruj gorge area are described below.

#### Wādī Ḥudruj 1 (WS1)

37°36.058'E 30°17.880'N

Wādī Ḥudruj 1 is located on the western end of a long, slightly curving butte, ca. 800m north of the Wādī Ḥudruj gorge. The site covers ca.

4500m<sup>2</sup> and comprises several diffuse clusters of chipped stone tools and debitage, as well as a number of low, dry stone structures of unknown date. These include a cairn ca. 5m in diameter and a roughly heaped linear feature ca. 45m long. The site provides excellent, almost 360°, views of the lowlands and wadi drainages below. Most of the chipped stone material was non-diagnostic typologically, but in terms of technology the broad platforms on the flakes and blades suggest a Chalcolithic or EBA origin. One cluster near the centre of the site included a sparse distribution of Middle Palaeolithic Levallois flakes and blades. There were also occasional Upper Palaeolithic or early Epipalaeolithic materials scattered in several places on the top of the butte.

*Wādī Hudruj 2 (WS2)*

37°35.856'E 30°17.810'N

Wādī Hudruj 2 is located ca. 350m west of Wādī Hudruj 1, on the western end of a small butte across a deep saddle in the same formation. The site comprises a scatter of chipped stone tools and debitage around a number of apparently recent dry stone structures. These include a cairn ca. 2m in diameter and ca. 1.5m high, and a rectilinear feature ca. 2.5m across. The site provides excellent, almost 360°, views of the lowlands and wadi drainages below. The area of lithics scatter was much more confined than at Wādī Hudruj 1, and the corresponding density of artefacts much higher. Nevertheless, individual episodes of use appear to be represented at this site, in the form of four clearly defined artefact clusters ca. 2 to ca. 6m in diameter (designated, from north-east to south-west, as Clusters A to D). The predominant presence at Wādī Hudruj 2 is Chalcolithic / EBA, which is found all over the area, although there is a particular concentration at Cluster C. Upper Palaeolithic / Epipalaeolithic presence (most likely Upper Palaeolithic) is focused at Cluster B, whilst Chalcolithic / EBA and Upper Palaeolithic / Epipalaeolithic material are equally present in Clusters A and D. There is also a small amount of Middle Palaeolithic Levallois debitage and tools at Cluster A.

*Wādī Hudruj 3 (WS3)*

37°35.874'E 30°17.744'N

Wādī Hudruj 3 is located immediately below and to the south-west of Wādī Hudruj 2,

on a terrace sloping down towards a great bend in the Wādī Hudruj gorge. The site comprises a slope scatter of chipped stone debitage and a few tools, mostly dating to the Chalcolithic / EBA, although one Middle Palaeolithic Levallois flake core was also found. The presence of chipped stone artefacts here is undoubtedly related to the occurrence of flint nodules exposed on the slope, the source of raw material not only for Wādī Hudruj 3, but potentially also for Wādī Hudruj 1 and 2. Of note here are several flake cores attributable to the Chalcolithic / EBA Jafr Industry (Quintero *et al.* 2002), used for the production of cortical flakes for the manufacture of fan / tabular scrapers.

*Wādī Hudruj 4 (WS4)*

37°39.215'E 30°19.066'N

Wādī Hudruj 4 comprises a scatter ca. 50m in diameter of chipped stone artefacts located on a broad, open hilltop ca. 650m south-west of the Desert Police fort at Mushāsh Hudruj. The relatively high hilltop has excellent views in all directions, especially over the torrent bed of Wādī Hudruj immediately to the south. Although there are some Chalcolithic / EBA tools and flakes/blades on the surface, this almost completely deflated flint 'pavement' includes much higher proportions of Middle Palaeolithic Levallois flakes, points, blades and cores. Tools include scrapers and denticulates. Artefact density was estimated at two artefacts per square metre.

*Wādī Hudruj 5 (WS5)*

37°39.482'E 30°18.824'N

Wādī Hudruj 5 is located on a broad, mid-level ridge immediately south of Wādī Hudruj. This ridge slopes gently down from south to north towards a small cairn of recent date and is located ca. 800m south of the Desert Police fort at Mushāsh Hudruj. The site comprises a broad distribution of chipped stone artefacts covering several thousand square metres. The most striking feature of the site, notwithstanding the fact that it is clearly deflated, is the presence of a number of shallow, round depressions that have been cleared of surface debris and may represent hut/tent circles. Many of these features are surrounded by relatively dense clusters of Chalcolithic / EBA debitage, cores and tools (scrapers, burins, bifacial knives). The site extends

down slope as far as the south bank of Wādī Ḥudruj. Here the lithics become much more varied, including Middle Palaeolithic, Epipalaeolithic, Late Pre-Pottery Neolithic B (PPNB), Late Neolithic / Chalcolithic and Chalcolithic / EBA debitage (some naviform blades), cores (with one naviform blade core) and tools (including a fan scraper).

