THE MOAB ARCHAEOLOGICAL RESOURCE SURVEY: SOME RESULTS FROM THE 2000 FIELD SEASON

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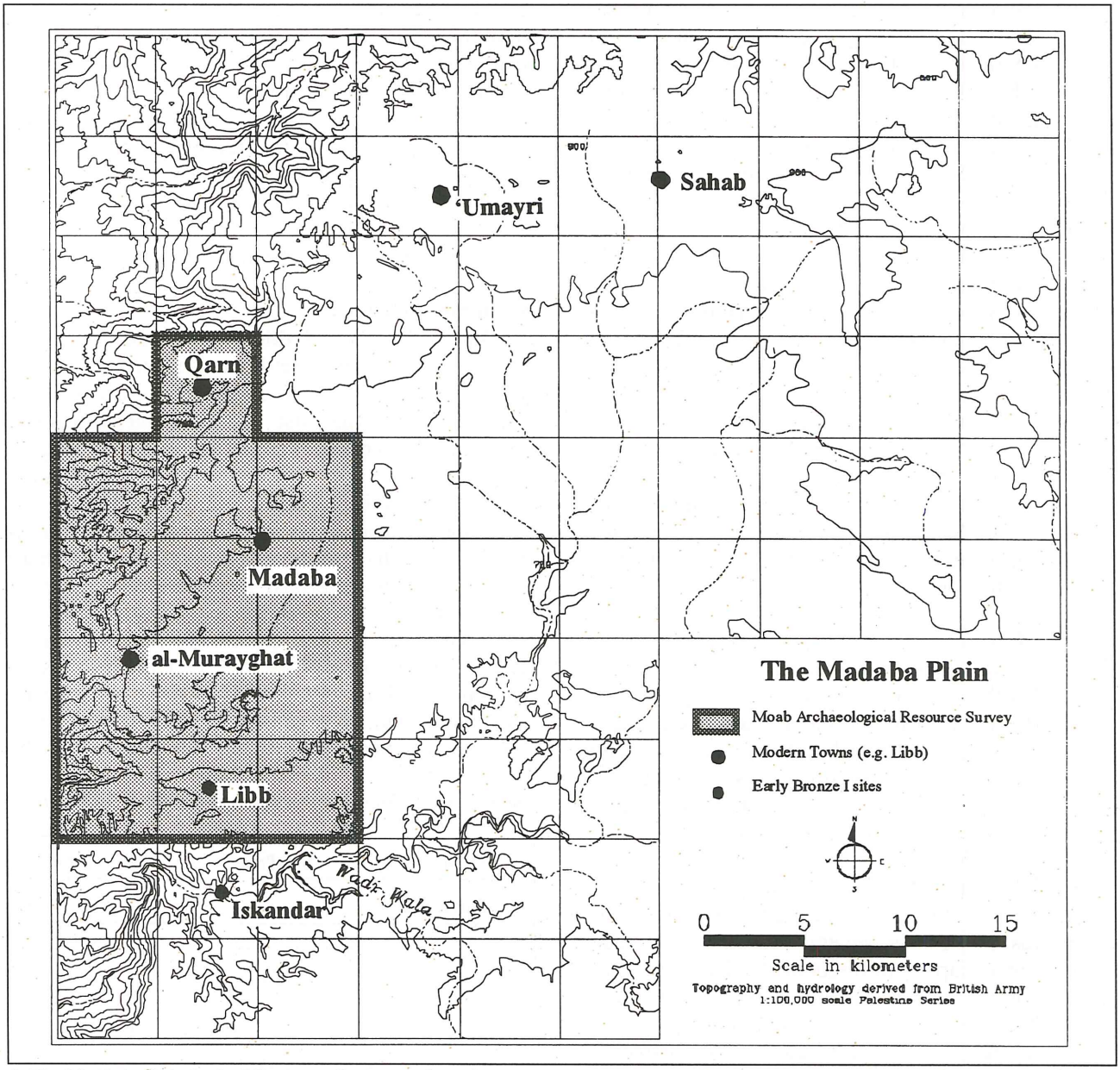
Introduction

The Moab Archaeological Resource Survey (MARS, see **Fig. 1**) finished its first full season in 2000. The aim of the project is to gather settlement, ceramic, lithic, faunal and botanical data from sites in an area that appears to have contained



1. The Moab Archaeological Resource Survey study area.

a single settlement cluster representing a large social unit in the Early Bronze Age (EBA, ca. 3500-2000 BC). These data will be used to test a model of early social organization based on heterarchy (see Crumley 1995), first by describing a single settlement cluster, and then comparing it to similar archaeological datasets from similar contexts (e.g. domestic/residential, administrative/public, etc.) at urban and rural-village sites in other site clusters. The project is part of a larger, ongoing research effort that is investigating the range of adaptive strategies and social institutions developed by human communities in the semi-arid highlands of central Jordan. Its unique contribution lies in its emphasis on individual settlement clusters as an appropriate comparative scale, and its emphasis on testing the heterarchy model of early social organization in a region characterized by shifting settlement systems and flexible adaptive responses to an unpredictable physical environment.

The field crew consisted of Savage, Tim Griffin, Dayle Elder, and our Department of Antiquities representative, Ms. Rheem Shgour. Elzbieta Dubis visited the site at al-Murayghāt, and assisted us with our survey of the dolmen field there. Preliminary ceramic analysis was begun by Mr. Rob Sauders, and lithic analysis was performed by Rollefson. Lithics are currently being drawn by Ms. Monique Blom and Mr. Sidney Rempel, and Ms Fiona Haughly drew some of the groundstone artifacts from the surface survey. We wish to gratefully acknowledge the assistance of the Department of Antiquities of Jordan, especially its Director, Dr. Fawwaz Al-Khraysheh and the Director of the Mādabā Office, Mr. Hazem Jazer. We also wish to thank Dr. Tim Harrison for his support and assistance in establishing the survey.

Project History

The MARS project was initiated in the summer of 1999 with a brief reconnaissance of several sites in the Mādabā region. Khirbat al-Qarn (خربة القرن) al-Murayghāt (المريغات), al-Mukhayyaṭ (المخيط), and Mā'īn (ماعين) were visited to assess their current condition, the logistics of conducting fieldwork on and around them, and to assemble small, diagnostic artifact collections. Following this initial examination, Khirbat al-Qarn and al-Murayghāt were chosen as the first sites to be thoroughly examined. Al-Qarn was chosen for several reasons: 1) it may have been occupied throughout the EBA, but not afterwards, 2) it possesses standing architecture that will allow rapid mapping and examination of site structure, 3) its location near the escarpment is transitional location between the Mādabā Plain and the Jordan Valley, 4) it dominates a later Roman road that possibly follows an EB track. Al-Murayghāt was chosen because: 1) it appeared to be mainly a ceremonial site, mainly devoid of residential architecture; 2) it was used in the Chalcolithic as a ceremonial site, and later in the EB as a burial ground, thus emphasizing its ritual importance to the regional settlement system for over two millennia.

