

# THE SECOND PRELIMINARY REPORT OF THE WĀDĪ AR-RAYYĀN ARCHAEOLOGICAL PROJECT<sup>1</sup>: THE FIRST SEASON OF EXCAVATIONS AT AL-KHAWĀRIJ

J.L.Lovell<sup>2</sup>, J. Meadows, T.J. Adams, D.C. Thomas, T. Richter, H. Miller, C. Elias, I.K. McRae and M. al Balwaneh (with a contribution from L. Weeks)

## Introduction

The site of al-Khawārij is one of two known Chalcolithic sites located in the Wādī al-Yābis survey (Palumbo *et al.* 1990: 101). Mabry estimates its size to be 20ha (Mabry 1992: 327). The second, smaller site, Jilmāt ash-Shariyya, was sounded by Mabry (Palumbo *et al.* 1990: 109-111) and estimated to be 7.5 ha (Mabry 1992: 327) (**Fig. 1**). The Wādī ar-Rayyān Archaeological Project (WRAP) began its work at the larger site of al-Khawārij with a detailed site survey in 2003 (Lovell *et al.* 2005)<sup>3</sup>.

As stated in our first preliminary report (Lovell *et al.* 2005), the project is driven by an interest in olive domestication and its implications for Chalcolithic settlement (Lovell 2002, *in press*). As such all excavation was accompanied by a directed sampling strategy for archaeobotanical remains (see below).

## Architecture and stratigraphy (JLL; TJA; DCT)

Following our survey and planning of all surface features, areas for excavation were identified on the basis of extant surface architecture and associated sherd concentrations. The result

was six major areas of excavation positioned across the site in order to target areas with archaeological integrity. What follows is a brief outline of our activities in each of these areas (A-F) and their associated finds. The southern area of the site, known as the 'spur', was sounded as Areas A-C<sup>4</sup>: Area A contained some architecture but little in the way of associated finds, while Area B contained some Late Bronze Age material, there was little in the way of good deposits. The finest architecture was found in Area C, which contained a well-preserved domestic structure. The northern sector — the terrace — was sampled as Areas E-F<sup>5</sup>. In Area E we uncovered a large complex of architecture with clear associated floors, while in Area D revealed more fragmentary architecture with excellent and exciting finds. Area F produced clear architecture but little in the way of finds.

## Area A

Area A is located at eastern edge of the site (see **Fig. 2**), at the southern side of the 'spur' that extends NNE and overlooks the wadi itself. This area yielded the highest concentration of artefacts in the 2003 survey (Lovell *et al.* 2005:

1. We particularly thank Dr. Fawwaz Al-Khaysheh, Director General of the Department of Antiquities and his staff in the 'Amman and 'Ajlun offices for generous assistance during our time in Jordan. The Wādī ar-Rayyān Archaeological Project is funded by the *Australian Research Council*. A reconnaissance survey in 2001 was funded by the *Australian Academy of the Humanities*. The research and fieldwork for this project was carried out while J. Lovell was an ARC Postdoctoral Fellow at the University of Sydney and we thank His Excellency, John Tilemann, and his staff at the Australian Embassy in 'Amman, for invaluable logistic support. In addition we thank the site supervisors (J.A. Fraser (Area A), P. Kottaras (Area B), T.J. Adams (Area C); G. Cincunegui (Area

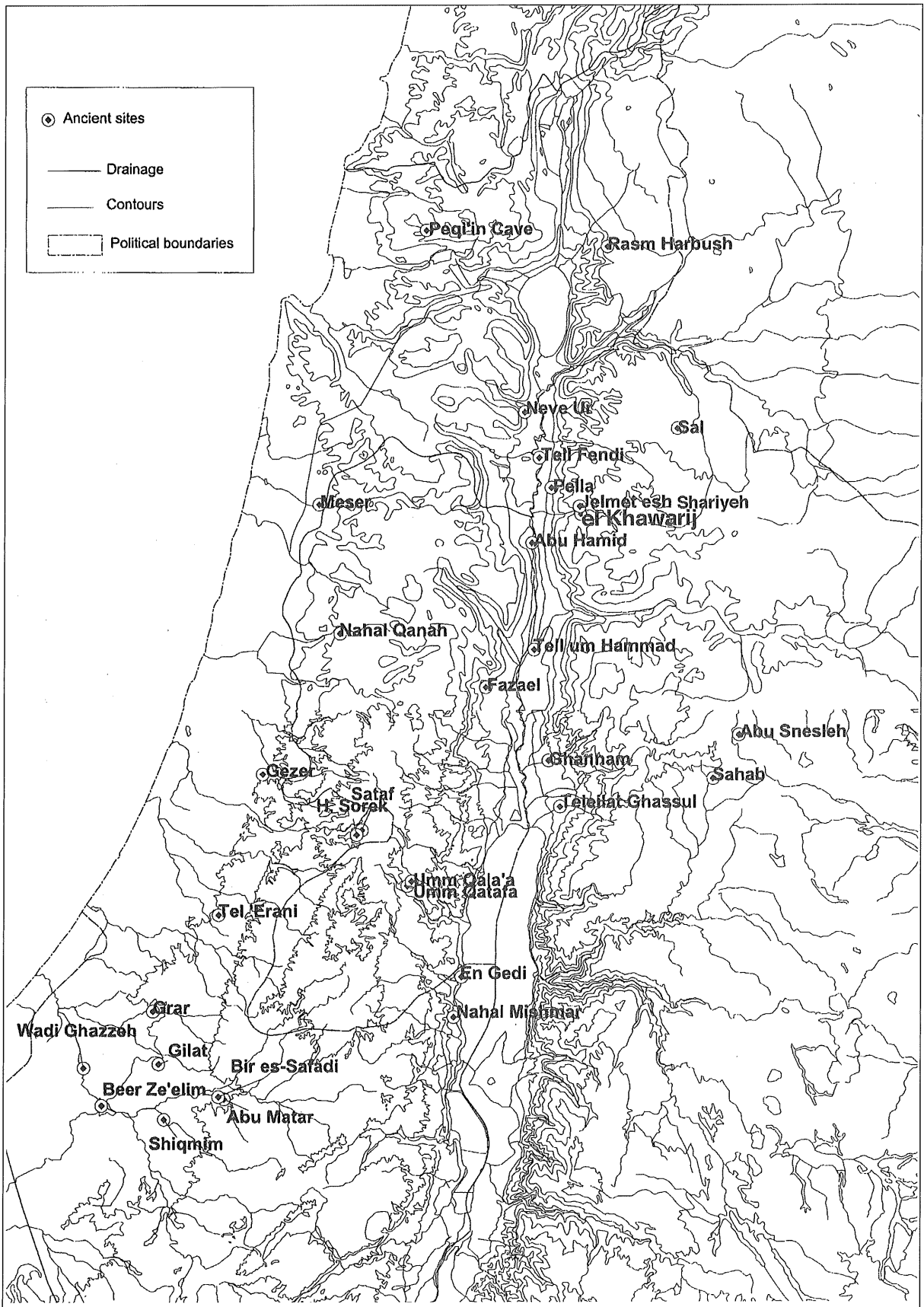
D); D.C. Thomas (Area E); I.K. McRae (Areas F and E). I thank I.K. McRae and G. Cincunegui for their help with the plans and P. Kottaras for the photographs produced here.

2. Corresponding author: *Council for British Research in the Levant* (CBRL), P.O. Box 519, Jubaiha, Amman 11941, JORDAN, email: j.lovell@cbrl.org.uk

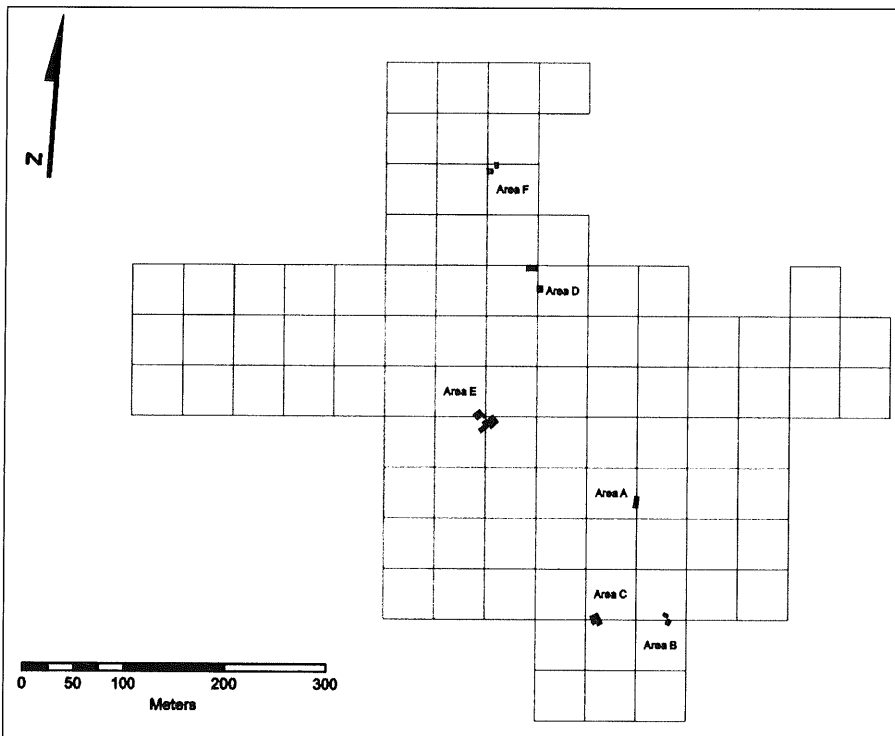
3. Note that previous publication (Lovell *et al.* 2005: 190) a typographical error occurred. The size of al-Khawārij, as surveyed in 2003, is approximately 20 ha as estimated by the Wādī al-Yābis surveyors — our survey area covered 23.5 ha total.

4. T.J. Adams was field director on the spur.

5. D.C. Thomas was field director on the terrace.



1. Map showing location of al-Khawarij.



2. Plan with location of all areas and trenches.

fig. 5). A large fuul field runs east-west across the base of the spur, *circa* 7m north of Trench A1, and it is probable that the excavated area was also once ploughed. The ploughing activity is partially responsible for the high density of artefacts on the surface, and has damaged large portions of the archaeology. The area on the edge of the plough area includes a concentration of wall-lines, and Trench A1 was opened in the centre of this area<sup>6</sup>.

A1 (5 x 4m) encompasses two walls, one recorded in the survey as Feature 417, and another that was not visible in 2003 (Fig. 3). Wall 1042 (formerly Feature 417) runs east-west across the southern third of the trench; Wall 1046 runs roughly north-south. A large rock outcrop extends northwest-southeast between these two walls. Wall 1042 appears to have no return, which may suggest that it is a terrace wall.

Wall 1046 may be related to a series of eight large rocks running roughly East-West from just outside the east baulk (Feature 416 from

the 2003 survey)<sup>7</sup>. A series of surfaces and fill layers, east of Wall 1046, probably relate to this structure. These deposits were cut by two pits, 1247 and 1243. Pit 1243 cut an earlier, smaller pit in its southern corner that contained a fenestrated stand (see Fig. 10: 25).

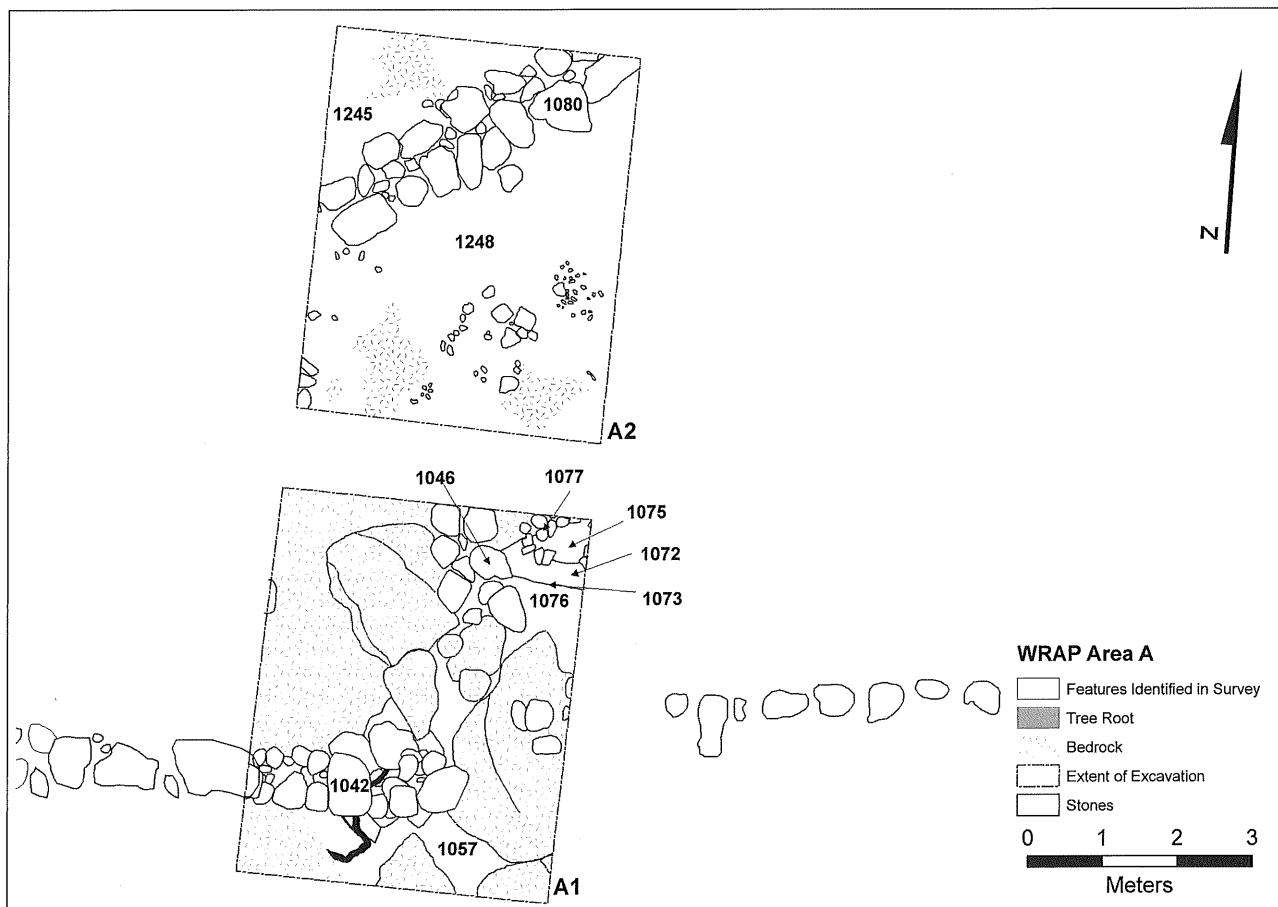
Bedrock was reached throughout the trench, and occurs on a range of levels. In the southwest corner a channel 0.20m wide and 0.10m deep was found carved into the bedrock, dropping 0.70m at the eastern end. The channel end flares as it hits the drop-off. Bedrock was reached at higher levels in the northwest and southwest, and the rock outcrops appear to form an eastern boundary against a lower area of bedrock, natural or otherwise. It is therefore possible that the bedrock and rock outcrop were used, and possibly altered, in antiquity<sup>8</sup>.