*Wādī Ḥudruj 6 (WS8)*  
37°35.836'E 30°17.707'N

Wādī Ḥudruj 6 is located ca. 170m south of Wādī Ḥudruj 2, on a sloping terrace immediately above a great bend in the Wādī Ḥudruj gorge. The site lies between the cliff edge and a prominent modern east-west track. The sloping terrace is littered with eroded cores, flakes and tools over an area of ca. 3000m<sup>2</sup>. The material is dominated by Lower / Middle Palaeolithic Levallois material (it seems older than that from Wādī Ḥudruj 4) similar to that described by Whalen (1999), characteristically patinated to a reddish colour. This is in contrast to the dark brown 'desert varnish' of the Chalcolithic / EBA artefacts which occasionally occur across the site. The number of cores suggests that this was probably a relatively important site during the Late Pleistocene period.

*Wādī Ḥudruj 7 (WS9)*  
37°36.150'E 30°17.731'N

Wādī Ḥudruj 7 is located in a wide gully, sloping gently down to the north-east, immediately below a shallow exposure of eroding flint nodules and just above a small drainage. It is ca. 320m south-east of Wādī Ḥudruj 1 and ca. 150m south-west of a small butte. The site comprises three discrete nodes, defined by low, circular 'walls' of Jafr Industry flake production. The northernmost, Node A, consists of three circular clusters of nodules, debris and debitage: the first cluster has three Jafr flake cores, the second has four, and the third has just two. Node B, a few tens of metres to the south, is also composed of three circular artefact clusters: the first cluster has 39 Jafr flake cores, the second has 10, and the third has five, as well as one Jafr blade core. Node C is a single cluster adjacent to the exposed nodules. It is the most impressive, as it is ca. 7m in diameter and includes 47 Jafr flake cores, some up to 50cm across. Over-

all these three nodes suggest three visits to the flint outcrops, with one person (perhaps more) working Node C, but three people each exploiting the nodules at Nodes A and B. It should be added that a fourth 'area' of the site occurs to the south-west of Node C along an erosional feature, where dispersed Jafr flake cores and debitage were found.

*Wādī Ḥudruj 8 (WS10)*  
37°36.319'E 30°17.288'N

Wādī Ḥudruj 8 is located over the hill and ca. 700m south of Wādī Ḥudruj 7, on a flat, low-level terrace just above the torrent bed of Wādī Ḥudruj. The terrace is on the north bank of the wadi, where it forms the inside of a pronounced bend, and is sheltered to the south by prominent bluffs and cliffs on the opposite bank. The site is typical of those exploited by modern Bedouin camping along the Wādī Ḥudruj during the contemporary winter months. Five circular, dry stone structures, ranging from ca. 3.5 to 16m in diameter, and a number of rectangular, dry stone platforms are clearly visible on the surface. The largest circular structure has interior features that suggest it served some function relating to penning animals; the other four may have been temporary domestic structures. Chipped stone artefacts cluster around the circular structures and are relatively broad in scope, including knives, scrapers and denticulates. There were also three Jafr flake cores. Taken together, the architectural features and chipped stone artefacts are highly suggestive of a Chalcolithic / EBA camp used by pastoral nomads involved in Jafr flake production. It is conceivable that the same group was also responsible for the Jafr Industry activities at Wādī Ḥudruj 7 and Wādī Judayyat Ḥudruj 2.

*Wādī Ḥudruj 9 (WS11)*  
37°36.605'E 30°17.320'N

Wādī Ḥudruj 9 is located ca. 200m south-east of Wādī Ḥudruj 8, beyond the bluffs and cliffs to its south. There is tributary wadi here, with a steep slope on its northern bank. Lying on this slope is a single structure consisting of an oval ring of limestone blocks, ca. 6m across in its longest dimension, with an east-facing opening ca. 1.5m across. Two Chalcolithic / EBA Jafr flake cores form part of the wall. A smaller mound of

stones inside the oval structure may represent a primitive platform or perhaps a burial.