In 2000, we conducted detailed mapping of surface features and 20 percent, random, stratified, non-aligned surface collections at each site. We collected over 7,000 sherds and more than 10,000 lithics from the two sites. We also began pedestrian survey of the region around the sites, recorded several additional features related to Byzantine agriculture near al-Qarn, and visited a large lithic scatter (MARS Site 0011) northwest of al-Murayghāt. Following a brief discussion of the settlement history of the region and the theoretical approach we have taken, this report describes results form the mapping and surface collection activity, and includes initial analysis of ceramics, and more detailed data on the lithic assemblages from al-Qarn, al-Murayghāt, and Site 0011.

Settlement History

During the EBA (**Table 1**), the southern Levant experienced a cyclical settlement pattern, characterized by the development and decline of urbanism in Cisjordan, and the first cycle of intensification-abatement in Transjordan. In the EBA the region recovered from what Tom Levy (1995) has called the "Chalcolithic Collapse", and experienced the development and apparent collapse of social complexity, at what some researchers (e.g. Richard 1987) have characterized as a "chiefdom" level. The EB I in the southern Levant was characterized by relatively dispersed, unwalled communities (Joffe 1993; Gophna 1995: 273). During the subsequent EB II and III periods populations became more nucleated, as signaled by the advent of fortified towns atop mounded *tall* sites throughout the

Table 1: *Early Bronze Age settlement history in the southern Levant.*

Period	Sub-Period	Dates
Early Bronze Age		ca. 3500-2000 BC.
	Early Bronze I (EB I)	ca. 3500-3200 BC.
	Early Bronze II (EB II)	ca. 3200-2800 BC.
	Early Bronze III (EB III)	ca. 2800-2200 BC.
	Early Bronze IV (EB IV)	ca. 2200-2000 BC.

region (Richard 1987). Rituals, as indicated by the "High Place" at Megiddo, had become highly elaborate and centralized, functioning as integrative mechanisms to tie "tribal" units into larger political configurations. By the end of EB III these towns had been abandoned wholesale, and settlement shifted to farming hamlets and seasonal herding encampments during EB IV. Pottery evidence, in the form of localized "Ceramic Families" in various regions of the Negev, suggests that urban society may have fragmented along its natural fracture planes — the old "tribal" configurations. Significantly, though, formal cemeteries appear near the sites of the old, abandoned towns in EB IV, perhaps signaling a continued land claim by the descendants of the towns' former inhabitants. Most archaeological interpretations of EB IV emphasize a shift from settled farming to non-sedentary pastoralism during this interlude of two to three centuries (Dever 1987).

Theoretical Framework

The cyclical nature of Bronze Age settlement in the southern Levant has been explained through a number of theoretical constructs that contribute to our understanding of the problem of settlement and society in the central Jordanian EBA. Three approaches merit close consideration: 1) the urban development/collapse model; 2) cycles of intensification and abatement; and 3) heterarchy/ hierarchy.

Urban Development - Collapse: Although much has been written about urbanization and subsequent collapse of the EBA in the southern Levant, and numerous sites excavated, very little has been done to examine the functional relationships that developed between sites. Most have viewed the urbanism of the south Levantine EBA as structurally equivalent to that found elsewhere in the Near East (see Amiran 1970a; Richard 1987; and the papers in Miroschedji 1989); it only occurred later, and on a reduced scale. Urbanism as experienced in the southern Levant was seen simply as a secondary, derivative expression of the earlier and larger scale manifestations of social complexity documented in southern Mesopotamia and Egypt. Thus, south Levantine settlement systems were seen as being dominated by a few, almost continuously occupied, walled cities located in regions of relatively abundant rainfall and stable environments. Not surprisingly, these places turned out to be the ones where most archaeological efforts had been expended, sites such as Megiddo, Gezer, and Hazor.

Rather than looking only at the larger, "urban" centers, some archaeologists are now beginning to examine whole settlement systems. Methods of settlement pattern analysis, including site distribution maps, Theissen polygons, cluster analysis and measurements of "system integration" and centrality have been brought to bear on large regions (Broshi and Gophna 1984; Bunimovitz 1995; Gophna and Portugali 1988; Na`aman 1988; Esse 1991; Finkelstein and Gophna 1993; Joffe 1993; Portugali and Gophna 1993). And Falconer (1987) has defined "urban" on the basis of whether a site's population was dependent on food products from outside its catchment area, thus forcing us to consider a rural component. Falconer (1994a; 1994b) and Falconer and Savage (1995) have stressed that the rural component of a settlement system may be more stable, and contribute more to the shape of a settlement system then the so-called "urban" component. Conceived in this way, integration, not scale, becomes the key index for measuring the level of urbanization (and centralization) achieved in a region.

Intensification - Abatement: Dissatisfaction with models that stressed only the urban component of a settlement system, and the appreciation that many human activities have been determined primarily by how people obtain food, led archaeologists in the 1960s and 1970s to formulate an approach based on system-wide fluctuations in food producing strategies, their energy requirements and consequences (Adams 1978). The overall energy input to the food system either intensifies or abates through time, results that are reflected in cycles between processes of sedenterization and nomadization in the central highlands of Jordan. "Sedenterization deals with the gradual establishment of farmsteads, villages, and towns whose inhabitants engage in the production of crops" (Geraty *et al.* 1989: 5). Nomadization emphasizes a shift toward pastoralism, accompanied by a decline in sedentary food production (often marked as a decline in the number or size of sites). Thus, Geraty *et al.* suggest that "the repeated cycles of intensification and abatement reflected in the long-term patterns of the Madaba Plain are accounted for by the varying rates at which sedenterization and nomadization have occurred" (1989: 5-6). Excavations of sites such as Tall Ḥisbān (تل حسبان), Tall al 'Umayrī (تل العميري), and Tall Jālūl (تل جالول), and a number of systematic site surveys in the northern part of the Mādabā Plain and the southern 'Ammān foothills (e.g. Ibach 1978; 1987; Cole 1989; Boling 1989; LaBianca 1989; 1991; Younker 1991a; 1991b;

Christopherson 1991) have identified five cycles of intensification-abatement (Geraty *et al.* 1989: 6). Of these, the first, EBA, cycle is perhaps the most interesting, since it established settlement patterns and social responses that continue to resonate in modern Jordan.