A2 is a 6 x 4m trench (located directly to the north of A1, placed to sample any occupation surfaces in association with a curved wall noted in the 2003 survey (Feature 455, and now al-

6. Within survey squares E10 and E11 grided during the 2003 survey (see Lovell *et al.* 2005: fig. 5)

7. Two large rocks, just to the north of Trench A1, aligned with Feature 416, may also form part of a rectangular structure about 4m wide at its western end.

8. Note that two large boulders were located at the northern edge of the southern depression, beneath Wall 1042, although it is unclear whether these relate to the wall or pre-date it (see Fig. 3).



3. Plan of Area A showing A1 and A2.

located wall number 1080, see **Fig. 3**). Topsoil was removed as 1242 and 1078. A thin layer of fill deposit (1079) underlay this topsoil and overlay some rock tumble on bedrock. The earliest deposits were sandy silt layers which underlay Wall 1080 and sat on the bedrock, but unfortunately contained very few finds.

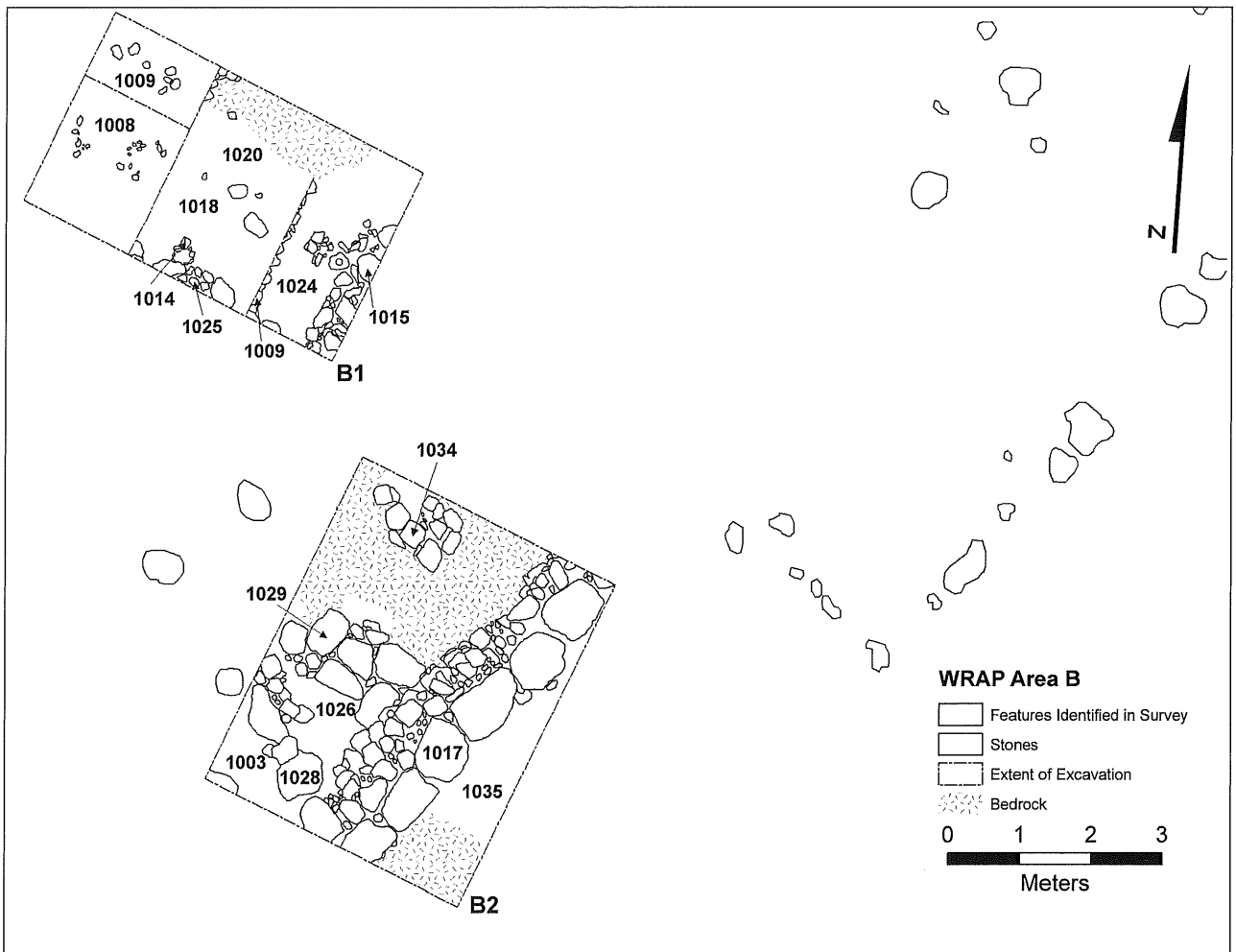
#### Area B

Area B is located at the southern edge of the survey area (**Fig. 2**). Trenches were placed here to examine traces of architecture picked up during the 2003 survey squares G11 and H11 (see Lovell *et al.* 2005: fig. 5). The area consisted of two 5 x 5m trenches.

B1 encompassed what appeared to be an architectural feature but soon turned out to be rock tumble. The survey had picked up a number of later period sherds in this area and it was thought that this later material may seal earlier Chalcolithic deposits. Deeper excavation within a 5 x 3m area within this trench continued to produce a mixture of Roman, Byzantine, Late

Bronze and Iron Age sherds. There was quite a deep (*circa* 1.5m) deposit of wash which eventually bottomed to some features which may have originally been Chalcolithic, in particular a stone lined pit (1014) and Wall 1015 (**Fig. 4**), however due to the disturbance from wash and erosion very little could be said about these with certainty.

Area B2 was located to the south west of B1 across a wall and a return (**Fig. 4**). This turned out to be the corner of a large structure formed by walls 1017 and 1028 with a paved floor (1029). The packing for this floor overlay bedrock with several pits (*e.g.* 1032, 1033) and/or postholes cut into it. The deposit above the paved floor (1031) yielded largely Late Bronze Age material, although some Iron Age material was found in other deposits. It is evident from the wall lines picked up in the surface survey of 2003 (see **Fig. 4**) that we only revealed the corner of a much larger complex of what might have been a rural farmstead of the Late Bronze and Iron Ages.



4. Plan of Area B showing possible architecture in condensed B1 and structures in B2.

#### Area C

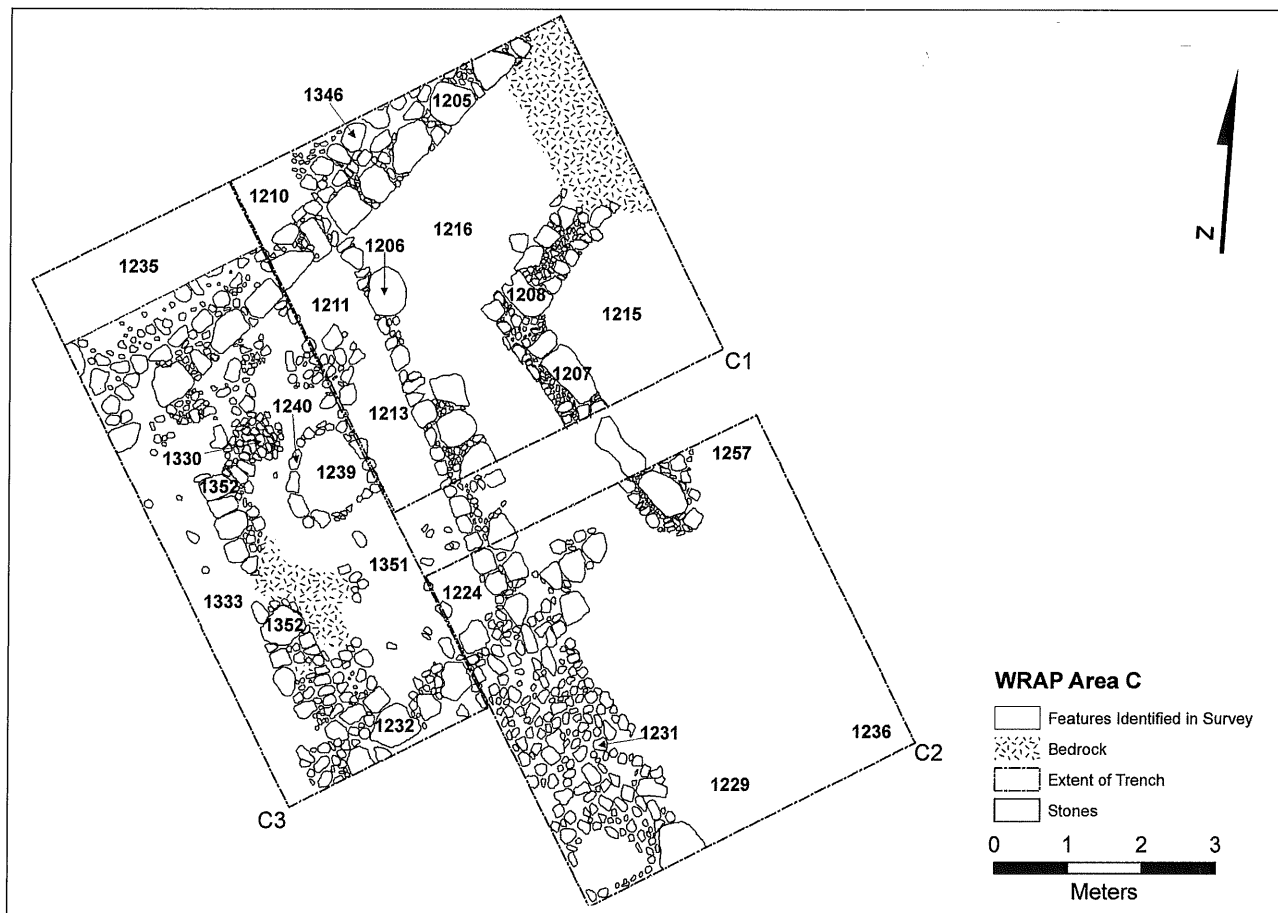
Area C is located in the southwest area of the site (see **Fig. 2**). It was established to investigate features within grid squares G10 and H10 identified during the WRAP 2003 survey. Trench 1 (5 x 5m) was established to investigate Feature 602 (a wall) and its possible return.

After removal of 10-15cm of topsoil confirmed the line of rough limestone field stones (Feature 602) orientated approximately north-south, assigned context 1205, and two possible additional walls, (1206 and 1207), running north from the southern section (see **Fig. 5**). Wall 1206 abuts wall 1205, which runs east-west and appears to be a boundary wall rather than the wall of a building. Wall 1207, in the southeast of the trench, also appears to have a return, 1208. Bedrock was revealed beneath 1202 against the east section and in the centre of the trench, marking the end of wall 1207 and the start of its return

to the east, 1208. The deposits within these two walls overlay patchy and undulating bedrock and two small irregular pits against the east section (1218 and 1220).

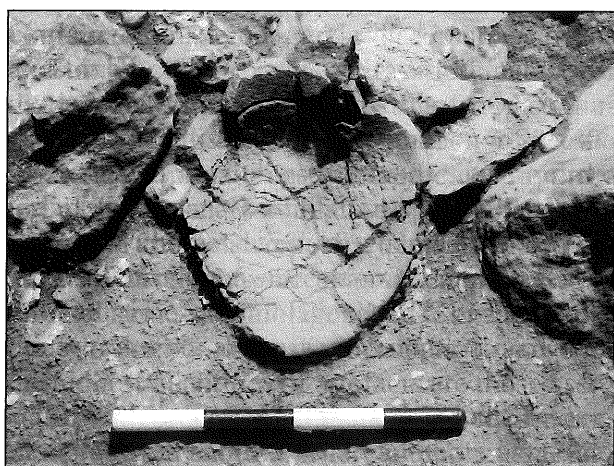
In the central L-shaped area of the trench, bedrock appeared with patches of grey-brown deposit between the higher areas of bedrock. Some of these contexts contained a few ceramic sherds, but otherwise resembled natural. Excavation revealed a channel cut into the rock beneath (1216) leading into rough irregular cuts/natural dips.

C2, another 5 x 5m trench, was established to the south of C1 separated by a 1m baulk. In the east of the trench relatively flat bedrock was discovered at a depth of *circa* 10cm, in places cut by some 'cup holes'. Wall footing 1207 does not appear to continue far into trench 2, presumably because of the rise in bedrock. Wall 1206 was found to continue south with a return to the west



5. Plan of Area C.

(Wall 1232). It is possible that 1205 forms a later division wall within the large building formed by walls 1205 and 1232, but stratigraphically Walls 1205, 1232, 1207 and 1208 appear to be equivalent. A near complete basalt bowl (**Fig. 6, Fig. 12: 2**), was found in the corner formed by walls 1206 and 1232 on a surface (1224).