*Wādī Judayyat Ḥudruj 1 (WS6)*

37°37.084'E 30°18.857'N

Wādī Judayyat Ḥudruj 1 is located on a long, low *mesita* top overlooking Wādī Judayyat Ḥudruj to the north, with a prominent dry stone cairn at its western end. The Desert Police fort at Mushāsh Ḥudruj is visible from the site, approximately 4km away on a bearing of 078°. The site comprises two diffuse but recognisable clusters of chipped stone artefacts, one located around the cairn and ca. 25m in diameter, the other located approximately 140m to the east and ca. 15m in diameter. More recent visits to the site are indicated by three 'desert mosques', consisting of rectangular areas cleared of stone debris with arcs in the centre of each southern edge to represent *a miḥrāb*. The site provides extensive views in all directions, especially over Wādī Judayyat Ḥudruj immediately to the north. Both clusters of chipped stone artefacts are Late Neolithic / Chalcolithic / EBA in character and include cores, debitage, and a fan scraper and sidescrapers.

*Wādī Judayyat Ḥudruj 2 (WS7)*

37°35.695'E 30°17.897'N

Wādī Judayyat Ḥudruj 2 is centred on a small, very shallow watercourse running from south-west to north-east in a broad pavement of natural flints ca. 320m north-west of Wādī Ḥudruj 2. A modern track runs through the middle of the site. The site comprises a concentration of Jafr Industry flake cores and blade cores ca. 40m in diameter. Jafr Industry cores and cortical flakes were found throughout the scatter, but blades were restricted to the south-eastern quadrant, suggesting that the site retains a certain degree of spatial integrity. The site is a smaller version of the more extensive Chalcolithic / Early Bronze Age quarry and manufacturing sites along the northern and north-eastern uplands around the Jafr Basin (Quintero *et al.* 2002). However, Wādī Judayyat Ḥudruj 2 is not only smaller than the sites around the Jafr Basin, but the cores and products are smaller as well. This is clearly a reflection of the smaller flint nodules in this vicinity. Several other cores suggest that this exposure of flint nodules may have been ex-

ploited on a more casual basis by Epipalaeolithic and possibly PPNB hunting groups.

**Wādī Ḥudruj: Discussion**

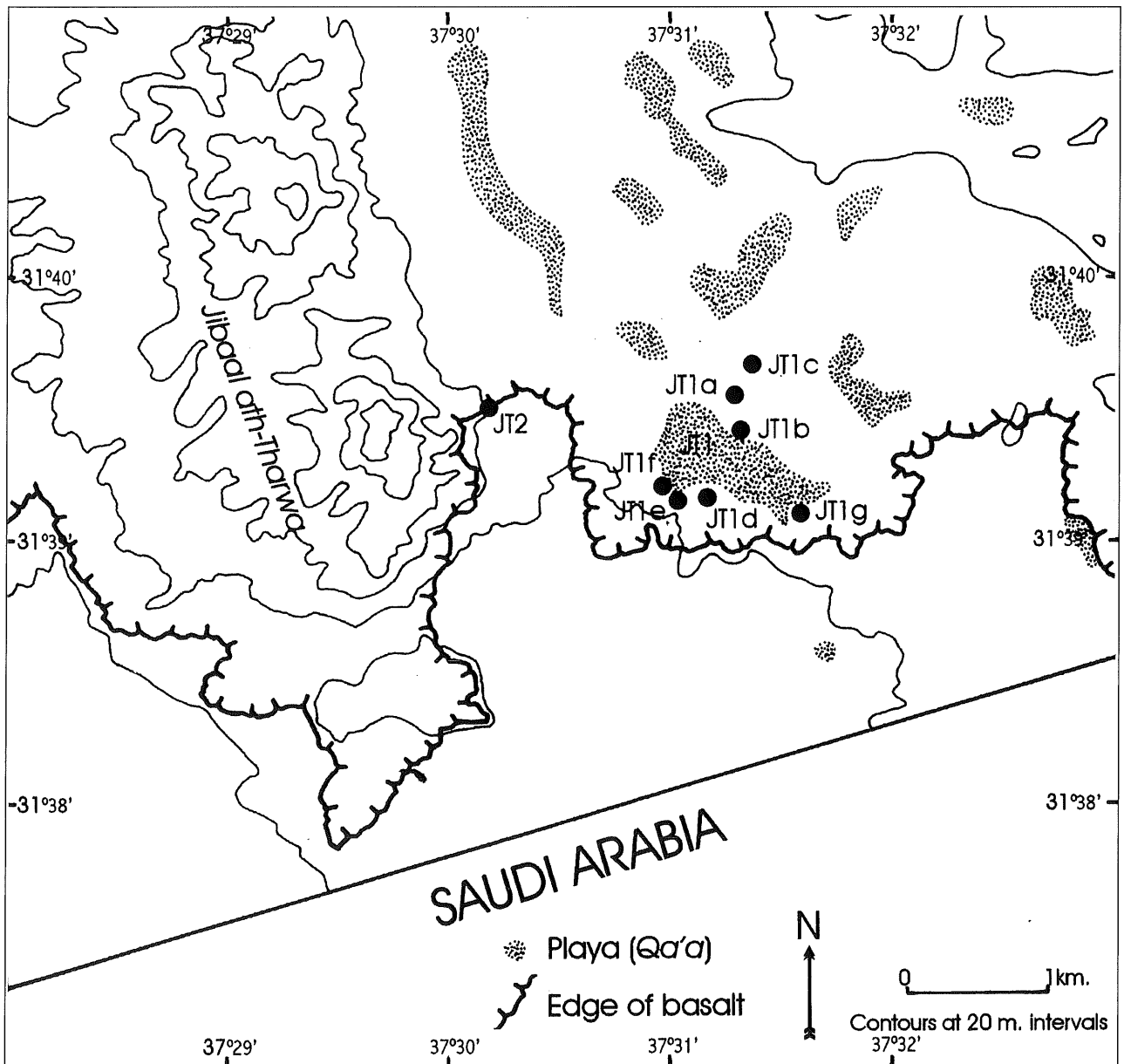
The most striking aspect of the sites identified around the Wādī Ḥudruj gorge is the prevalence of Chalcolithic / EBA material. Not only was this found at every site, it was also numerically predominant, except at Wādī Ḥudruj 4 (overwhelmingly Middle Palaeolithic) and, possibly, Wādī Ḥudruj 5 (which has the broadest array of archaeological periods represented).