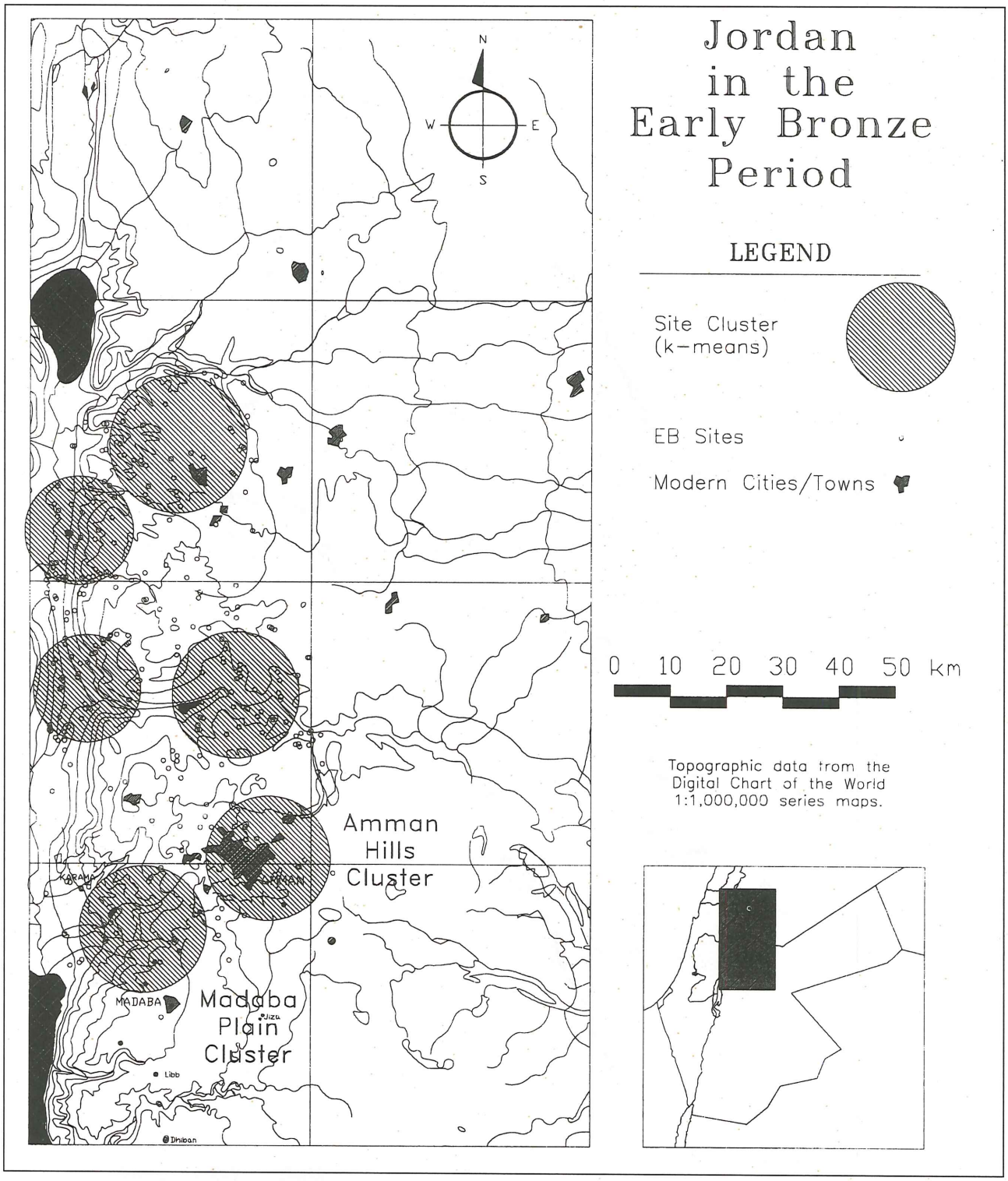
Shifts between intensification and abatement provide a dynamic framework for the examination of the human use of the Mādabā Plain through time, without resorting to notions of urban development and collapse or the inherent problems of defining *urban vs. rural* that have bedeviled earlier approaches. Beyond presenting a theoretical construct that helps explain changes in the archaeological record over several millennia and recording the dramatic difference between the Mādabā Plain region of central Jordan and the rest of the southern Levant, this framework emphasizes the necessity of adopting a larger view of the past than that which has been restricted to examination of individual sites. A weakness of the intensification/abatement model, however, is its relatively undeveloped notion of human social systems. Although the model captures the ebb and flow of human settlement across the Mādabā Plains, it does not directly inform shifts in human social adaptation. However, its insights may be subsumed under the heterarchy approach.

Heterarchy and Hierarchy: A heterarchy embraces a series of related elements in a system that are unranked with respect to one another, or they are equivalently ranked, or they possess "the potential for being ranked in a number of different ways" (Crumley 1995: 3). Sites of equal size might be important for different reasons, while sites of unequal size do not necessarily maintain the same rank-order with respect to variables other than size. Instead, a heterarchically arranged society possesses "a maze of boundaries — social, linguistic, topographic, climatic, administrative, commercial — that do not necessarily *nest* but often crosscut one another" (Crumley 1995: 2). Furthermore, Crumley stresses that the relationship between heterarchy and hierarchy is flexible, both spatially and temporally, because government heterarchies can, over time, develop into hierarchies, or vice-versa, without invoking explanations based on collapse. Crumley notes that "Heterarchical relationships among elements at one spatial scale or in one dimension...may be hierarchical at another" (1995: 4).

The heterarchy-hierarchy approach explains how shifts from intensification to abatement and back may have affected socio-political structures and settlement patterns over time. While the intensification-abatement model explains shifts in the food system and settlement *pattern*, the heterarchy model addresses shifts in the underlying settlement *system*. Rogers (1995: 15) observed that hierarchy, which she interprets as a special case of heterarchy, is generated when there is a conflation of group identity with place. Thus, in periods of intensification, there may be pressure toward hierarchy; in periods of abatement, towards heterarchy. Furthermore, Janet Levy (1995: 48) suggested that the heterarchy model helps explain the cyclical characteristics of settlements, where centers of influence shift from one location to another, and the degree of centralization fluctuates through time. Thus, the heterarchy model predicts the formation and collapse of a variety of centers and social orders (that is, the social system), in which the intensification-abatement model functions as an effective measure of settlement pattern.