6. Reg. # 040743 in situ (Photograph: P. Kottaras for WRAP).

C3 was excavated to further clarify the architectural complex revealed in C2. It was a 7 x 3m trench, with a 3 x 1m extension on the southwestern edge. Here we found the well-preserved remains of a rectangular structure (formed by walls 1205, 1206, 1232 and 1352), complete with installations (1211, 1240, 1350) on a clear surface (1351) which corresponds with 1224 (C2). Removal of the surfaces and fill deposits revealed the same irregular cuts in the bedrock found in the other trenches in Area C.

#### Area D

Area D is located on the long flat terrace that forms the northern section of the site adjacent to a large bedrock outcrop (**Fig. 2**). A number of installations had been cut into this bedrock and traces of architecture had been located in the 2003 survey. D1 was a 5 x 5m trench placed to examine some of these architectural traces. Removal of topsoil exposed a plough-affected deposit. This topsoil overlay a dark brown loamy silt deposit (1086, 1088) that contained a number

of broken, yet re-constructible, vessels and their soil contents (1085, 1086, 1087). This formed the fill within a room delineated by two walls: 1096 ran north-south along the western section, and 1092 ran east-west along the southern section (Fig. 7). In the southwest corner a distinct 'threshold' of re-deposited crushed limestone bedrock (1097) formed the link between these walls.

Removal of Walls 1092 and 1096 revealed the same material underneath which, in turn, overlay 1105, a loamy silt, containing a complete churn (Fig. 10: 24) and other finds. A complete diorite mace head was found (Fig. 13: 13, see below) adjacent to Wall 1096. In the northeast of the trench we excavated a possible surface (1094) and the packing underneath (1099, 1100) associated with Wall 1096 and a hearth or ashy patch (1095). Large numbers of artefacts were obtained from these deposits.

Removal of 1099 and 1100 revealed a layer of degraded bedrock or crushed bedrock very similar in style to 1097. This crushed/degraded bedrock appears consistently throughout D1. There are two pits cut into this re-deposited bedrock material, both of which bottomed at solid bedrock. Clearance of the trench down to bedrock included removal of reddish brown crumbly deposit in far north eastern corner and removal of two fragmentary structural deposits (wall stubs 1114 and 1115) associated with this. Between these two wall stubs was a pit, or bedrock depression, filled with a dark brown silty deposit.

Trench D2 was separated from D1 by a 1m baulk to the east (Fig. 7). Removal of topsoil revealed a complex scatter of walls and a layer of chocolate brown soil (1102). Unfortunately the deposits below this, while associated with definite architecture (Walls 1111, 1118, 1119, 1120), were very shallow. Notably deposits 1104 and 1113, on the western side of the trench abutting walls 1111 and 1119, appear to contain a large amount of debitage. Walls 1111 and 1119 appear somewhat curvilinear, while 1118 and 1120 are rectilinear and may relate to the structure in D1.

Trench D3 was a 6 x 5m trench to the south-east (Fig. 7). This trench was located specifically to investigate several features in the outcropping bedrock which may have been rock-cut installations (features 1334, 1337, 1341) and

their fills (1332, 1335, 1338 etc.). Notably there were traces of architecture associated with these rock-cut installations (Walls 1329 and 1336). The excavation of the largest of these was not able to be completed — the excavator reached a depth of 1.4m before it became too dangerous to proceed.

#### Area E

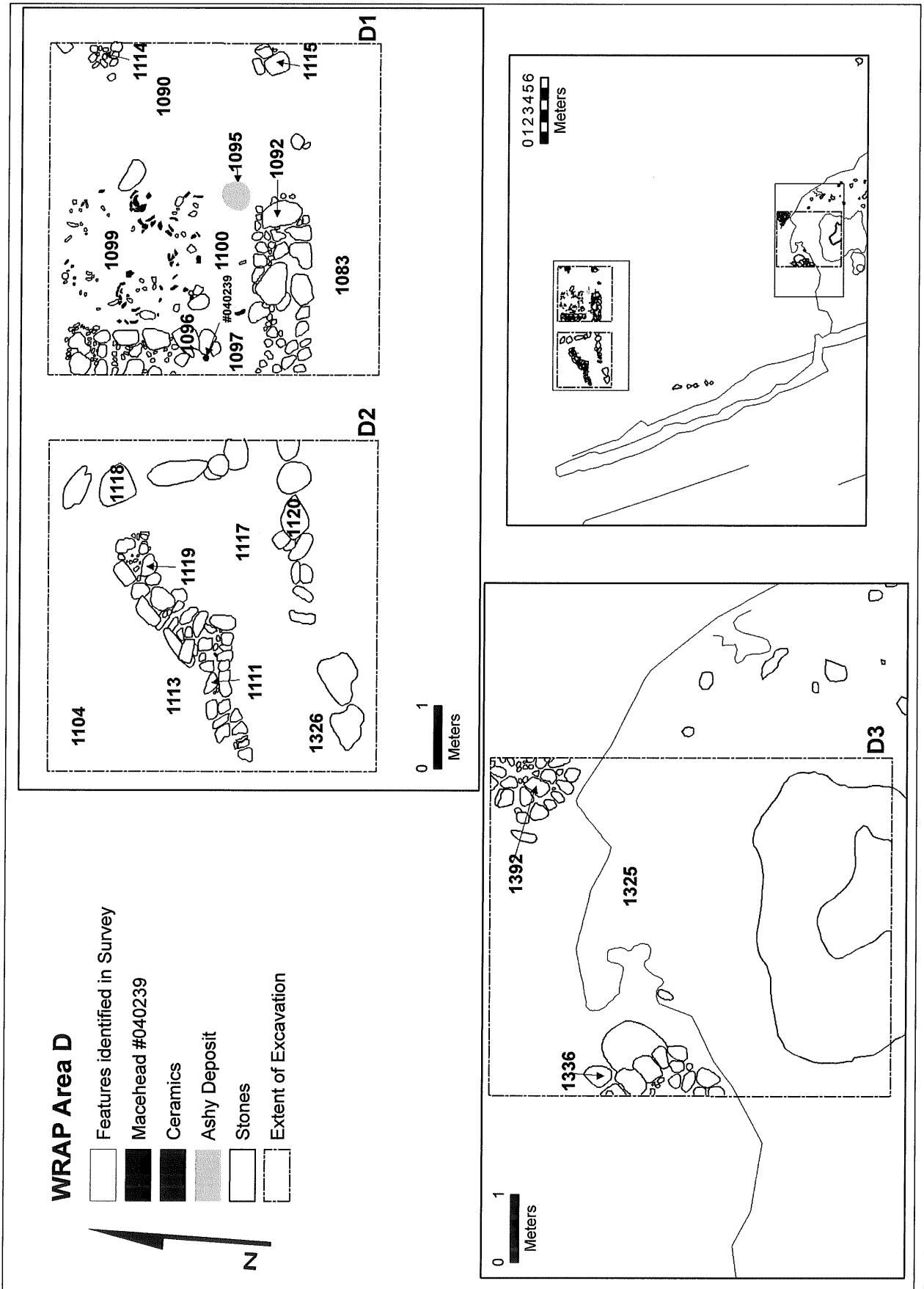
Area E is located on the southwestern edge of the large terrace (see Fig. 2). A total of circa 130m<sup>2</sup> was excavated in this area in the form of 6 trenches: E1, E2, E3, E4, E5 and E6. In fact E1 began as a cleared area and was not pursued and so we need only discuss E2-6 here.

E2, 3 and 5 will be presented together, since they formed one large trench with no internal baulks by the time the excavations had ceased. These three trenches revealed a large rectangular building with an additional, adjoining room (see Fig. 8). In the main room, bounded by Walls 1141, 1143 and 1144, the removal of surface 1155 exposed sub-surface packing 1157, circa 10cm thick. In the southeastern corner of the room an earlier surface was preserved, directly above bedrock, 1282. E5 was begun to complete the excavation of the room, however it was only possible to remove the topsoil (1285) and plan the tops of the walls before the close of the season.

In the room to the north, bounded by walls 1144 and 1145, a small sounding contained a possible surface 1160 and fire installation, Feature 1281, in the northern portion. The fire installation is roughly rectangular, measuring 33 x 30cm and circa 8cm deep. It has a central hollow circa 15cm in diameter and circa 7cm deep. Unlike the surrounding surface/deposits, 1281 is very compact and stony. It appears to be intensely burnt, although it did not have associated ash, nor was it blackened.

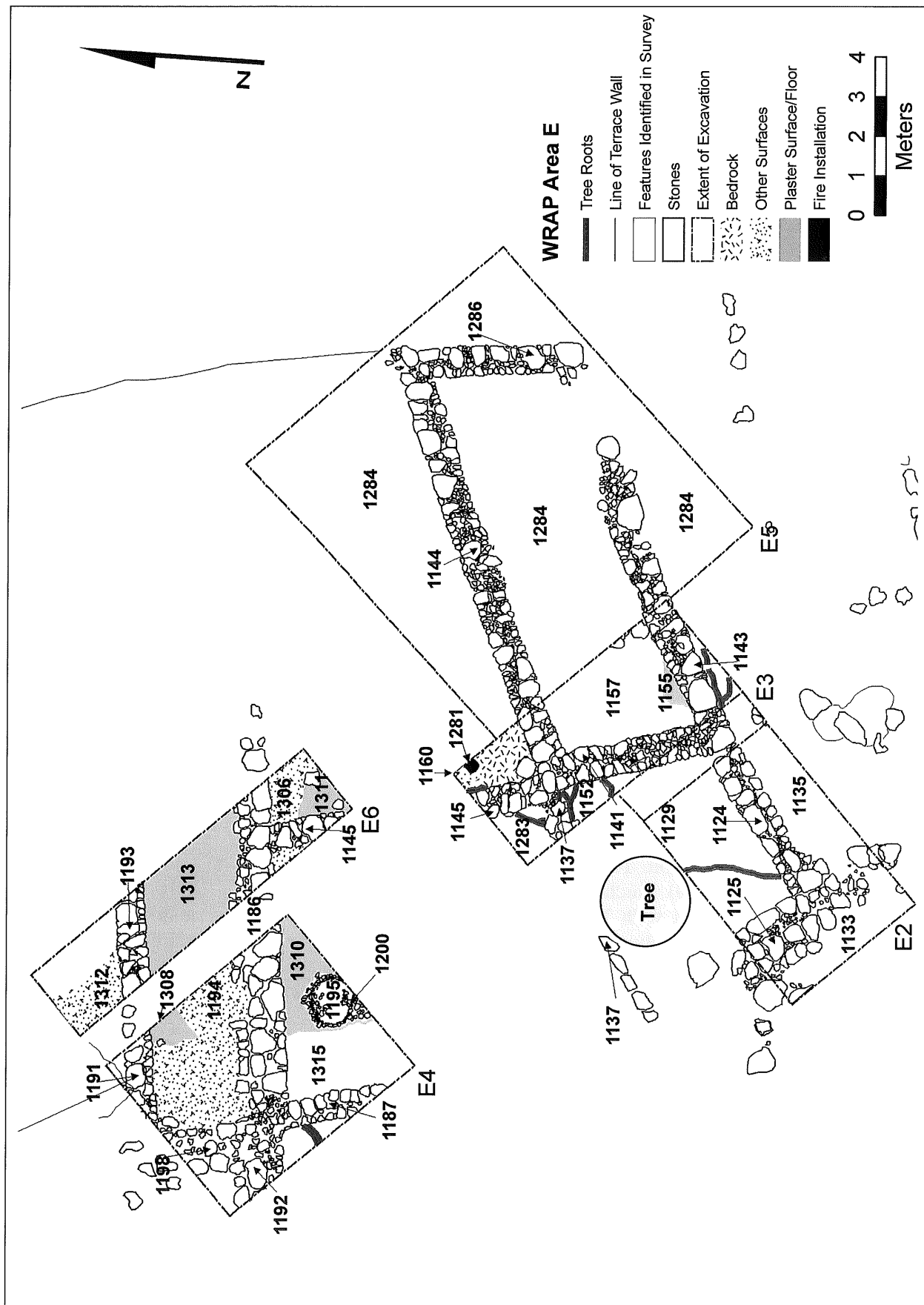
It should be noted that Wall 1145 was clearly a later addition. It was not bonded with 1141, evidenced by its slight difference in alignment (see Fig. 8). Clearly then the deposits just discussed must relate to a later phase, and this may also apply to walls 1124, 1125 and 1137. Further deposits on this western side were excavated west of wall 1145, but unfortunately there were few deposits with any integrity.

In E2, to the west, an additional room was



7. Plan of Area D.





8. Plan of Area E.

uncovered, formed by Walls 1124 and 1125, and also by its return, 1137 (which lay outside the trench). Unfortunately less secure deposits were available here. Wall 1124 clearly butts against Wall 1125, but they may be essentially contemporary. No junction could be viewed between 1137 and 1125. The fill inside the room was removed as 1129. The deposit came down upon bedrock. The whole complex's external length is 17.5m.

Given that some of the walls appear to be additions the question of internal phasing is very important. Therefore deposits in association with the original long room structure (1141, 1143, 1144 and 1286) appear to be the earliest phase.

Areas E4 and 6 will be discussed together as they were excavated within the same complex. E4 was a 6 x 5m trench placed across a stretch of walling identified during the 2003 survey. Upon excavation it was revealed to be a second long rectangular room with further rooms on the sides. Topsoil was removed revealing the tops of Walls 1186, 1191 and 1198, which formed the basis of the rectangular structure, the fourth return lay outside the excavated area<sup>9</sup>.