**Periods Represented**

In comparison with other areas of the Jordanian steppe and desert, the relative paucity of evidence for Epipalaeolithic hunter-gatherers around the Wādī Ḥudruj gorge is somewhat curious. In similar vein, it is also remarkable that the Late PPNB period is represented solely by a small sample of naviform blades and core (along the gently sloping wādī bank at Wādī Ḥudruj 5). However, there is strong evidence for periods of increased precipitation, compared to today, during the middle of the Chalcolithic (Levy 1995: 241) and during the Early Bronze 1 period (Goldberg and Bar Yosef 1982: 404). This would certainly explain the prominence of the Chalcolithic / EBA presence in the Wādī Ḥudruj area (and indeed south-eastern Jordan as a whole), although it may well have been the case that the area was not intensively exploited even during this period.

**Jabal adh-Dharwa: Physical Description**

The Jabal adh-Dharwa survey area (Fig. 3) is located approximately 80km east-southeast of Azraq oasis, close to the western edge of the basalt desert (*ḥarra*) that delineates the eastern side of the Wādī as-Sirḥān. Average annual rainfall in the area is in the region of 60mm (Betts 1998, fig. 1.7). The twin basalt peaks of the Jibāl adh-Dharwa ("Mountains of Riches") overlook, to the east, an area of mudpans (*qī'ān*) separated by low basalt ridges which was the focus of our archaeological reconnaissance. It should be noted that a remarkable concentration of structures and enclosures of various shapes, sizes and — undoubtedly — dates is preserved immediately north of the Jibāl adh-Dharwa but, although interesting discoveries are undoubtedly waiting



3. Map of Jabal adh-Dharwa survey area.

to be made in this area, lack of time meant that we were unable to make more than a cursory inspection.

### Jabal adh-Dharwa: Results

The results of our archaeological reconnaissance of the Jabal adh-Dharwa area are described below.

#### *Jabal adh-Dharwa 1 (WS12)*

37°31.219'E 31°39.215'N

Jabal Dharwa 1 is a small mudpan (*qā'*), just over 1km long (north-west / south-east) and 300 to 500m wide. It is located ca. 3km east of the

Jabāl adh-Dharwa and ca. 2km north of Jordan's border with Saudi Arabia. Jabal adh-Dharwa 1 was the focus for repeated occupations between the late Pleistocene and mid Holocene. A series of sites, dating to the late Epipalaeolithic (Natufian), Pre-Pottery Neolithic, Late Neolithic and Chalcolithic / EBA periods, were identified around the edges of the *qā'* and on the surrounding ridges. These sites were designated Jabal adh-Dharwa 1a to 1g.