The southern Levant is an excellent place to test these ideas. Analysis of survey data from the Mādabā Plain region has revealed a striking pattern of low-level integration and autonomous development (Harrison 1995a; 1997) that seems consistent with the predictions of the heterarchy model. EBA communities consistently favored adaptive strategies that permitted flexibility and autonomy over those that emphasized maximum productivity. Even at the height of development in EB II-III, the basic organizational and productive unit remained the household (Harrison 1995a: 227-229), and a pattern of rural, not urban, complexity (cf. Schwartz and Falconer 1994) emerged. Communities appear to have remained self-sustaining and socio-politically autonomous, while engaging in varying levels of specialized economic production.

Social organization in the southern Levantine EBA had not yet reached the "state" level, yet developing urbanism in the region suggests a level of social organization in which nascent urban centers and their rural neighbors became associated in smaller polities (see Falconer 1994a; 1994b; Falconer and Savage 1995; 2001; Savage and Falconer in prep.). Spatially, these social units probably comprised clusters of sites, where a larger (but not necessarily "urban") center was surrounded by smaller communities; they are therefore recoverable through cluster analysis of site location. K-means analysis of EBA site locations suggests that six site groups existed in the Central Highlands of Jordan during this time. Of these, the Mādabā Plains Cluster (**Fig. 2**) is the subject of the current project. Some results of the 2000 field season at Khirbat al-Qarn, al-Murayghāt, and MARS Site

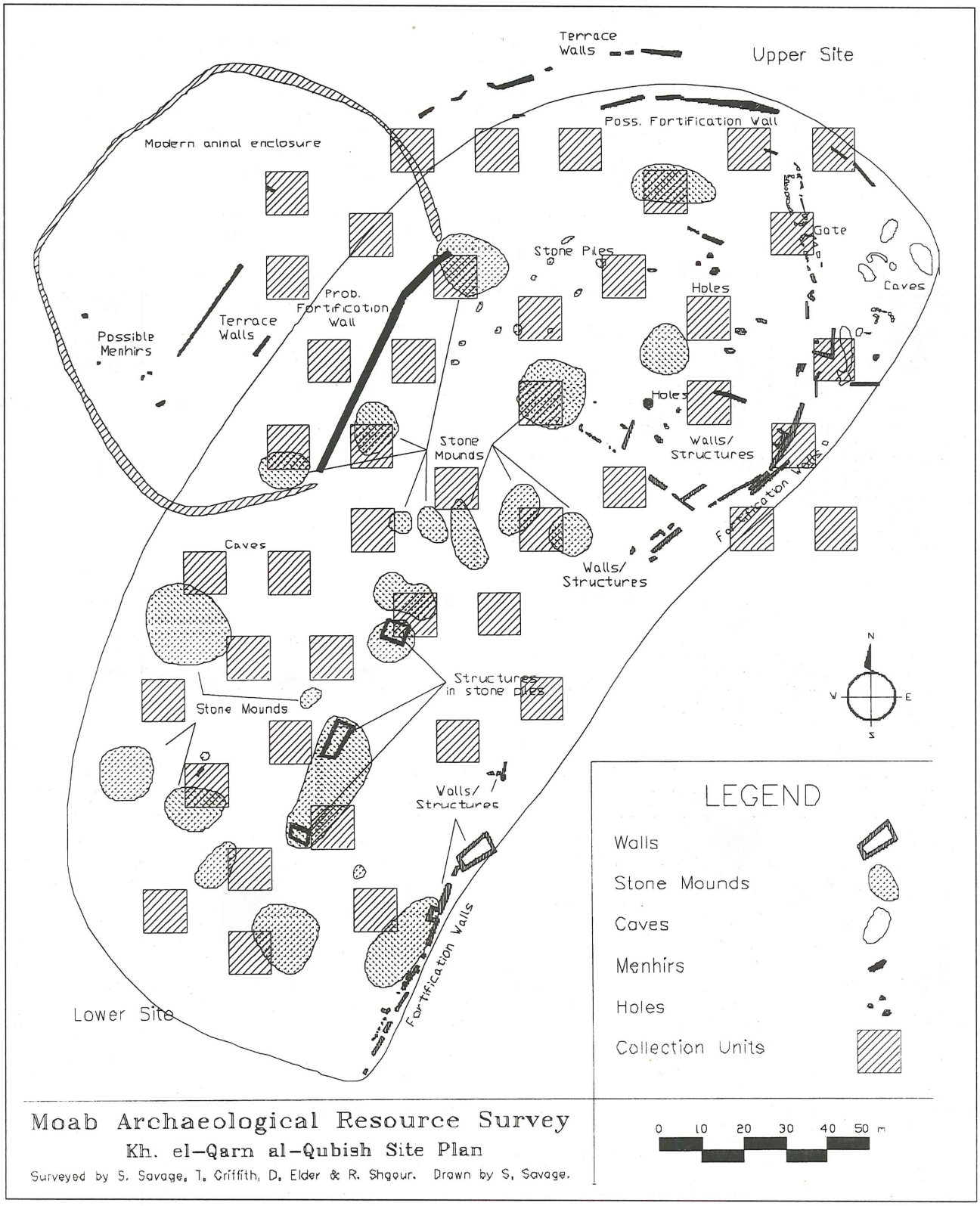


2. Early Bronze Age site clusters in the Central Highlands of Jordan.

0011 are summarized below.

Khirbat al-Qarn (خربة القرن)

Also known as Khirbat al-Kabsh (خربة الكبش), or Khirbat Qarn al-Kabsh (خربة قرن الكبش), al-Qarn is a small (ca. 1.7ha.) site off the western edge of the Mādabā Plain, northwest of Mādabā and southwest of Ḥisbān, at the top of a natural hill. The settlement site consists of an upper site, or acropolis, on the north end, and a lower site about 5-8 meters below the acropolis, on the southwest (**Fig. 3**). The upper site is relatively flat, but breaks into two ter-



3. Site plan and surface collection units at Khirbat al-Qarn.

races, each about 2 to 3 meters high, along the north end. Several terraces also mark the transition between the upper and lower site. Less flat than the acropolis, the lower site is smaller, steeper, and subjected to greater damage from erosion. The south slope, and parts of the east slope of the site

have been eroded down to bedrock, but extensive midden deposits are still present on the north and west slopes of the hill. Never before mapped surface features at al-Qarn include fortifications, a town gate with possible flanking towers, a number of caves located on the east and south slopes of the hill, and a number of large, transported stones on the northwestern slope that might be menhirs (Palumbo 1998: 103-104). There are numerous large stone mounds on the site, which careful examination shows to be the remains of structures. Some of the mounds are more than two meters high, and the tops of walls can be discerned just below the layer of rocks on the surface.