Note that 1198 appears to be a later wall, and was only partially preserved. A further structural feature, 1192, perhaps represents a collapsed bench, but deposits within this area were disturbed<sup>10</sup>. An additional wall, 1187, ran from the southwest corner of this structure, southwards towards the E3 structure and probably joined with it, forming a later addition. This room included a stone built pit (1200) which appears to have cut surfaces associated with Walls 1186 and 1187 (1310, 1315, 1317), thus this pit and its fill (1195, 1996, 1199, 1307) may date to a later phase. The pit and floor levels were sealed by a grey layer, 1190, that was itself beneath topsoil.

Deposits inside the main long rectangular room were excavated as 1188, light grey loam, 1194 and 1197, a red-brown loam which lay on top of bedrock in some places, but in one area the remains of a yellowish grey surface was preserved 1308. In two places the bedrock was cut by small pits against Wall 1198. In the east

of this room, a further trench was opened (E6) which extended the sample of the floor surface (1308). E6 was a long, thin (9 x 2m) trench. Topsoil removal clarified the continuation of Walls 1186 and 1191, and showed Wall 1145 (from E3) abutting the structure. A return between 1186 and 1191, however, was still not in evidence — this must lie much further to the east<sup>11</sup>.

A grey loamy sand was removed from east of 1191 (1304), and within the walls (1305) and this revealed the continuation of the yellowish grey surface excavated in E4 (1309) and a second surface beneath it (1313). A similar surface (1311) was found between 1186 and 1145 underneath 1306, a greyish loam in which a complete V-shaped bowl was found. This surface (again yellowish grey) is associated with wall 1145. North of Wall 1191 a further two yellowish-grey surfaces (1312 and 1314) were located beneath 1304. These overlay bedrock in the eastern portion of the trench and a cut in the bedrock there was filled with an ashy deposit (1316).

#### *Area F*

Area F was located in the northern sector of the site in order to test several walls that appeared on the surface (see **Fig. 2**), including Features 176 and 226 from the survey. Two trenches were excavated here, F1 (a 5 x 5m trench) and F2 (a smaller, 3 x 5m trench).

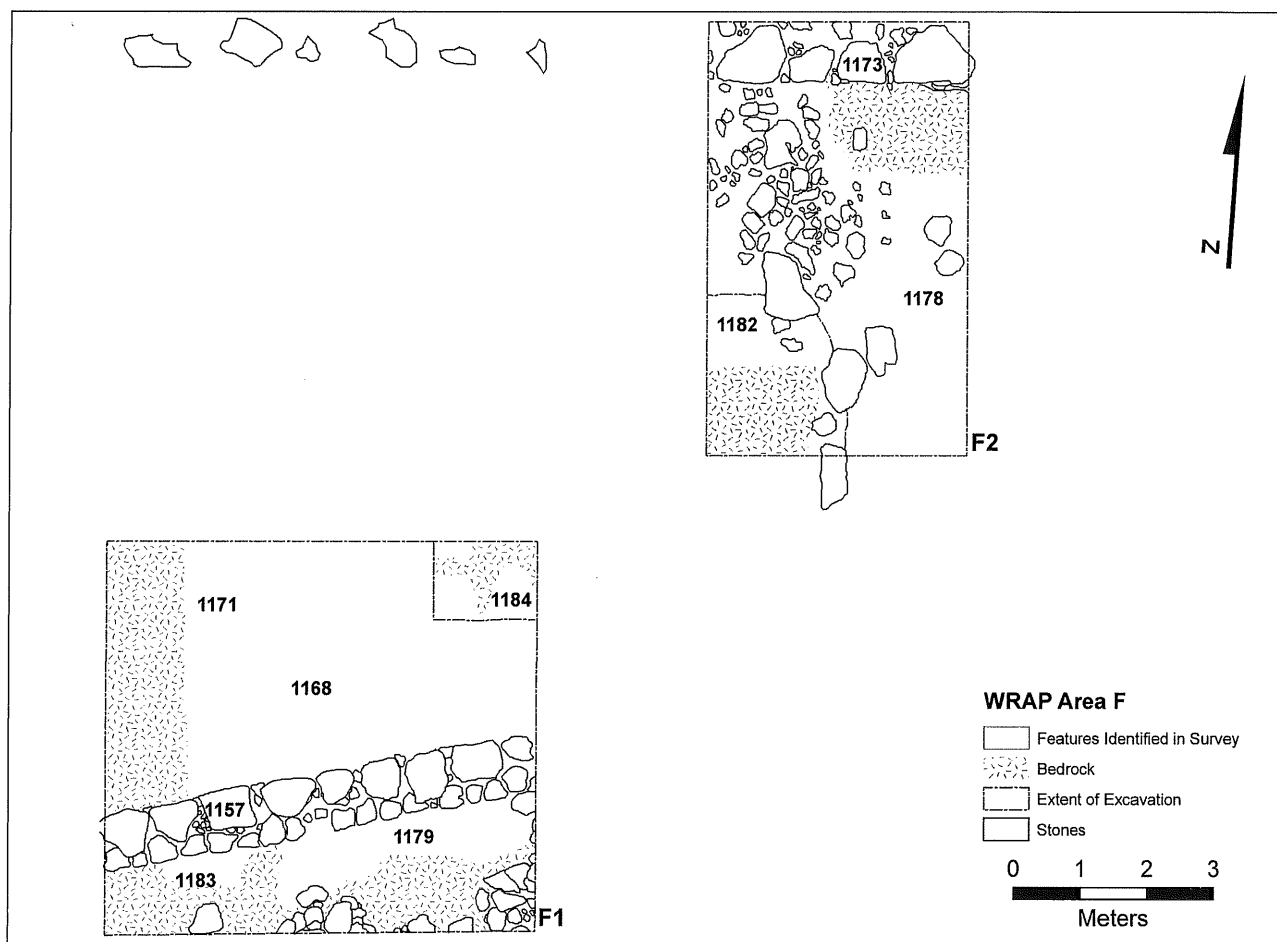
F1 (see **Fig. 9**) was laid out to cross Feature 176 (henceforth Wall 1162) and several layers of topsoil were cleared from around it (1161, 1163-6). Unfortunately no good surfaces or fill layers were encountered. All the deposits in this area contained a good deal of stone rubble. 1167 and 1168 contained burnt ceramic and lithic material concentrated against the wall, but lacked any clear definition as a surface. A large cut in the bedrock appeared underneath 1167, and was sounded as 1183. This large round cut or depression extended well into the north eastern trench, F2 (see below). Small soundings (1169, 1171) were located in the west of the trench north of Wall 1162, in order to ascertain the depth of deposit. 1170, 1176, 1177 and 1179 were further excavated in the southern portion to take the trench to bedrock.

9. Excavation is planned for 2005.

10. Excavations in 2005 will seek to clarify the phasing

in this section of the area.

11. Excavation is planned for 2005.



9. Plan of Area F.

F2, located to the northeast, was laid out to test a possible return to 1162 visible on the surface and a further cross wall (1173), running east-west. Topsoil was removed as 1172, 1174 and 1175. A layer of small stones (1178) which may have been related to Wall 1173 was removed, as was a deposit beneath this (1184), but the return wall which might have joined 1173 and 1162 was not in evidence. 1180, 1181 and 1185 formed the fill of the northeastern section of the same cut or depression located in F1.

### Ceramics (JL)

The ceramic material from the al-Khawārij excavations shows a classic 'late Chalcolithic' assemblage. A very few sherds of Late Neolithic material were found (*e.g.* Fig. 10: 22), as were very occasional EBA sherds in topsoil deposits. Later Bronze Age material was present in Area B<sup>12</sup>, but all other areas clearly dated to the Chalcolithic. Full details on fabric selection

and break-downs of fabric percentages will be presented in the final report. Fig. 10 provides a sample of the forms encountered. Percentages and other figures given below are based upon the sample of material from good contexts that has been catalogued to date — however we have processed all of the secure contexts.

### The Assemblage

The assemblage contains a number of closed vessels (just under 50%) and open vessels (just over 50%). Fabrics are generally similar to other Chalcolithic sites, the main temper being carbonates, with occasional use of basalt or crushed calcite. There are distinct fabric groups within the assemblage, but full characterisation of each group awaits a more detailed study. While the classic red painted decoration characteristic of a Chalcolithic assemblage is present, it is not present in large numbers. This may be partially due to taphonomy in the shallow deposits, but might

12. This material will be discussed in a future report.

also be an expression of regionalism. Thumb and other impression techniques are also in evidence, as are incision and other surface manipulation techniques.

*Open vessels — bowls:* The bowl repertoire contained the standard round-sided bowls (**Fig. 10: 3**) and a significant numbers of 'v' shaped bowls (perhaps 10% of the bowl repertoire — **Fig. 10: 1, 2, 4**). Paint in red bands (10.2) or trickles (10.3) is present but often not well preserved. The small wheel-fashioned 'v' shaped bowls are also present (Roux and Courty 1997), some with quite thick walls (*e.g.* **Fig. 10: 5**) and evidence of string-cut bases (*cf* Braun 2000: fig. 7.3) and some with the more usual thinner friable walls. Small hemispherical bowls are also noted (**Fig. 10: 7**).

*Fenestrated bowls:* Bowls on stands are rare but certainly present (**Fig. 10: 25**). This example has scalloping around the rim, and the classic bands of red paint.

*Basins:* large basins are not common (although there are a number from Area C) but smaller painted bowls are present (*e.g.* **Fig. 10: 23**).

*Closed vessels — jars:* Of the jar repertoire about 25% are storage jars. These include the large basins (*e.g.* **Fig. 10: 26**) and the tall-necked jars (**Fig. 10: 10, 13** and **14**) which come in a wide variety of morphological forms, including the slightly sinuous tall neck jar, which is probably an indicator of a later Chalcolithic date. In depth study of the jar types will likely reveal important patterns of use of the area, because, if it can be assumed that ceramics were a household production, then the notable variability in jar types may indicate a communal use of the area and its industrial facilities. Many of these jars were handled and the handle repertoire contains both loop and lug handles, but it also has some ledge-like handles (**Fig. 10:15, 17**), but so far we have no wavy-ledge handles as described by Braun (2000: fig. 7.4). Short-necked jars area also present, but less common (**Fig. 10: 11**).

*Torpedo vessels:* Interestingly we also have one possible torpedo vessel (**Fig. 10: 27**) —

these are rare vessels that occur at only a few sites. Burton's work on the torpedo vessels at Jilāt suggests that these may have contained olive oil (Burton 2004: 597) if this is correct it would have interesting implications for this example from al-Khawārij.

*Holemouths:* Holemouths are present in the form of simple thick rims (**Fig. 10: 8**) or the slightly up-tuned rim common from the middle Chalcolithic phases (**Fig. 10: 9**), as well as pinched or thickened rims, more common in the later Chalcolithic (**Fig. 10: 6, 12**).

*Fossil indices:* The excavations have not uncovered any cornets, although there are a large number of churns (2.5% of the assemblage) — both large (like those found at Be'er Sheva sites (see **Fig. 10: 18-19**) and some smaller 'bird-shaped' vessels (**Fig. 10: 20, 24**).

### Chipped stone (TR and HM)

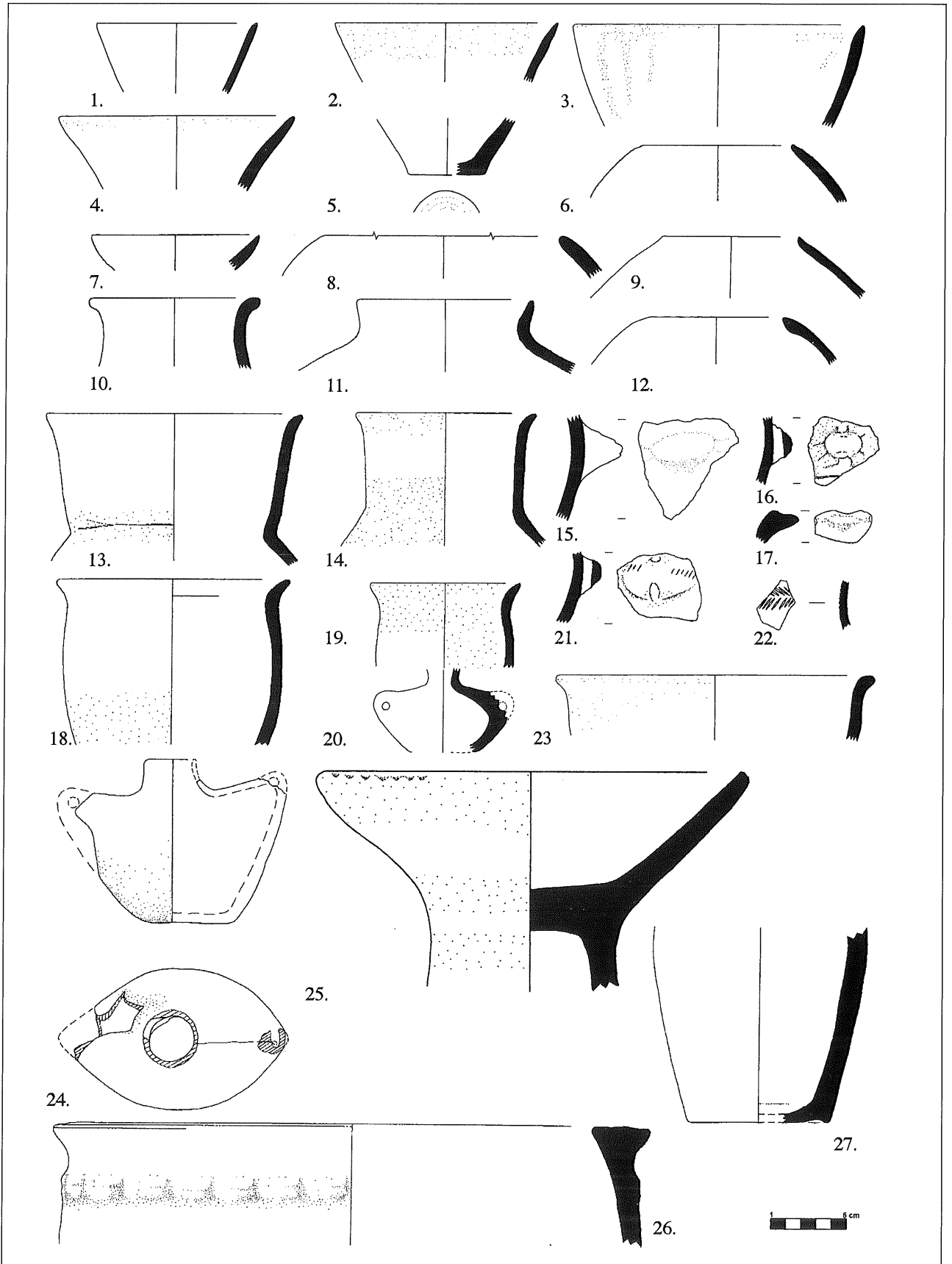
The al-Khawārij chipped stone assemblage comprises *circa* 16,500 individual pieces. Retouched pieces make up the majority of these, followed by flakes, debris, blades, bladelets, cores and core trimming elements. The entire assemblage was sorted and classified according to debitage categories, cores and retouched artefacts. Of the retouched artefacts (n = 4574) a total of 3153 have been typologically analysed to date, concentrating on those from more secure deposits. Artefacts deriving from topsoil or stratigraphically less secure deposits were sampled at 50% for typological analysis. Retouched artefacts were studied using Rosen's (1997: 40) type list<sup>13</sup>.