#### *Jabal adh-Dharwa 1a (WS12a)*

37°31.290'E 31°39.520'N

Jabal adh-Dharwa 1a is located on level

ground ca. 150m north-east of the *qā'*. The site is ca. 350m north of Jabal adh-Dharwa 1b (see below). It comprises a single oval structure ca. 7m in diameter formed by an oval of small (ca. 15-25cm) basalt boulders set one to three stones wide and standing just one stone high. There are indistinct interior spaces set off by other stone alignments and a possible central feature that may be a hearth. Not a single artefact was found inside the structure, and in the near vicinity there was only very rare, non-diagnostic chipped stone material. For this reason the structure is difficult to date, but there are many close similarities with circular 'tent' foundations from the last Yarmoukian occupation at 'Ayn Ghazal (cf. Rollefson and Kafafi 1994: fig. 7; Rollefson and Simmons 1987: 105). It is therefore tempting to assign Jabal adh-Dharwa 1a to the Late Neolithic on that basis (see also below in the description of Jabal adh-Dharwa 1g "The Village").

*Jabal adh-Dharwa 1b (WS12b)*

37°31.314'E 31°39.303N

Jabal adh-Dharwa 1b is located on a long, low ridge which runs for ca. 300m along the north-eastern edge of the *qā'*. The site comprises an agglomerative architectural feature, which incorporates linear, curvilinear and sub-rectangular elements, situated at the south-eastern end of the ridge (i.e. at its highest point). This structure is constructed of large basalt boulders, some up to ca. 0.75m across, and, notwithstanding recent disturbance, is ca. 0.5m high and ca. 8m across at its maximum extent. A scatter of chipped stone artefacts is centred around the structure and extends, with decreasing artefact density, to the north-west and south-east for almost the full length of the 300m long ridge. The chipped stone scatter clearly retains a high degree of spatial integrity; at least 16 distinct artefact clusters ranging from 0.4m to ca. 8m in diameter were observed and separately recorded. Both the Pre-Pottery Neolithic and Late Neolithic periods are represented at the site. The Pre-Pottery Neolithic appears to be restricted to within ca. 50m of the structure; this assemblage includes projectile points, drills and an exhausted naviform core. The projectile points include both Abu Ghosh and Amuq types, suggesting that the Middle PPNB and Late PPNB / PPNC periods are represented. The Late Neolithic has a much

wider distribution along the ridge, typically in much smaller clusters (under 1m diameter); the assemblage is dominated by burins and occasional arrowheads. Additional finds included a thin red basalt grinding slab, broken into three pieces and measuring 0.6m by 0.35m with a perforation in one corner, and a broken piece of mother-of-pearl from within the structure.

*Jabal adh-Dharwa 1c (WS12c)*

37°31.373'E 31°39.621'N

Jabal adh-Dharwa 1c is located on a prominent north-west / south-east basalt ridge which overlooks the *qā'* ca. 400m to the south-west. The site comprises an extremely extensive complex of ridge-top architectural features, including cairns and curvilinear and rectilinear structures, which extends for at least 300m north-west and 300m south-east of the grid coordinates provided above. The cairns average ca. 2 to 4m in diameter and stand up to 0.8m high. They are often in close association with the curvilinear structures, and may represent the stone clearance necessary to create the buildings. The curvilinear structures, possibly animal pens, vary enormously in shape and size. They range from ca. 4m to 10m in diameter, are relatively free of boulders on the inside and sometimes have rectangular structures / platforms up to 3m across attached to the outside (usually in the north-western quadrant). The walls are typically constructed of a single ring of basalt boulders, ca. 0.2 to 0.4m across. The rectilinear structures are similarly variable. Their size ranges from ca. 12m by 12m to ca. 3m by 6m; some also have internal subdivisions, entrances, and internal and external platforms and 'bins'. Artefacts are extremely sparse across the entire area, but occasional flakes with broad, steep platforms, a Canaanite blade fragment, a microradial flake core and occasional wheelmade pottery all suggest a Chalcolithic / EBA date. Overall, the architectural features at Jabal adh-Dharwa 1c are highly reminiscent of those at Maitland's Hill-Fort (Maitland 1927; Betts 1983), roughly 30km to the north-west, which supports their attribution to the Chalcolithic / EBA period.