The 2000 survey shows that Kh. al-Qarn is a complicated, well preserved site that dates primarily to the Early Bronze III period. In addition, there is a smaller EB I component, and a Roman/Byzantine presence, probably related to the agricultural activities on the slopes east of the site. On the eastern slopes of the hill, Ottoman and Ayyubid/Mamluk sherds are occasionally found; they do not appear to represent an occupation of the site. The site is frequently visited by pastoral nomads, who graze their flocks of sheep and goats on the hill. A large, fairly modern animal enclosure has been constructed on the west slope of the hill, probably using the remains of an extant fortification wall.

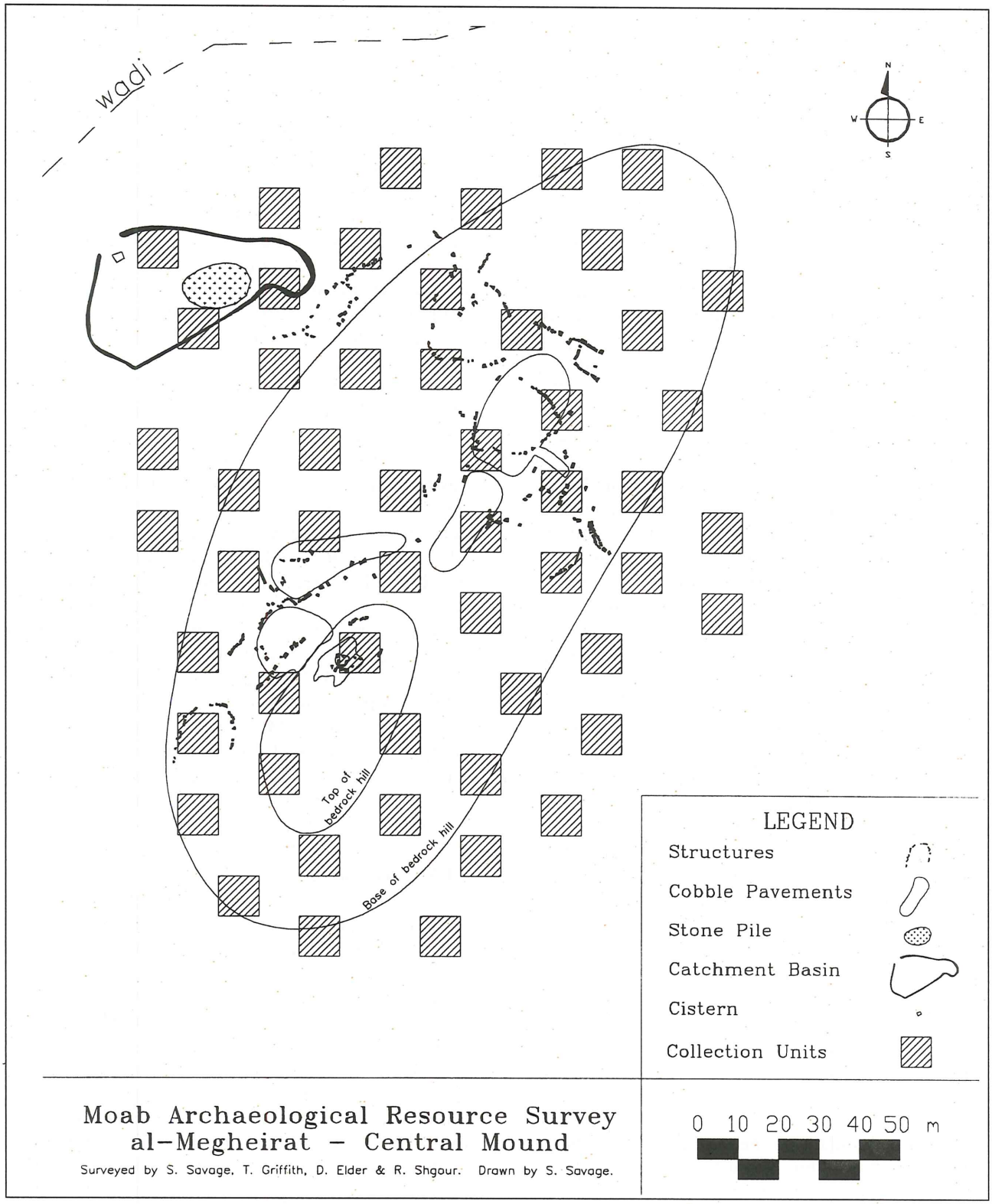
The site has been visited or discussed by a number of researchers in the past (e.g. Conder 1889: 171-172; Musil 1907: 344; Glueck 1935: 111, site 240; Ibach 1987: 12, site 19; Palumbo 1998). Ibach and Glueck found numerous EB III sherds on the surface. The EB III presence is important for Jordan as a whole, because only about 50 settlement sites from this period are known.

Al-Qarn seems to have been founded during the EB I period, and reached its zenith in the EB III. By that time, an extensive fortification system had been constructed around at least three sides of the hill (probably excluding the very steep south side), and a gate complex dominated the northeastern approach to the site, where the natural hill is connected by a "saddle" of land to the rest of the Mādabā Plain. The evidence of the EB I occupation is not abundant on the surface — less than 10 percent of the pottery from the surface collection could be assigned firmly to the early period. Most of the ceramic assemblage comes from the EB III period. A number of sherds were assigned to the EB II/III period, but given the preponderance of EB III material at the surface, it seems likely that the EB II/III sherds belong with the EB III material. However, they may represent an EB II occupation of the site. The surface collection failed to find any material that could be assigned to the EB IV. At the time of its founding in EB I, there may have been only a small settlement population, perhaps occupying the caves. But evidence of EB I occupation may be found in several meters of intact deposits on top of the *tall*, and on the northern and western sides. Excavation is therefore required to answer this question. By EB III, a substantial number of large, stone buildings occupied the upper and lower site. These are preserved under the stone mounds on the hilltop, and excavation can reveal their shape and function; it is quite likely that there are preserved floor and room-fill deposits inside the structures.

We will begin test excavations at Khirbat al-Qarn in 2001, in order to help illuminate the little-understood Early Bronze III period, and document the nature of social organization in the EB site cluster that occupies the Mādabā Plain. Excavations will proceed in the gate structure and in midden deposits on the western slope. At al-Qarn, the EB I phase is less well represented on the surface, but the midden deposits offer a good chance to recover the remains required to test the heterarchy concept even in the earlier period. These materials can be compared directly to those from the 1996 excavations in Field A at Mādabā (Harrison *et al.* 2000; Harrison and Savage 2001) and with those recovered from al-Murayghāt. Furthermore, by comparing materials from al-Qarn to al-'Umayrī, it will be possible to study the relationship of village sites in two different site clusters (probably representing two social units).