### Materials

Knappers at al-Khawārij relied on a range of locally procured raw materials. However, in a number of instances raw materials appear to be derived from a source not immediate to the surrounding area<sup>14</sup>. Local raw materials were used for production of the vast majority of the 'expedient' tool groups, such as retouched flakes, scrapers, notches/denticulates and borers, as well as the more formal celt tool group. This lo-

13. We added further types to Rosen's list including further sub-types amongst the scraper tool class, as well as the borer class, accounting for different types of blanks (*i.e.* blades, flakes or bladelets) used for the manufacture of these types of tools.

14. A brief raw material survey of the immediate region was undertaken in 2004 and 2005 to document the presence of different types of flint, chert and other rocks that were locally available.



10. Ceramics from the 2004 excavations.

Figure 10.#	Catalogue #	Form	Fabric	Decor
1	20040	Bowl, Small Deep 'v' shaped	1aM (var)	
2	20084	Bowl, 'v' shaped	5cM	Red painted band rim ext./int.
3	20090	Bowl, large round sided	1aM	Trickles red paint rim and body ext./int.
4	20037	Bowl, Medium 'v' shaped, flaring	4bM	Red painted band on rim ext./int.
5	20118	Bowl, Small 'v' shaped (wheel fashioned?)	3aF	
6	20002	Holemouth, simple, pinched rim	6cM (var)	
7	20007	Bowl, Small, round sided	1bM	
8	20010	Holemouth, simple	1bM	
9	20107	Holemouth, fine	11aM	
10	20001	Jar, tall neck, thickened out-turned flaring rim	7aM	
11	20012	Jar, short neck, slightly flared	6aM	
12	20078	Holemouth, medium thickened in-turned rim	1aM (crystalline)	
13	20020	Jar, tall neck, string indentation at bottom of neck ext.	6cM	Traces of red painted band ext.
14	20059	Jar, large tall neck, out-turned pinched rim	6aM (c. basalt & cryst.)	Red painted bands ext.
15	20006	Handle, ledge (?)	7aM	
16	20004	Handle, lug	1aM	Traces red paint ext.
17	20018	Handle, ledge	14aM	
18	20056	Churn, large neck — bulbous with out-flaring pinched rim	3aM	Red painted band int.
19	20121	Churn, neck — bulbous with out-flaring pinched rim	5aM	Red painted ext. and band int.
20	20006	Churn, miniature	7aM	
21	20008	Handle, lug	1aM	Red painted ext. with short parallel incised lines
22	20134	Bodysherd	3aF	Incised herringbone pattern, over which white slip and red painted ext.
23	20047	Basin, round-sided out-flaring pinched rim	1bM	Red painted ext.
24	040504	Churn, small	1cM	Red painted ext.
25	040294	Bowl, fenestrated	1bM	Red painted band ext.
26	20123	Jar, storage, thickened bevelled rim	2aC	Applied impressed ext
27	20132	Jar, torpedo (?)	4cM	

cal material consists of small to medium sized wadi cobbles of largely re-deposited flint. Many of these nodules display repatinated, and often abraded outer surfaces; cortex has been partially removed by re-deposition. The chipping property of these local materials is generally of a medium to poor quality. However, some production drew on a more purposeful selection of fine-grained flints, *i.e.* some more formal tools appear to have been produced on non-local flint and lack of debitage from this better quality material suggests that these tools were not produced on site.

### The retouched assemblage

A detailed discussion of technology will appear in the final report. Here we discuss only the basic typological spread of the assemblage in order to provide a sense of the nature and chronological scope of the material.

*Glossed Pieces:* Backed and truncated blades with gloss are evident ( $n = 33$ ), (Fig. 11: 1). This group is fairly homogenous, both in terms of retouch location, retouch type and general tool shape. We also noted two examples of simple blade segments with gloss (see Fig. 11: 4).

*Retouched Blades:* A few retouched blade segments are suggestive of the Canaanite blade industry (Fig. 11: 2-3). However, straight-backed blades (Fig. 11: 6) are more common at the site and display a fair degree of homogeneity. Many appear to be unused or spare parts of composite tools, which were possibly sickles. This is supported by the formal similarities between non-glossed backed blades and backed and truncated glossed blades. Arched backed blades are far less common than straight-backed blades, and represent a slightly more diverse tool repertoire. The majority of retouched blades (Fig. 11: 5, 8) are made up of simple retouched blades, which display different degrees and types of retouch, ranging from semi-abrupt to invasive varieties. Simple retouched blades occur consistently across the entire site.

*Retouched Bladelets:* Simple retouched bladelets also dominate the bladelet tool category (Fig. 11: 7). Microendscrapers, and retouched,

twisted bladelets are rare. The retouched bladelet category accounts for only 50 items.

*Borers:* Awls and drills are predominantly made on flakes. Awls on flakes (Fig. 11: 10) ( $n = 14$ ) are the most common, closely followed by awls made on blades ( $n = 9$ ). Drills were also predominantly made on flakes ( $n = 5$ ) (Fig. 11: 11), but drills on blades also occur in small numbers ( $n = 3$ ) (Fig. 11: 12). There are no microlithic drills of any kind in the present assemblage, which probably reflects chronological as well as functional tendencies.

*Tabular Scrapers and Knives:* Although not particularly abundant some tabular knives and few tabular scrapers (Fig. 11: 15-16) occur at al-Khawārij. As previously noted many of these were imported, yet some limited local manufacture also took place. The highest concentration of tabular knives occurs in excavation area E, but trenches A1 and A2 have also produced these artefacts. Thirteen unifacial knives were recovered<sup>15</sup> (Fig. 11: 13-14). They occur in significant quantities in Area B and Area E, and are made on local as well as imported raw materials. The absence of bifacial roughouts suggests that production was not taking place at the site, or at least not within the excavated areas.

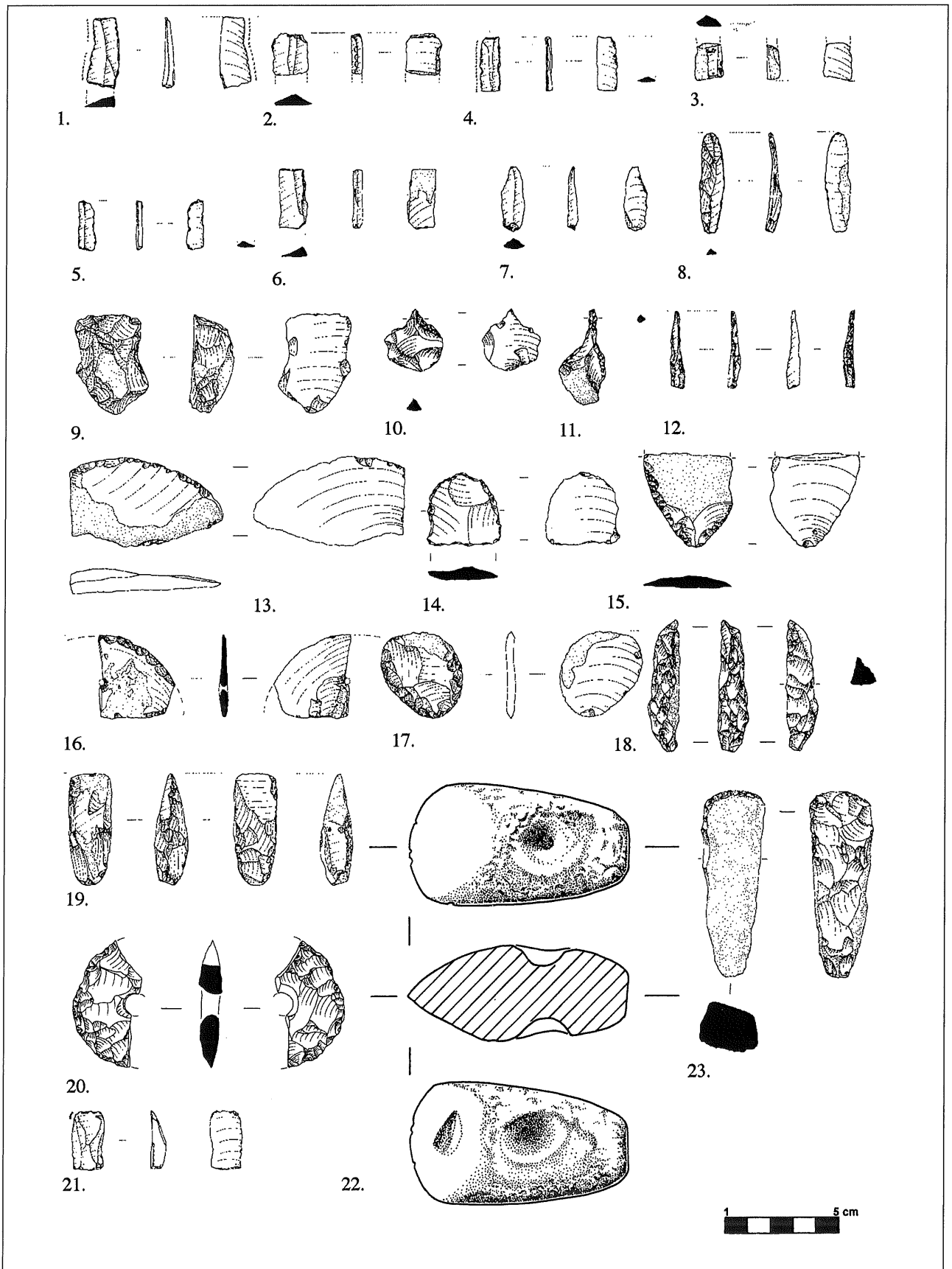
*Discs:* These tools are characteristic of the Chalcolithic (Rosen 1997: 85) and are well documented from other sites in the southern Levant (*e.g.* Noy in Epstein 1998: 282-3). These tools occur principally in Area E, in particular E4, although one disc was found in Area F. Eight examples were recovered, only one of which was holed (Fig. 11: 20).

*Scrapers:* 210 scrapers in all were recovered from the excavation, representing a number of typological forms. Most recall the *ad hoc* nature of the assemblage as a whole (Fig. 11: 9, 17), including the simple endscrapers, sidescrapers, massive scrapers and small scraper types. In each of these categories, the flake blank was more prolific than the blade, probably indicating the *ad hoc* technology, rather than a true preference for this form of tool. There are no examples of the more formal tongue-shaped endscrapers<sup>16</sup>.

15. Note our discussion of unifacial knives found in the 2003 intensive survey in Lovell et al. 2005.

16. This may be due to the transitional nature of the as-

semblage as these are generally attributed to Chalcolithic sites but do not occur in the Early Bronze Age.



11. Chipped stone from the 2004 excavations.



Figure 11.#	Catalogue #	Registration #	Description
1	1848	040509	Glossed piece
2	1856	040509	Retouched blade - Canaanean
3	1863	040509	Retouched blade - Canaanean
4	1612	040627	Glossed piece
5	1614	040627	Retouched bladelet
6	1855	040595	Retouched blade, semi backed
7	1803	040773	Retouched bladelet
8	1791	040773	Retouched blade
9	1794	040773	Scraper
10	760	040921	Awl on flake
11	448	040321	Drill on flake
12	1242	040035	Drill on blade
13	128	040263	Unifacial knife
14	1543	040601	Unifacial knife
15	809	040823	Tabular scraper
16	701	041060	Tabular scraper
17	702	041060	Scraper
18	435	040321	Chisel
19	170	040769	Clet/Axe
20	1327	040843	Pierced disc
21	539	040150	Threshing tooth
22	040575	040575	Votive axe
23	548	040576	Celt/Axe

*Notches and Denticulates:* These tools occur relatively frequently and evenly throughout the excavated areas. In frequency they are second only to the retouched pieces which dominate. Steep notches and denticulates occur in almost equal numbers to the flat examples. The steeper types are thought to be particularly common in Chalcolithic and Early Bronze Age assemblages.

*Retouched Pieces:* *Ad hoc* tools dominate the assemblage in general and these expedient pieces make up the largest tool group (n = 2090) in every area of the site. Note that many pieces fall under this classification that are closely related to other *ad hoc* tools and can include shattered or broken pieces, errors and retouched chunks. Selection of raw material is as eclectic as the retouch and form of these pieces.