*Jabal adh-Dharwa 1d (WS12d)*

37°31.124'E 31°39.131'N

Jabal adh-Dharwa 1d is located on a low



ridge immediately above and extending down to the south-western edge of the *qā'*, ca. 440m south-west of and on the opposite side to Jabal adh-Dharwa 1b. The site consists of at least five to six circular or semi-circular structures, ca. 2m to 8m in diameter, in single cluster. These are constructed of large basalt boulders, some up to 0.6m across and standing ca. 0.1m to 0.2m high. Of particular interest is the associated chipped stone artefact scatter, which extends for ca. 70m east-west by ca. 40m north-south. This has very few blades, but many bladelets, two endscrapers, one drill, one endscraper burin, and one nibble-retouched (interior) arch-backed bladelet. All this indicates a late Epipalaeolithic, most likely Natufian, date, although there was also one Late Neolithic arrowhead on the surface, and is highly suggestive of a seasonal camp of up to 2800m<sup>2</sup>.

*Jabal adh-Dharwa 1e (WS12e)*

UTM 359 288 E 3502 786 N

Jabal adh-Dharwa 1e is located ca. 200m west of Jabal adh-Dharwa 1d, on a low ridge overlooking an 'inlet' in the edge of the *qā'*. The 'site' comprises a spot-find of a Yarmoukian-like arrowhead found in a tumble of basalt boulders and cobbles that may represent a one time structure of Late Neolithic date.

*Jabal adh-Dharwa 1f (WS12f)*

UTM 359 317 E 3502 942 N

Jabal adh-Dharwa 1f is located ca. 200m north-west of Jabal adh-Dharwa 1d, on a low ridge overlooking the *qā'* to the north-east. The site comprises a series of possible structures in a jumble of basalt boulders that covers an area of ca. 100m north-south by ca. 40m east-west. The sparse scatter of chipped stone artefacts is suggestive of an Epipalaeolithic, Late PPNB, Late Neolithic and Chalcolithic / EBA presence in this area, with the Late PPNB being focused on its northern end.

*Jabal adh-Dharwa 1g "The Village" (WS12g)*

UTM 360 415 E 3502 604 N

Jabal adh-Dharwa 1g is located at the south-eastern end of the *qā'*, and consists of around 20 seemingly contemporary circular structures (dubbed "The Village") covering an area measuring ca. 100m north-south by ca. 200m east-

west. Flakes and blades with broad, steep platforms were found in association with all of these structures, indicating a Late Neolithic to Chalcolithic / EBA date. One structure, located at UTM 360 365 E 3502 604 N seems to be a circular 'proto-Bedouin tent' foundation. It consists of a single-stone 'wall' ca. 7m in diameter with an interior hearth ca. 1m in diameter, two platforms or stone-lined pits in the south-eastern quadrant and a possible 'bin' in the western quadrant.

*Jabal adh-Dharwa 2 (WS13)*

37°30.271'E 31°39.498'N

Jabal adh-Dharwa 2 is located on and around a prominent flat-topped basalt peak on the lower, east-facing, slopes of the southern part of the Jibāl adh-Dharwa, just over 1km west of the *qā'* at Jabal adh-Dharwa 1. The site provides excellent views in all directions, especially over the *qā'* to the east. The flat summit measures ca. 90m north-south by ca. 60m east-west. It is covered with cairns up to ca. 5m in diameter and ca. 1m high, curvilinear structures (possibly animal pens) of dry stone basalt boulder construction up to ca. 8m in diameter, and numerous other enclosures and structures, all of which are highly reminiscent of those at Maitland's Hill-Fort (cf. Maitland 1927: Plate II). A number of large curvilinear structures, up to 15m in diameter, some with obvious entrances, can be found on the lower slopes of the peak. The highest point of the summit area is crowned with a large cairn, ca. 6 to 7m in diameter and preserved to a height in excess of 1.5m, which seems originally to have been almost vertically sided. Recent robbing of this cairn has thrown up human bone and a large quantity of ostrich egg shell. This has exposed a stone-lined cyst, originally roofed with flat slabs and at least 1m deep, 0.6m wide and more than 1m long, within the cairn. Artefacts are sparse, but seem to be predominantly of Chalcolithic / EBA date, including a small amount of pottery and rather more chipped stone, typified by broad, steep platforms. In addition, the lower slopes of the peak yielded a few Epipalaeolithic bladelets, a Late Neolithic knife and drill, and a handful of Late Roman or Byzantine pottery.