Al-Murayghāt (المريغات)

A large, ceremonial site consisting of a series of circles and rectangles of standing stones with cobblestone floors (**Fig. 4**), an extensive menhir and dolmen field, and a sherd/lithic scatter, al-Murayghāt stretches across approximately 25 hectares. The site is located southwest of Mā'īn, south a large gravel quarry, whose operation is currently destroying the hills upon which the dolmen field is located. The dolmen field is concentrated mostly on hills to the west, but there are also dolmens on the hills to the south and north. The ceremonial center of the site occupies a low, denuded hill, with very little soil between bedrock terraces. However, the larger site is spread across an area that is currently planted in barley, which indicates some soil depth. Other, unplanted areas near the road from Mā'īn revealed approximately 1.5 meters of gray, midden-like soil, containing numerous artifacts. The site was visited by Conder (1889: 187-189),



4. Site plan and collection units at al-Murayghāt.

Glueck (Site 82, 1934: 33; 1939: 137), de Vaux, Mallon (Mallon *et al.* 1934), and Harrison (1997). Early accounts usually mentioned the site in passing, but Mallon collected a number of Chalcolithic sherds (Mallon *et al.* 1934: 155, pl. 63:4-9); Glueck (1939: 137-138) mentions that de Vaux had collected "a large number of EB IV-MB I sherds" and Harrison (1997: 29) reported that Chalcolithic

sherds were dominant, with a possible Early Bronze presence.

The low, bedrock hill that dominates the site was the focus of our research effort in 2000. There are several structures on the hill, comprised of outlines of megalithic rocks (probably columns or column bases), with cobblestone floors laid directly on bedrock. Some of the standing stones are more than two meters high. The standing stones form a series of structures; at least eleven can be discerned. There were probably others, but the area on the west side of the central hill that lies between the modern catchment basin and the discernible structures has been cleared for tents. At the highest part of the central hill, there is evidence of two concentric circles that may form a central "shrine", with a cobble pavement. These stones have fallen, but it is clear that they once supported a small circular building. The outer ring of stones is approximately 8-10 meters in diameter, and the inner ring about 4 meters across.

There are about 75 dolmens in the area around al-Murayghāt, which underscores the ceremonial importance of the place. Most of the dolmens are located on the slope of the hill immediately to the west of the central hill, across a small wadi. There are very few artifacts associated with the dolmens we have investigated to date. Ceramics are especially rare. Lithic material in their vicinity tends to be non-diagnostic, though there seems to be a large chert cobble/core associated with many of the dolmens. The lack of diagnostic artifacts renders estimating their age problematic. Based on the ceramic evidence from the rest of the site, an EB I date is likely, though other researchers (mentioned above) have reported EB IV material from al-Murayghāt, so a later date cannot be ruled out. The presence of so many dolmens in association with the probable ritual function of the central precinct at al-Murayghāt point to its primacy as a ceremonial center during the EB I period. No other known site in the region has this combination of features in EB I, which provides further evidence of heterarchical social organization.

Preliminary Ceramic Analysis

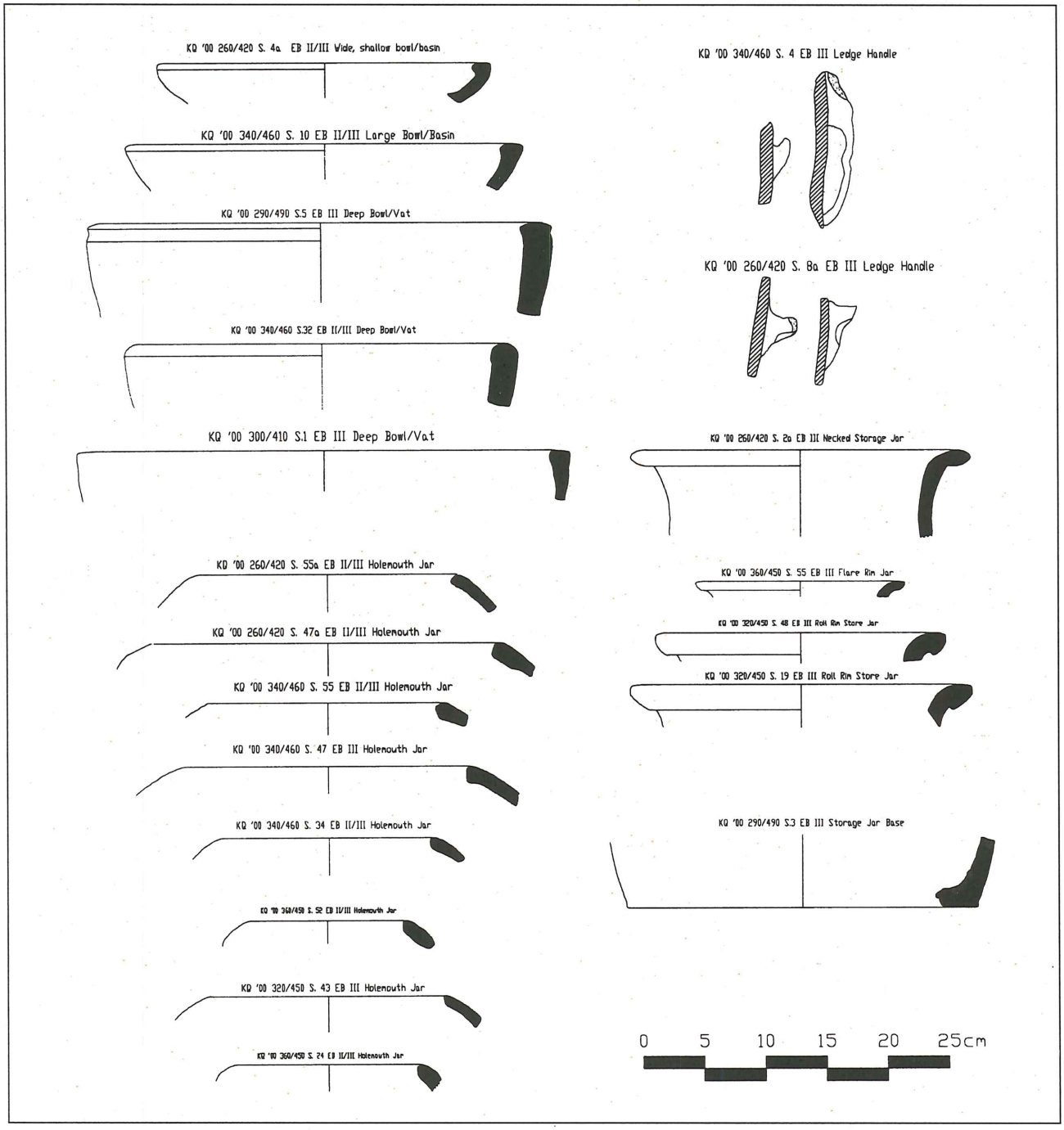
Analysis of ceramics from the 2000 season was begun in the field by Rob Sauders, Savage, and Tim Harrison. Since detailed analysis of these materials has not yet been completed, the results included below are preliminary, and reflect work done during the field operation.