*Celts:* Amongst the heavy-duty tools, the axes are the most common type, with round edge axes (Fig. 11: 23) being more common than straight edged examples (Fig. 11: 19). Adzes and chisels (Fig. 11: 18) occur as frequently as the round edged axe. Barkai argues that adzes may have been used as hoes (Barkai 2002: 6), while chisels and axes may have been used for tree clearance (Barkai and Yerkes 2004). The relatively large number of heavy-duty bifacial roughouts indicates on-site production of these tools and perhaps the frequency with which they were required. One entirely polished axe (Fig. 11: 22), was recovered from Area D, notably these are generally argued to have a ritual function (Rosen 1997: 93).

*Miscellaneous:* This category comprises a number of tool types including examples of

chopping tools, burins, threshing teeth (**Fig. 11: 21**) and other miscellaneous categories recovered. 2004 excavations have included the recovery of one Amuq point, an el-Khiam point and a retouched blade likely to be of the Pre-Pottery Neolithic period. One Palaeolithic endscraper was also recovered.

### Conclusion

Overall, the assemblage contains a large number of the types regarded as being typical of the Chalcolithic period. Notches, denticulates and scraper forms, disc tools, tabular knives and glossed pieces all suggest a late Chalcolithic date, some pieces are indicative of very early Bronze Age forms. In terms of function, these pieces suggest predominantly agricultural and residential activities.

The assemblage as a whole is consistent with other Chalcolithic lithic assemblages from the southern Levant: there is an abundance of 'expedient' flake tools, as well as other, more formal tool types such as discs, tabular knives, and truncated, straight backed glossed pieces. Although some 'Canaanean'<sup>17</sup> type prismatic blade technology is present on a limited level, at this stage, there is no evidence for glossed Canaanean blades. The presence of these blades may indicate that the al-Khawārij assemblage represents a transitional phase, given that Rosen largely attributes the Canaanean technology to the Early Bronze Age (Rosen 1997: 59-60, 65)<sup>18</sup>. Note that the assemblage contains few intrusive or residual elements, notably a number of Neolithic points from trenches A1, B1, and E4, as well as one probable Palaeolithic sidescraper from area F2. The excavated chipped stone artefacts therefore represent a chronologically homogenous assemblage, with limited contamination.

### Ground stone (IKM)

The terminology used here follows well-

established definitions developed for other Chalcolithic assemblages<sup>19</sup> and applied by Wright (1991, 1992). Artefacts that are commonly dealt with as "ground stone" include a variety of tool and vessel types, as well as a number of miscellaneous stone pieces that may or may not represent artefacts ground in production. The ground stone assemblage has been divided into seven categories: basalt vessel fragments; fenestrated stands; perforated objects (including items with perforation that appear to be fragments of agricultural tools or stone weights); grinding tools (handstones, pounders and other tools used in processing); querns or grinding slabs; mortars; and miscellaneous items.

### *The assemblage*

The ground stone artefacts from the 2004 excavations (n = 66) exhibit a typical range of raw material, as represented at other Chalcolithic sites (see especially Gilead 1995) in line with the generally accepted view that prehistoric communities located away from outcrops of basalt often used alternative, locally available rocks (Philip and Williams-Thorpe 2001: 14). The main two raw materials in use at al-Khawārij are olivine basalt and limestone. Without geochemical or petrological examination<sup>20</sup> of the material, exact provenance remains uncertain. However preliminary examination suggests there is a relationship between form or function of artefact type and material used.

*Basalt vessel fragments (n = 9)*: All of these are made from fine-grained basalt, typical of Chalcolithic sites (see particularly Epstein 1998: 234; Gilead 1995: 311; Lee 1973: 260; Mallon *et al.* 1934: 67-70; Perrot *et al.* 1967: 216, fig: 13: 1-3) where basalt vessels are restricted to fine-grained rocks (Philip and Williams-Thorpe 2001: 14). Most of these vessels are the classic 'v' shaped bowls<sup>21</sup>. Two examples (e.g. **Fig. 12: 1**, note also the residual trefoil base on this

17. The present authors consider the terminology of 'Canaanean' prismatic blade technologies as problematic. For reasons of consistency and communication, however, we continue to employ the terminology at this stage. Note that Rowan and Levy (1994) claimed a 'proto-Canaanean' industry was operative in the Chalcolithic although this probably requires significant review (Rowan *pers. comm.*).

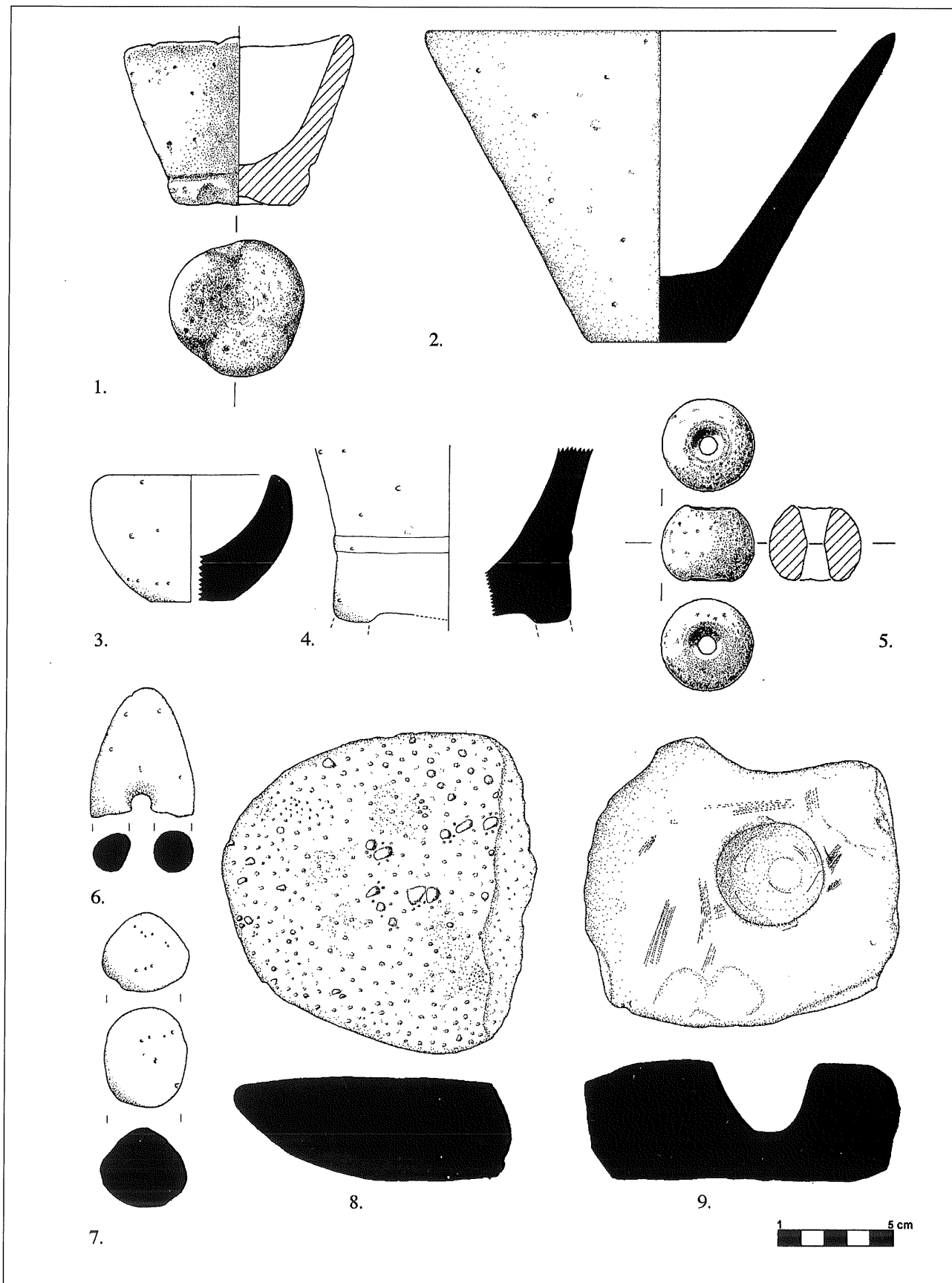
18. There is other circumstantial evidence building for Canaanean technology in the Chalcolithic, see Mi-

levski *et al.* n.d.

19. Including the Golani sites (Epstein 1998: 229ff), Tulaylāt al-Ghassūl (Lee 1979; Mallon *et al.* 1934: 66ff), Grar (Gilead 1995: 309ff) and Neve Ur (Perrot *et al.* 1967: 216).

20. After preliminary study of the 2005 excavation season materials a representative sample of ground stone material from both seasons will be submitted for materials analysis.

21. See Amiran and Porat 1984; Braun 1990.



12. Ground stone from the 2004 excavations.

Figure 12.#	Registration #	Description
1	040132	'V' shaped bowl with line at base
2	040743	'V' shaped bowl
3	040076	Rounded bowl
4	040040	Fenestrated stand
5	040584	Weight
6	040131	Hoe
7	040624	Grinding stone
8	041005	Quern
9	040786	Mortar

piece) exhibit incised lines around the base of the vessel, a characteristic feature of basalt vessels from the Chalcolithic period (Braun 1990: 87) although it has been posited that this is more common at sites removed from basalt sources (Epstein 1998: 234). **Fig. 12: 2** (see also **Fig. 6**) represents a large 'V' shaped bowl reconstructed from many fragments, and it is possible the vessel is not basalt but phosphorite (Braun 1990). Another vessel form is the rounded bowl, known from the Golani sites (**Fig. 12: 3**; cf Epstein 1998: 234).

*Fenestrated Stands (n = 4)*: Five fragments of fenestrated stands, two joining, were collected from three areas of the site (A, C and E). Part of the wall, base and knob of a foot are preserved in two of the fragments (**Fig. 12: 4**). Both have a raised relief line along the lower part of the bowl. Parallels for these can be found at a number of Chalcolithic sites, (see, Epstein 1998: pl. 38: 10-14; Gilead 1995: fig 7.1, 10; Lee 1979: 267, LB12e; Perrot *et al.* 1967: fig 13.1-2). The other two fragments appear to represent the base of stands.

*Perforated Objects (n = 13)*: This group includes miscellaneous pierced stones made of un-worked stone with a carefully drilled hole through the stone. The placement of the hole

is unsystematic. One example, made of chert, is similar to the perforated ceramic discs (see below). Other items probably represent agricultural tools or stone weights, all but one of which are made of basalt (one is made of sandstone). Other objects include 'stone weights' made of very fine-basalt (**Fig. 12: 5**) or more porous basalt. One of fragment of fine basalt (**Fig. 12: 6**) may be identified as a "hoe" and is made of a fine-basalt.

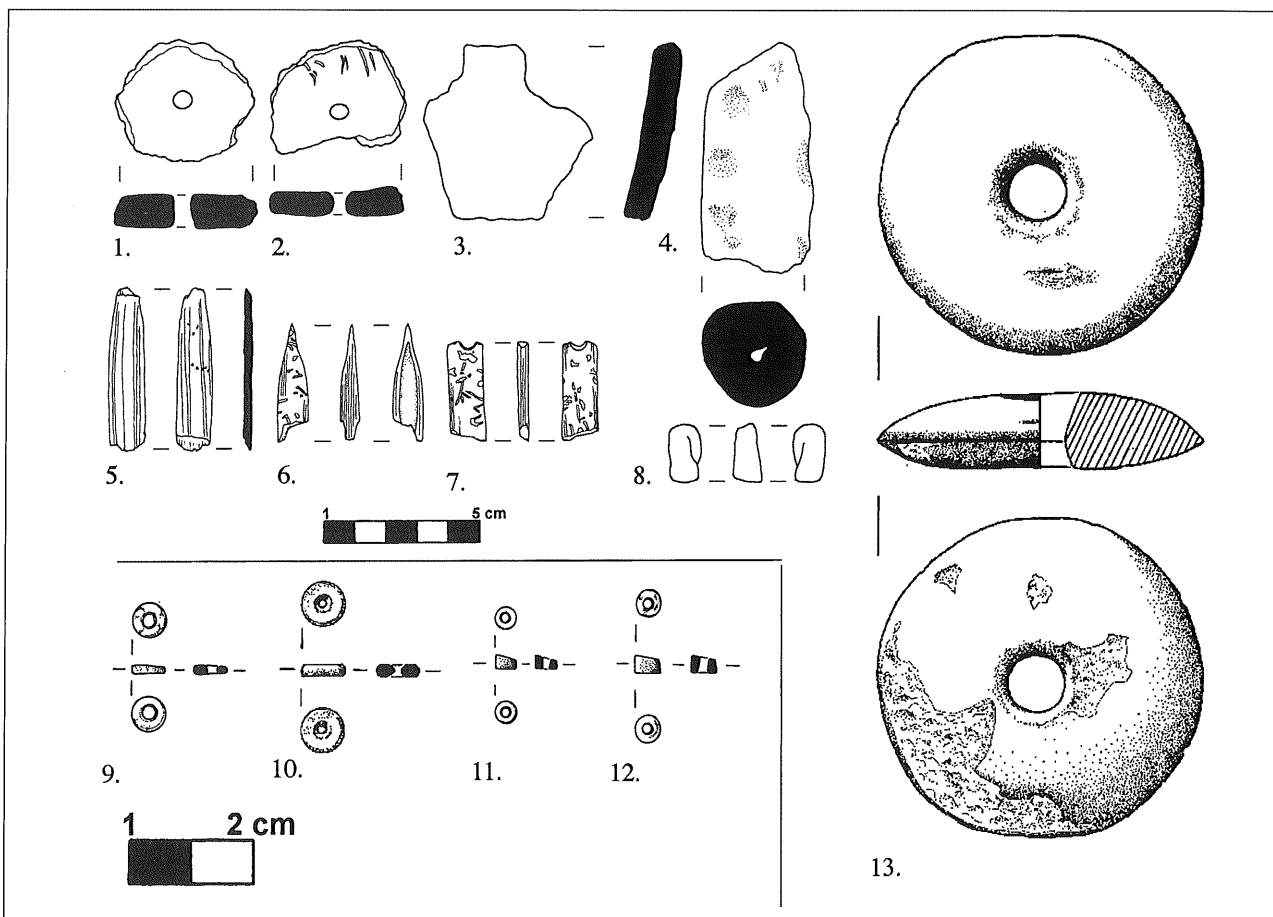
Included in this category are two polished diorite<sup>22</sup> disc-shaped objects interpreted as mace heads, one complete example from Area D (**Fig. 13: 13**) and a further fragment from Area E. These are circular in plan, lentoid in section, with a circular perforation in the centre. They exhibit limited evidence of wear along outer edge of the perforation and at various places on both surfaces. Diorite maceheads of this type are considered to come from Egypt<sup>23</sup>. The al-Khawārij maceheads may therefore represent further evidence for a relationship between Egypt and Jordan during the Chalcolithic<sup>24</sup>. Parallels for this particular type do exist in Chalcolithic contexts. Two examples are cited from Tulaylāt al-Ghas-sūl in 'dolerite', (Mallon *et al.* 1934: 71, fig. 27; Lee 1973: 275, LB42: n). A further close parallel comes from Neve Ur, in 'marbre noir' (Per-

22. We thank Assoc. Prof. Geoff Clarke and Dr Joel Fitzherbert of the University of Sydney's School of Geosciences for assisting with the identification.