**WISAD**

Once our reconnaissance of the Jabal adh-

Dharwa area was complete, we decided to continue to the east through the red sands of the Shumaysāniyyat area with the intention of intersecting the TAP (Trans Arabian Pipeline) line at Wisad and returning to al-Azraq via the TAP line track. This was to enable us to visit a number of early prehistoric sites (e.g. Jabal Subḥi, Duwayla) adjacent to the TAP line which had previously been described by Betts (1998) for comparative purposes. During this diversion, a brief visit was made to the pools (ghudrān) at Wisad, which are of significance as one of only three reliable open water sources in the ḥarra—the others being at Burqu' and al-Ghirqa' (Lancaster and Lancaster 1991: 128; Alan Rowe: pers. comm.). This resulted in the discovery of two Neolithic sites which are briefly described below, although no collection of artefacts was carried out.

#### *Wisad 1*

37°57.979'E 31°54.246'N

This large complex of circular and sub-rectangular enclosures and structures, ca. 200m across, seems to date almost entirely to the Late Neolithic on the basis of the projectile points (variants of Betts' Badia point) and bifacial knife fragments observed on the surface.

#### *Wisad Pools*

37°57.579'E 31°54.828'N

The enormous complex of Late Neolithic animal pens, cairns and other structures associated with the pools at Wisad may have been re-used, renovated and added to by later Chalcolithic / EBA groups. However, what is of more particular interest here is the relatively dense surface indications of Late PPNB occupation immediately around the edge of the pools, possibly from buried *in situ* deposits that might rival Duwayla in depth and importance.

### **Jabal adh-Dharwa: Discussion**

The southern part of the Jordanian 'panhandle' is densely littered with the remains of visits to the temporary water sources, represented by modern *qī'ān*, by hunting groups during the Late Epipalaeolithic (Natufian) and Early Neolithic, and by some herders on a larger scale during the Late Neolithic and well into the Chalcolithic / EBA.

#### *Late Epipalaeolithic*

The Natufian camp at Jabal adh-Dharwa 1d is impressive in terms of the architecture that is preserved there, and if all of the structures were simultaneously used (which cannot be demonstrated by the survey itself), there may have been a band of six or seven smaller social units participating in this seasonal hunting venture, possibly as a 'macroband' when water was sufficient for many people and when conditions for hunting and plant gathering would have been optimal.

#### *Early Neolithic*

By contrast, all of the Early Neolithic (and some of the Late Neolithic) locations appear to have been very sporadic and short-lived, although there seem to have been frequent visits to the area. Some of the Pre-Pottery Neolithic lithic concentrations may be associated with structures, e.g. at Jabal adh-Dharwa 1b and possibly 1f, but the general character of the artefact densities and distributions suggest brief maintenance areas used by a couple of hunters rather than herding families. The exception to this observation might be the situation at Wisad Pools, where possible Late PPNB artefacts appear to be dense in number and possibly stratified in relation to natural pools that attracted hunters and possibly herders for an appreciable time.

#### *Late Neolithic*

The Late Neolithic (and probably later Chalcolithic / EBA) presence at Jabal adh-Dharwa 1f and Wisad 1 seem to be associated with animal enclosures as well as probable domestic structures, all of which represent considerable effort on the part of the pastoral groups who stayed in these locations for considerable amounts of time, probably during the winter and early spring when seasonal rainfall made these parts of the desert productive for grazing and browsing animals.

#### *Chalcolithic / EBA*

Late Neolithic stays at Jabal adh-Dharwa 1c cannot be ruled out, but it seems that this part of the survey area was more heavily used by Chalcolithic / Early Bronze Age groups, who likewise expended significant effort in the construction of pens and living quarters. Contemporary Jabal

adh-Dharwa 2 is very different in character, despite similar architectural features being found there, by virtue of its location on a flat-topped basalt peak that overlooks the *qā'* at Jabal adh-Dharwa 1 but which is without a water source of its own. Its location may have been defensive, however the construction of a prominent burial cairn on the highest point of the summit area suggests that Jabal adh-Dharwa 2 may have had an equally important geographical and social role as a major focal point in the landscape (cf. Maitland's Hill-Fort) for the Chalcolithic / EBA pastoralists who occupied the intervisible Jabal adh-Dharwa 1c below.