Ceramics from al-Qarn: Several thousand sherds were retrieved from ten-meter surface collection units (**Fig. 3**). The assemblage (**Fig. 5**) is noteworthy for several reasons. First, it is dominated by EB III forms, indicating the period of the site's greatest use. Since there are very few stratified EB III sites in Jordan, the importance of the site for our understanding of the first "urban" period (EB II/III) in Jordan is clear. Second, the assemblage contains a large number of store jar forms, including large holemouth jars, necked jars, and body sherds more than two centimeters thick. There is, therefore, a significant storage function associated with the site. Storage vessels such as those indicated here are not nearly as frequent at other EB III sites (such as al-'Umayrī, see Harrison 1995b; 1997). Combined with the fortification system, large storage containers suggest the existence of a guarded, centralized facility that points out the importance of al-Qarn during the EB III. Mādabā, though arguably the largest site in the cluster during the late EB I and early EB II period, may not have been occupied during the EB III; Harrison (1997) found some EB III pottery on the *tall*, but the recent excavations there have not revealed any EB III strata (Harrison *et al.* 2000). If there was no settlement at Mādabā in EB III the role of al-Qarn in the regional settlement system becomes even more important at this time.

Another important aspect of the ceramic assemblage at al-Qarn is the presence of a large number of sherds with a white coating, probably made of lime. On most pieces, the coating is from .5 to 1.0mm thick, but on others it is so thin that it resembles a sort of whitewash. The significance of the coating is not known at this time, but it has been speculated (Tim Harrison, personal communication) that it may be associated with the production and exchange of olive oil. Al-Qarn's location, on the edge of the escarpment, is an ideal one for olive growing; many modern farms have olive trees planted in small soil pockets in the limestone bedrock.

Ceramics from al-Murayghāt: As noted above, previous visits to al-Murayghāt by a number of archaeologists have resulted in the identification of several different ceramic components. These have included the Chalcolithic, EB I, EB III and EB IV periods. The controlled surface collection recovered ceramics from the EB, EB I, EB II/III(?), Roman/Byzantine, Ottoman, and Modern periods.

The EB I period clearly dominates the ceramic assemblage (**Fig. 6**). Most of the diagnostic pieces are from bowls/platters or jars. Bowl types include wide, shallow basin forms and small serving bowls of simple profile, and deeper forms with a more

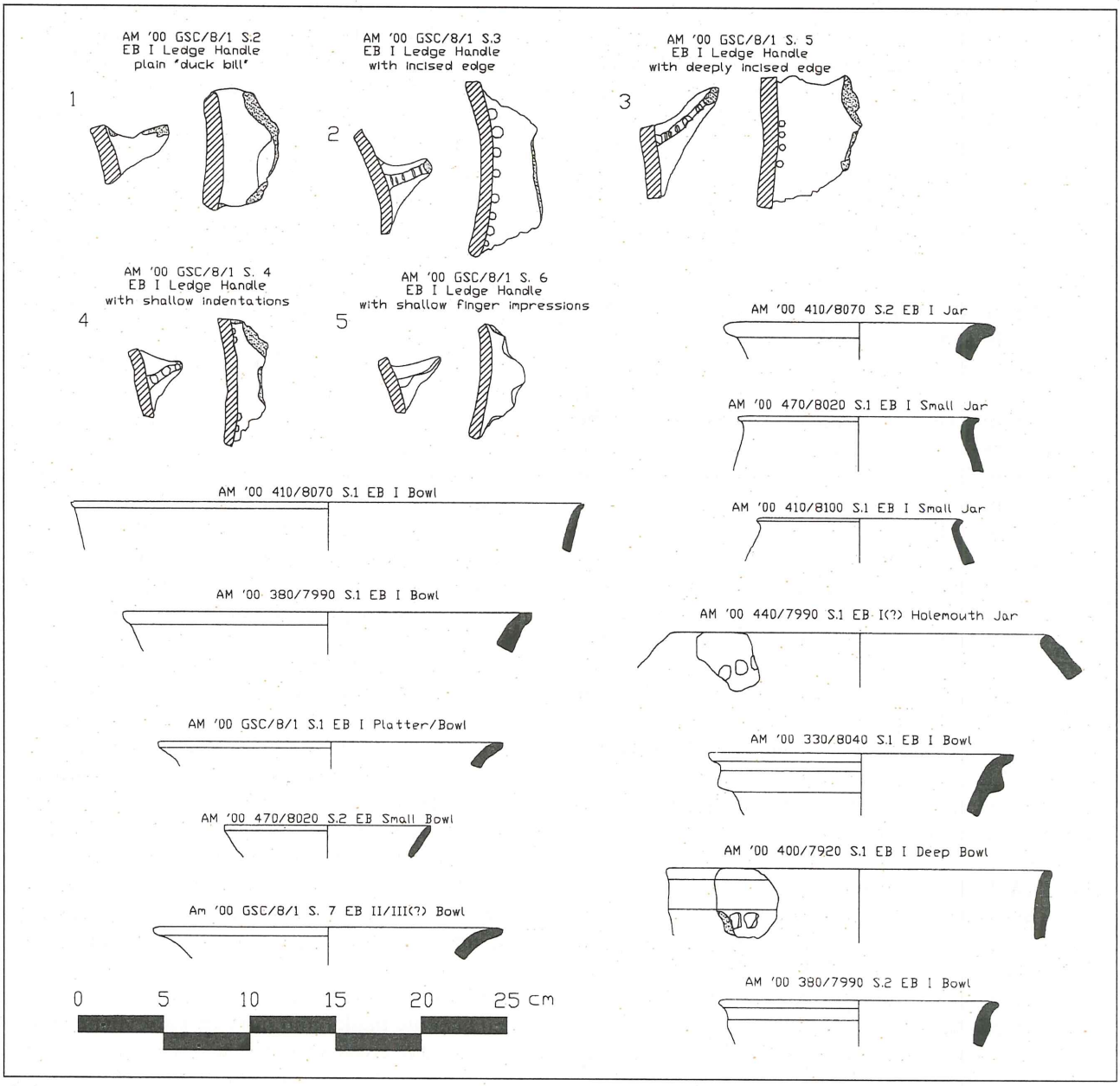


5. Ceramics from the 2000 season at al-Qarn.

complicated rim profile; some of these have finger or stick impressions below the rim. Diameters run from about 15cm to about 30cm for the EB I types. A single sherd from a bowl with a slightly outcurving rim may date to the EB II/III period.