23. Interestingly, the majority of the parallels for this type of mace head do not come from Egypt proper, but from the Sudan, with only 2 of the 20 being found in Egypt (Cialowicz 1987: 15-17).

24. Conversely, the association with Egypt could be questioned. Ground and polished stone mace heads are a characteristic feature of the Chalcolithic ground stone

assemblage (Hanbury-Tenison 1986: 164). To date the most common forms are oval, piriform, spherical and pear-shaped, and are usually manufactured from stones such as limestone and imported calcite. They can also be made of copper or haematite. Ground stone examples have been found at a number of sites, including Abū Ḥāmid (Dollfus and Kafafi 1986: 595), Tall Abū al-Kharaz (Fischer 2002), Pella (Bourke *et al.* 1994: 91-93), Tulaylāt al-Ghas-sūl (Bourke *et al.* 2000: 71), and Tubna (Banning *et al.* 1998: 153).



13. Other finds from the 2004 excavations.

Figure 13.#	Registration #	Description	Material
1	040307	Pierced disc	Ceramic
2	040938	Pierced disc	Ceramic
3	040941	'Violin' figurine ?	Ceramic
4	040942	Cylindrical (phallic?) figurine	Ceramic
5	040208	Shuttle or spatula?	Bone
6	040320	Point	Bone
7	041002	Shuttle	Bone
8	040520	'Bird' figurine ?	Ceramic
9.	040610	Bead	Bone
10	040797	Bead	Faience
11	040741	Bead	Bone
12	040028	Bead	Faience
13	040239	Macehead	Diorite

rot *et al.* 1967: 218-220, fig. 13:5). It is unclear whether these stone types were properly identi-

fied, if not, they may have been made of a similar material to those from al-Khawārij<sup>25</sup>.

25. I thank Christine Elias (registrar) for conducting the

preliminary research on these pieces.

*Grinding Stones* ( $n = 7$ ): Each of these stones recovered could have been used as pounder/grinders and represents the upper, mobile stone in a pair of grinding, pounding or polishing tools as defined by Wright (1991). These are made in various materials: flint, limestone, basalt (**Fig. 12: 7**) and miscellaneous non-local stones. Some examples show use-wear on one of their sides, and the two flint examples have evidence of chipping.

*Querns/Grinding Slabs* ( $n = 17$ ): **Fig. 12: 8** represents one of the larger fragments of grinding slabs, half of a large oval mortar made of very-porous basalt, smoothed on the upper surface and the sides, the lower surface is fashioned but reasonably un-worked. Parallels for this type of quern can be found at a number of Chalcolithic sites, for example the Golani sites (Epstein 1998: 235). Other examples are made of limestone. A number of the smaller quern fragments show no sign of being dressed on the under side, however the sides are notably worked. It difficult to make any assumptions on the typical form in use at this preliminary stage, as so many of the examples from al-Khawārij tend to be small fragments.

*Mortars* ( $n = 10$ ): The term mortar is used here for a collection of stone bowls, similar in classification to those of Wright's 'mortars', "the lower stationary stone in a pair of tools used for pounding" (1991: 21, 1993: 65). The examples from al-Khawārij are, for the most part, un-worked externally, but have a worked cavity on the upper surface (**Fig. 12: 9**). Large grinding basins are also represented.

## Conclusion

This discussion is merely a brief analysis of the types (forms) of ground stone artefacts uncovered during the 2004 excavations. Specific information pertaining to the types of raw material and an analysis of find-spot will be discussed in the final report when material from all the seasons may be examined. In brief, the ground stone assemblage at al-Khawārij supports a simple, domestic occupation, however the highest quantities of artefacts are those associated with processing (*i.e.* mortars and grinding slabs). Upper mobile grinding implements are also rare, which might suggest that other implements were used for grinding/processing.

## Other finds (CE)

The other finds from the site include the general repertoire of bone points, shell, holed discs, and occasional figurines. What follows is a brief description of selected examples.

### *Ceramic Figurine*

A small figurine fragment (**Fig. 13: 8**) comes from E2. It is sub-rectangular in plan, and oval in section, with remains of reddish-brown slip. The top section folded over onto itself to form a flattened loop with no gap. The lower section cylindrical, and it has overall dimensions of 1.9 x 1.0 x 0.9cm. The style of this figurine fragment is reminiscent of examples that have been identified as possibly representing birds (Dollfus and Kafafi 1993: 250-2, fig. 4:1-4). Although the 'beak' area on this example is not free from the body as in other figurines, the overall impression is bird like. The remains of slip also suggest that the piece is likely to be a finished object rather than just a piece of clay.

Two other ceramic 'figurines' come from the rock cut features in Area D. One is a roughly recut sherd in a shape reminiscent of the violin figurines known from other Chalcolithic sites (**Fig. 13: 3**). The second is a cylindrical object (**Fig. 13: 4**) which may represent a phallus.

### *Ceramic Discs*

A number of complete and fragmentary examples of circular ceramic discs were recovered. One complete example (**Fig. 13: 1**) and two fragments (see **Fig. 13: 2**) have circular perforations in the centres of the disc. A further seven examples show no evidence of having been pierced. These discs are common on Chalcolithic sites but their exact function is unclear. Suggestions for use include weights, for the larger and heavier examples, and for the smaller discs, spindle whorls or small weights (Bourke *et al.* 1995: 50). Unpierced examples are often designated as counters or gaming pieces.

## Beads

A total of four beads were recovered from the site, all of which are circular disc beads. Three of the four come from the complex in Area E, while the fourth comes from a fill context in Area B. Two examples are made from bone (**Fig. 13: 9, 11**) and two made from faience (**Fig. 13:**

10, 12). Unfortunately it is not possible to determine the original colour of the faience beads as the material is weathered and chalky. They range in diameter from 0.3-0.6cm, with small, medium and large thread holes.

Published examples of faience beads from contemporary sites come from Tulaylāt al-Ghas-sūl (Bourke *et al.* 2000: 74-5) and the Chalcolithic cave at Horvat Castra (van den Brink *et al.* 2004: 146).

### Worked Bone

The most common type of bone tool recovered from the site is the worked bone point, (5 of the total 9 pieces, **Fig. 13: 6**). These are of varying length and width; some are more highly polished than others. There are also two fragments of what might be shuttle needles or spatulae (**Fig. 13: 5, 7**). These objects are made from animal ribs that have been smoothed and polished. One example (**Fig. 13: 7**) retains part of the hole that had been made at one end. Examples of such tools have been recovered from Tulaylāt al-Ghas-sūl (Bourke *et al.* 1995: 49-50, fig. 7.5-6 and 2000: 72-4, fig. 22:3 and an almost complete example was found at Abū Ḥāmid (Dollfus and Kafafi. 1993: 250-1, fig. 3:1).

### Shell

Although the shell assemblage is yet to be completely analysed, we present here a brief overview of the shell assemblage.

The shell recovered from the site includes examples of bivalves, gastropods and snail (see **Table 1**). Of the number of shell pieces recovered, snail shell represents 89% (219 from 246 pieces) of the total — no doubt a reflection of taphonomy. The highest concentration of snail shell comes from areas B and E. Snail represents 94% of the total from area B (98 pieces) and 91% of the total from area E (110 pieces). These include complete and fragmentary examples.

Very little shell was recovered from areas A, C, D, and F. Of the 16 pieces recovered from area A, 9 are snail, 2 single bivalves with mother-of-pearl, 1 bivalve fragment, 1 gastropod and 2, as yet, unidentified pieces. Only 1 example of snail shell was recovered from areas C and D and none from Area F. Also recovered from area C was a single, circular bivalve with a circular perforation in its apex. It is unclear

**Table 1:** Shell from the 2004 excavations at al-Khawārij.

Classification	Quantity
Complete bivalve shell	1
Single bivalve shell	1
Single bivalve shell (with mother of pearl)	4
Bivalve fragments (with mother of pearl)	3
Gastropod shell	3
Gastropod fragments	1
Snail shell	123
Snail shell fragments	96
Unidentified shell fragments	14

whether the perforation was man made or a natural occurrence. Area D only yielded the 1 piece of snail shell; Area F 2 fragments of shell, as yet unidentified.

### Slag (LW)

Fragments of 'slag' were found in almost every area of the site. The slags are very porous and lightweight, with the heaviest pieces weighing no more than *circa* 7g and being no more than *circa* 4cm in their largest dimension (most pieces weigh less than 2g and are less than 2cm in their largest dimension). The slags vary in colour from light brown to dark grey or black, and often show slight traces of vitrification. Preliminary physical examination suggests that they are most likely fuel-ash slags, *i.e.* the byproducts from high temperature operations in which carbonized fuel reacts with (*i.e.* fluxes) nearby clay-rich soil or furnace lining, forming a lightweight, slightly vitrified material. Fuel-ash slags can be formed in a number of high-temperature contexts, from a simple campfire to more complex installations such as hearths, kilns, and furnaces. The very minimal vitrification of the samples at al-Khawārij suggests that they are more likely to be the byproduct of relatively low-temperature pyrotechnological operations such as campfires or hearths, rather than installations such as kilns or furnaces where significantly higher temperatures are likely to have been achieved. It is possible that the prevalence of such residues at the site relates specifically to

the fire installation found adjacent to one of the larger rooms in Area E (see above).

## Archaeobotany (JM)

### Sampling strategy

Sampling for archaeobotanical remains was an integral part of the 2004 excavation season at al-Khawārij. Bulk samples of sediment were taken from all securely-stratified contexts, with a notional sample volume of 20L where possible. Ninety-six samples were obtained, and processed by machine flotation. Light fractions (flots) were collected in 1.0mm and 0.3mm mesh sieves. The flots were scanned for archaeobotanical remains and 76 were fully sorted under a binocular microscope at  $\times 10$ — $\times 45$  magnification.

### Results

The incidence of plant remains was relatively low, but carbonised specimens were identified in most samples (**Table 2**). As al-Khawārij is an open site in a warm, semi-arid environment, plant remains are rapidly consumed by soil micro-organisms, unless carbonised (charred). The many uncharred remains recovered (roots and seeds) are thus assumed to be modern. The abundance of carbonised grains and chaff may be related to the use of herbivore dung as fuel (Miller 1984). The low incidence of grains and chaff at al-Khawārij might reflect a reliance on wood for fuel, with dung used for other purposes (e.g. manure), but wood charcoal is also scarce, which suggests that the poor preservation of archaeobotanical remains is mainly the result of post-depositional factors, such as:

- ploughing — the site has recently been ploughed to a depth of 0.3-0.5m (although the samples sorted generally came from contexts below the plough zone).
- bioturbation — excavation provided abundant evidence of soil disturbance, down to bedrock, by ants, moles, and tree roots.
- soil expansion and contraction — archaeological strata at al-Khawārij have not been deeply buried for much of the last 6000 years. Preservation is often poor in the upper 0.5-1.0m of deposits, even at sandy sites. The high clay content at al-Khawārij, and the strongly seasonal climate, mean that soil expansion and contraction would have been particularly destructive.

Nevertheless, some samples contained well-preserved specimens, although in these samples the sediment matrix was typically compact and difficult to dissolve, and the recovery rate was correspondingly low. Excellent examples of several species were recovered, however. These included grains of emmer wheat (*Triticum dicoccum*) and hulled barley (*Hordeum vulgare*), the typical cereal crops at Jordanian prehistoric sites; lentil (*Lens culinaris*), also a common cultivar, and several other pulses — pea (*Pisum sativum*) and bitter vetch (*Vicia ervilia*), chickpea (*Cicer arietinum*), and broad bean (*Vicia faba*) — as well as olive (*Olea europaea*), fig (*Ficus* sp.) and possibly a single example of date (*Phoenix dactylifera*). None of these is out of place in a Chalcolithic assemblage. Probable Early Bronze Age introductions, such as grape (*Vitis vinifera*) and durum wheat (*Triticum durum*) are absent. Grape, in particular, is common in Early Bronze Age assemblages in Jordan (Fall *et al.* 2002), and its absence would be surprising if al-Khawārij dated to the late fourth millennium BC.

Furthermore, there are clear spatial patterns in sample composition, which suggests that most plant remains in the richer samples are not residual (reworked). Only Area D samples produced significant numbers of fig (*Ficus* sp.) seeds (nutlets), small-seeded legumes (Fabaceae spp.), or *Lolium* and other grass seeds (caryopses). Of 41 fig seeds recovered in 2004, only 1 was not from Area D. In Area E, samples E6 1309a-c stand out. Pulses account for 80% of plant remains in these samples. This concentration probably stems from a single event, in which a sack or basket of pulses was burnt. The other Area E samples are more diverse, with more cereal grain and chaff in E3 1281, and olive stone fragments and pulses in E4 1196, 1308, and 1314, and E6 1316. E3 samples often contained an appreciable amount of 'slag' (see above), although this material was found in every excavation area. Small fragments of wood charcoal occurred in nearly every sample, but only in C2 1234, which yielded 6.5ml of charcoal, was there anything resembling a concentration. Area A and C samples contained fewer charred plant remains than did samples from other areas.