### Comparison of the Two Survey Areas

It seems patently clear that exploitation of the Wādī Ḥudruj region was of a very different nature from that around Jabal adh-Dharwa. Although Chalcolithic / EBA pastoral groups visited both areas, the Wādī Ḥudruj utilisation was probably of a very ephemeral nature by one or a few family groups over a brief time span, associated at least in part with the production of Jafr Industry cortical flakes to exchange as tabular scraper blanks with other groups in southern parts of the Jordanian landscape. Around Jabal adh-Dharwa in the Jordanian 'panhandle', the condition of exploitation was much more intensive and included the construction of extensive animal pens and domestic structures that were evidently used for prolonged periods of time. The Chalcolithic / EBA pastoral pattern here appears to have grown out of a similar model elaborated earlier in Late Neolithic times.

Another major distinction between the two areas is the relative presence of Neolithic groups of any age (although it is possible that some Late Neolithic artefacts were confused with Chalcolithic / EBA in the Wādī Ḥudruj area). The Pre-Pottery Neolithic populations of hunters (and possibly herders in the Late PPNB or PPNC) appear to have found the Jabal adh-Dharwa area more productive and perhaps more hospitable. It is likely that the wider al-Azraq region was wetter than the Wādī Ḥudruj region in the 10th to 6th millennia BC, so that seasonal water would have been more predictable in northern parts of eastern Jordan.

An additional reason for the relative absence of Neolithic material in the Wādī Ḥudruj re-

gion may be linked to the distribution of water sources within the greater Wādī as-Sirḥān basin. Today these are restricted to the eastern side of the Wādī as-Sirḥān, along the edge of the basalt, e.g. the Saudi oases of al-Kaf and Ithra. As a result, the western side of the Wādī as-Sirḥān, including the Wādī Ḥudruj area, may have been virtually uninhabitable until the Chalcolithic / EBA climatic amelioration (see above) or until the emergence of relatively sophisticated pastoral economies based on milking which would have made exploitation of such a marginal area possible.

Epipalaeolithic and Upper Palaeolithic sites are rare in both survey areas, although Epipalaeolithic sites are generally frequent in other parts of the wider al-Azraq region (e.g. Betts 1998). The Jabal adh-Dharwa survey area revealed no Middle or Late Palaeolithic sites, although the region east of al-Azraq has produced such assemblages in other surveys (Quintero and Wilke pers. comm.). On the other hand, these periods are hardly frequent in the Wādī Ḥudruj region, but what has been found during the 2002 reconnaissance reflects outliers of Late and Middle Palaeolithic exploitation of the south-eastern parts of Jordan around the Jafr Basin (Quintero and Wilke 1998) and the Mudawwara border sector (Abed *et al.* 2002).

### Conclusions and Future Work

Despite being in the field for just six full days, this archaeological reconnaissance of the Wādī Ḥudruj gorge and Jabal adh-Dharwa areas has contributed to our understanding of the little known archaeological record of the greater Wādī as-Sirḥān basin. Over twenty new sites, ranging in date from the Middle Palaeolithic to the Early Bronze Age, have been discovered. Furthermore, analysis of the results has exposed significant differences between the two survey areas. Although northern parts of the Wādī as-Sirḥān basin were clearly exploited throughout much of the late Pleistocene and early Holocene, its more arid south-western margins appear to have remained largely unoccupied until the Chalcolithic / Early Bronze Age.

One is left with assessing the potentials of further research in each of the survey areas. It seems unlikely that there are any *in situ* (*sensu stricto*) deposits among the Wādī Ḥudruj sites,

although a detailed collection and mapping of the pastoral camps at Wādi Ḥudruj 8 and 9 would provide valuable information about activity distributions in such sites.

In the Jabal adh-Dharwa area several sites are more promising. Certainly the Natufian camp at Jabal adh-Dharwa 1d would be worth investigating, since it is likely that *in situ* sediments still exist there. In view of the absolutely rare occurrence of Natufian presence this far into the desert, this site should be considered as a major priority for at least preliminary testing.

The work by Betts at Duwayla (e.g. Betts 1998) has shown that Late PPNB and Late Neolithic groups used some areas in the *ḥarra* on an extensive basis. The perhaps unsurprising Wisad Pools discovery, given the scarcity of water sources in the *ḥarra*, promises to add to what so far is a very isolated set of recovered information, and a campaign of test excavations in the Wisad Pools area seems very likely to improve our understanding of the desert region during the Early Neolithic period.

The extent of some of the Late Neolithic (e.g. Jabal adh-Dharwa 1f "The Village", Wisad 1) and Chalcolithic / EBA (e.g. Jabal adh-Dharwa 1c) installations in the Jabal adh-Dharwa area also deserves more intensive examination. Many of the structures seem to be obvious animal pens, but there is also a great deal of structural variability in the settlement areas themselves that demand more clarification as to structural functions.

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