### Olea Europaea

Eight whole carbonised olive stones were re-



**Table 2:** carbonised plant remains identified in flot samples, al-Khawārij 2004 season.

Excavation area	A	C	D	E	E	total samples
<i>Trenches</i>	1	1, 2, 3	1, 3	2, 3	4, 6	
<i>Samples sorted</i>	12	16	20	14	14	76
<i>Volume of sediment (L)</i>	218	264	211	242	241	1176
<b>Cereals (Triticum/Hordeum)</b>						
emmer wheat ( <i>T. dicoccum</i> ) grain				••	•••	5
wheat spikelet fork		•		•	•	3
wheat glume base	••	••	••	•••	•••	19
hulled barley ( <i>H. vulgare</i> ) grain			••		•••	9
barley rachis internode		••	•			3
cereal grain indeterminate		•••	•		•	5
cereal grain fragment	•••	••	•••	•••	••••	33
grass culm node ( <i>cf. cereal straw</i> )	•			•		2
<b>Pulses (large Fabaceae)</b>						
lentil ( <i>Lens</i> sp.)	•	•••	•••	••	••••	22
broad bean ( <i>Vicia faba</i> )			•			1
chickpea ( <i>Cicer</i> sp.)					•	1
grass pea ( <i>Lathyrus</i> type)			•		•	2
pea/vetch ( <i>Viciae</i> )	•	•••	•	••	••••	20
pulse fragment	•••	•••	•••	••••	••••	39
<b>Other food plants</b>						
olive ( <i>Olea europaea</i> ) stone whole	•			•	•••	7
olive stone fragment	•••	••••	•••	••••	•••••	44
fig ( <i>Ficus</i> sp.) seed (nutlet)			•••	•	•	8
acorn ( <i>Quercus</i> sp.) cupule		•				1
date ( <i>Phoenix dactylifera</i> ) stone			•?			1?
<b>Wild/weed seeds</b>						
Aizoon sp.	•				•	2
<i>cf. Picris</i> sp.			•			1
<i>cf. Adonis</i> sp.	•				•	2
<i>Boraginaceae</i> ( <i>incl. uncharred</i> )	••	•••	•••	••	••••	21
<i>Silene</i> sp.			•			1
<i>Caryophyllaceae indeterminate</i>					•	1
<i>Chenopodium</i> sp.				••		2
<i>Chenopodiaceae indeterminate</i>			•	•		2
<i>cf. Medicago</i> sp.		•		•		2
<i>Scorpiurus</i> sp.	•		•		•	3
<i>cf. Trigonella</i> sp.			•		•	2
<i>small-seeded Fabaceae indeterminate</i>			•••		••	7
<i>Fumaria</i> sp.				•	•	2
<i>Liliaceae indeterminate</i>				•	•	2
<i>Plantago</i> sp.		•••				4
<i>cf. Aegilops</i> sp.			•			1
<i>cf. Avena</i> sp.			•		•?	2?
<i>Phalaris</i> sp.					•	1
<i>Lolium</i> sp.		••	•••	•••	••	14
<i>large grass seed indeterminate</i>	•	••	•••	•••	••••	21
<i>small grass seed indeterminate</i>				•		1
wood charcoal	•••••	•••••	•••••	•••••	•••••	66
slag	••	•••	•••	••••	••••	35
<b>Key:</b>						
••••• = ubiquitous (found in >80% of samples sorted);						
•••• = abundant (50–80% of samples);						
••• = frequent (20–50% of samples);						
•• = occasional (<20% of samples);						
• = rare (found in only 1 sample)						

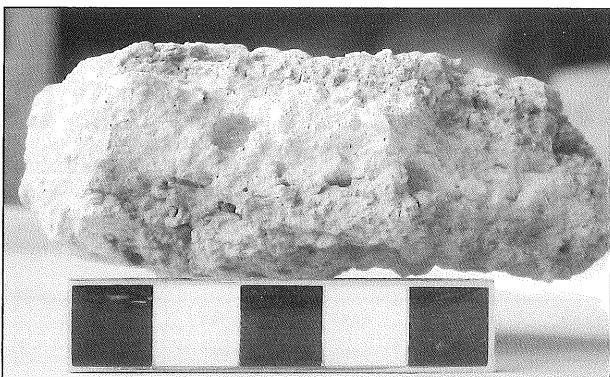
covered in 2004. One stone was found within a plaster surface in E3 1155, which also contained a few voids in the shape of olive stones (Fig. 14), suggesting that uncarbonised stones were present when the surface was laid. Olive was the most ubiquitous taxon identified: of the 67 samples with identifiable remains, 44 contained olive stone fragments. Some of these were large enough for radiocarbon dating<sup>26</sup>.

### Summary

Analysis of 76 flot samples, representing 1.2 cubic metres of sediment, has produced a small but interesting archaeobotanical assemblage. The staple food plants are emmer wheat, hulled barley, lentil and two or three other pulses, and olive. These were found in all excavation areas, and in a majority of contexts sampled. Fig seeds were found almost exclusively in Area D samples. Around 20 other taxa were identified, all of which are potentially weeds of the field crops (cereals and pulses). None of these was particularly common, however, and cereal chaff was also rare and fragmented. Eight olive stones were complete enough to measure, too few to draw any conclusion about the domestic status of the olive at this stage of the project.

### Conclusion

Despite the shallow deposits, the site of al-Khawārij clearly has much to contribute. In order to appreciate the full range of Chalcolithic occupation in the southern Levant it is necessary to investigate all ecozones. Excavation in this upland area poses certain difficulties, but can



14. Plaster floor 1155 from Area E with voids of olive stones (photograph courtesy of John Meadows).

produce extraordinary results. The site of al-Khawārij exhibits a late Chalcolithic material culture which most likely dates to the very transition to the Early Bronze Age. This has broad implications for our understanding of settlement shifts at the very end of the Chalcolithic and the relationship of the region with its neighbours (Lovell in press, *fc*).

### Bibliography

Amiran, R. and Porat, N.

1984 The Basalt Vessels of the Chalcolithic Period and Early Bronze Age. *Tel Aviv* 11: 11-19.

Banning, E., Blackham, M. and Lasby, D.

1998 Excavations at WZ 121, a Chalcolithic site at Tubna in the Wadi Ziglab. *ADAJ* 42: 141-159.

Barkai, R.

2002 Towards a Methodology of Neolithic and Chalcolithic Bifacial Tool Analysis. *Neo-Lithics* 1/02: 3-8.

Barkai, R. and Yerkes, R.W.

2004 Microwear Analysis of Flint Tools. Pp. 207ff in N. Scheftelowitz and R. Oren (eds.), *Givat Ha'oranim: A Chalcolithic Site Near Nahal Beit Arif*. Tel Aviv : Emery and Claire Yass Publications in Archaeology.

Bourke, S., Lovell, J., Sparks, R., Seaton, P., Mairs, L. and Meadows, J.

2000 Preliminary Report on a Second and Third Season of Renewed Excavations at Teleilat Ghassul by the University of Sydney, 1995/1997. *ADAJ* 44: 37-89.

Bourke, S.J, Seaton, P.L., Sparks, R.T., Lovell, J.L. and Mairs, L.D.

1995 Preliminary Report on a First Season of Renewed Excavation at Teleilat Ghassul by the University of Sydney, 1994. *ADAJ* 39: 31-63.

Burton, M.

2004 *Collapse, Continuity and Transformation: Tracking protohistoric social change through ceramic analysis*. Ann Arbor : UMI.

Braun, E.

1990 Basalt Bowls of the EBI Horizon in the southern Levant. *Paléorient* 16: 87-96.

2000 Area G at Afridar, Palmahim Quarry 3 and the Earliest Pottery of Early Bronze I: Part of the 'Missing Link'. Pp. 113-28 in G. Philip and D. Baird (eds.), *Ceramics and Change in the Early Bronze Age of the Southern Levant*. Sheffield: Sheffield Academic Press.

Cialowicz, K.M.

1987 *Les Têtes de Massues des Périodes Prédynastique et Archaique dans la Vallée du Nil*. Warazawa-

26. We thank the Australian Institute of Nuclear Science and Engineering (AINSE) for the provision of a grant

(AINGRA05104) for 10 radiocarbon dates. We look forward to reporting on the results of these samples.

- Krakow: Uniwersytet Jagielloński.
- Dollfus, G. and Kafafi, Z.  
1986 Preliminary Results of the First Season of the Joint Jordano-French Project at Abu Hamid. *ADAJ* 30: 353-379.
- 1993 Recent Researches at Abu Hamid. *ADAJ* 27: 241-255.
- Epstein, C.  
1998 *The Chalcolithic Culture of the Golan* Jerusalem: Israel Antiquities Authority.
- Fall, P.L., Falconer, S.E. and Lines, L.  
2002 Agricultural intensification and the Secondary Products Revolution along the Jordan Rift. *Human Ecology* 30/4: 445-82.
- Fischer, P.  
2002 Egyptian-Transjordanian Interaction during Predynastic and Protodynastic Times: The Evidence from Tell Abu al-Kharaz, Jordan Valley. Pp. 323-333 in E.C.M. van den Brink and T.E. Levy (eds.), *Egypt and the Levant: Interrelations from the 4<sup>th</sup> through the early 3<sup>rd</sup> Millennium BCE*. London: Leicester University Press.
- Gilead, I.  
1995 *Gar: A Chalcolithic Site in the Northern Negev*. Beer-Sheva VII, Studies by the Department of Bible and Ancient Near East. Ben Gurion University of the Negev Press.
- Hanbury-Tenison, J.  
1986 *The Late Chalcolithic to Early Bronze I Transition in Palestine and Transjordan*. Oxford: BAR Int. Ser. 311.
- Lee, J.  
1973 *Chalcolithic Ghassul: New Aspects and Master Typology*. Unpublished Doctoral Dissertation. Jerusalem: Hebrew University.
- Lovell, J.L.  
2002 Shifting Subsistence Patterns: Some ideas about the end of the Chalcolithic in the southern Levant. *Paléorient* 28/1: 89-102.
- in press The Wadi Rayyan Archaeological Project (WRAP): Investigating the Chalcolithic – Early Bronze Age transition. In H. Taher and S. Khouiri (eds.), *SHAJ* 9. Amman : Department of Antiquities.
- Forthcoming Horticulture, status and long-range trade in Chalcolithic southern Levant: early connections with Egypt. In B. Midant-Reynes and M.Y. Tristant (eds.), *Origins II: L’Egypt pré- et protodynastique. Les origines de l’Etat*. Leuven: Peeters, *Orientalia Lovaniensia Analecta*.
- Lovell, J.L., Richter, T., McLaren, P.B., McRae, I.K. and Abu Shmeis, A.I.  
2005 The First Preliminary Report of the Wadi Rayyan Archaeological Project: the survey of al-Khawarij. *ADAJ* 49: 189-200.
- Mabry, J.B.  
1992 *Alluvial Cycles and Early Agricultural Settlement Phases in the Jordan Valley*. unpub. doctoral dissertation, University of Arizona.
- Mallon, A., Koepfel, R. and Neuville, R.  
1934 *Teleilat Ghassul I*. Rome: Pontifical Biblical Institute.
- Milevski, I., Fabian, P. and Marder, O.  
n.d. Canaanite blades in Chalcolithic contexts of the Southern Levant? Paper presented at the “Culture, Chronology and the Chalcolithic: Transitions in the Late Prehistory of the Southern Levant” Workshop at 5<sup>th</sup> International Conference on the Archaeology of the Ancient Near East. Madrid 4<sup>th</sup> April, 2006.
- Miller, N. F.  
1984 The use of dung as fuel: an ethnographic example and an archaeological application. *Paléorient* 10/2: 71-9.
- Palumbo, G., Mabry, J and Kuijt, I.  
1990 The Wadi el-Yabis Survey: Report on the 1989 Field Season. *ADAJ* 34: 95-118.
- Perrot, J., Zori, N. and Reich, Y.  
1967 Neve Ur, un nouvel aspect du Ghassoulien. *IEJ* 17: 201-232.
- Philip G. and Williams-Thorpe O.  
2001 The Production and Consumption of Basalt Artifacts in the southern Levant during the 5<sup>th</sup>-4<sup>th</sup> Millennia B.C.: a geochemical and petrographic investigation. Pp. 11-30 in A. Millard (ed.), *Archaeological Sciences 1997: Proceedings of the Conference held at the University of Durham 2nd-4th September 1997*. Oxford: Archaeopress. BAR Int. Ser. 939.
- Rosen, S.  
1997 *Lithics after the Stone Age*. Walnut Creek: AltaMira.
- Roux, V. and Courty, M.-A.  
1997. Les bols élaborés au tour d'Abu Hamid: Rupture technique au 4<sup>e</sup> millénaire avant J.-C. dans le Levant-sud. *Paléorient* 23/1, 25-43.
- Rowan, Y.M. and Levy, T.E.  
1994. Proto-Canaanite Blades of the Chalcolithic Period. *Levant* 26:167-174.
- van den Brink, E.C.M., Horwitz, L.K., Khalaily, H., Liphshitz, N., Mienis, H.K. and Nagar, Y.  
2004 A Chalcolithic Dwelling and Burial Cave at Horvat Castra. *IEJ* 54: 129-153.
- Wright, K.  
1991 The origins and development of ground stone assemblages in late Pleistocene southwest Asia. *Paléorient* 17(1): 19-45.
- 1992 A classification system for ground stone tools from the prehistoric Levant. *Paléorient* 18(2): 53-81.