Jars include typical holemouth forms, some with finger impressions above the shoulder (**Fig. 6**); these tend to have openings in the 25cm range, which implies a relatively large jar. Other jar forms include smaller, restricted forms with slightly outcurving rims in the 15-20cm diameter range, and rolled rim storage jars.

Ledge handled jars are well represented. According to Amiran (1970b: 35-40) the plain type (also called "Duck-billed") is most characteristic of the EB I period. Duck-billed forms are well-represented at al-Murayghāt (**Fig. 6:1-4**). Interestingly, there are several additional treatments on this form that might suggest a developmental sequence during the EB I period. **Fig. 6:1** illustrates a



6. Ceramics from the 2000 season at al-Murayghāt.

plain duck bill form. **Fig. 6:2** is also duck-billed in shape, but the edge of the handle has been incised with a series of shallow grooves, and the top has finger-pinch marks where it was molded to the rest of the jar. The handle illustrated in **Fig. 6:3** is also of duck bill shape, with incised marks around the edge that are deeper and more pronounced than those from **Fig. 6:2.** Small finger pinch marks are also visible on the top, near the body of the jar. In **Fig. 6:4,** the edge of the duck-billed handle is decorated with shallow impressions, possibly made with a finger, but more likely with a small stick; as with numbers 6:2 and 6:3, there are small finger pinch marks near the vessel wall. The handle illustrated in **Fig. 6:5** may represent a very late EB I form, as the finger or thumb-indented form is more typical of EB II. Amiran lumps all the incised and indented varieties into one type, her Type 2, the thumb indented type, which she clearly implies dates to the EB II period; however, the incised and stick-impressed forms seem more closely related to the plain form than to the finger-impressed type, so an EB I date is likely.

The differences between the ceramic assemblages from al-Murayghāt and Khirbat al-Qarn are striking. Al-Murayghāt is dominated by small jars and bowls, with the occasional storage vessel, and "lime coated" sherds seem entirely lacking. At

al-Qarn, a significant proportion of the overall assemblage is from large storage jars, and there are numerous examples of lime-coated sherds. These differences probably reflect both temporal and functional differences between the sites. EB I al-Murayghāt seems to have been an unwalled ceremonial and agricultural center, with a probable residential component, and the economy seems to have been devoted more to lithic production, animal husbandry, and cereal agriculture. Al-Qarn, at least the EB III component of it, was a heavily fortified settlement that guarded one of the entrances to the Mādabā Plain, which seems to have functioned as a storage depot as well. Temporally, these difference might reflect a trend toward the concentration of populations in walled communities in EB II and III, and an associated shift from heterarchical to hierarchical social forms (perhaps as "chiefdoms" developed out of earlier "tribal" configurations). The lime coated ceramics may be associated with olive production, which is well suited to the escarpment where the site is located, but not as well matched to the region in the vicinity of al-Murayghāt (until one descends into the Zarqā' Mā'īn زرقاء ماعين). We do not know as much about the EB I component at al-Qarn, but test excavations there in the midden deposits and structures should help fill this gap. At that point, it will be interesting to see if the differences persist in the ceramic assemblages.

The MARS Lithic Samples

Three samples of very different sizes were analyzed from the surface survey: Khirbat al-Qarn, al-Murayghāt, and MARS Site 0011. The collection methods differed. At al-Qarn and al-Murayghāt, ten-meter collection units were established with a random, stratified, non-aligned sampling procedure. At Site 0011, we visited the site briefly one morning, and the lithics were collected during a random walk around the site. The lithic collections from al-Qarn and al-Murayghāt were divided in the field lab into tools and general debitage, and the tools were analyzed by Rollefson for this report. The general debitage awaits analysis in our field lab. By contrast, the entire grab sample from Site 0011 was analyzed.

Except for a single Middle Paleolithic Levallois flake, the al-Qarn collection (n=196) was entirely comprised of "Chalco/EB" (probably all Early Bronze) chipped stone artifacts. The larger al-Murayghāt sample (n=683) was temporally more diverse, including a Middle Paleolithic Levallois blade, a Middle/Upper Paleolithic double side-scraper on a blade, one Upper/Epipaleolithic side-scraper-plus-burin on a blade, two Epipaleolithic bladelet cores, a PPNB naviform blade, and a probable Pottery Neolithic truncation burin. Five artifacts could not be dated confidently, and the remainder of the sample (n=671) appears to be Chalco/EB.

The Site 0011 sample was smaller (n=47) but included a broad range of periods: one Late Acheulian cleaver on a flake, a Lower/Middle Paleolithic (L/MP) Levallois blade core, a single L/MP disc core, one L/MP Levallois blade, and a single Middle/Upper Paleolithic blade core. The remainder of the sample included 37 Chalco/EB chipped stone artifacts.

Debitage: **Table 2** provides a summary of the Chalco/EB debitage types in the three samples. Blades are defined on the basis of technique and do not reflect any particular ratio of length to width. In other words, it is possible to have short, squat blades under this definition. Ordinary blades refer to pieces with parallel edges and parallel ridges that usually have little other preparation to the core; striking platforms are usually broad, thick, and steeply angled. Canaanean blades come from specially prepared blade cores, and they typically have a trapezoidal cross section and bear considerable preparation on the platform (e.g. Shimelmitz *et al.* 2000), which is often missing due to shattering at detachment. It is generally held that Canaanean blades are the products of specialists (Rosen 1997: 107), and that they might represent imports into small settlements where full-time specialists could not be supported. Naviform blades (only one possible example was encountered in the samples, although it is included in the "indeterminate blade" category in **Table 2**) often have trapezoidal cross-sections, and they usually have very small punctiform platforms. Indeterminate blades refer to those pieces that are fragmentary

Table 2: *Debitage types from the al-Qarn (KQ), al-Murayghāt (AM), and MARS Site 0011 (S11) samples.*

	KQ		AM		S11	
Debitage	**n**	**%**	**n**	**%**	**n**	**%**
Ordinary blade	32	16.4%	178	26.5%	11	29.7%
Canaanean blade	16	8.2%	16	2.4%		
Indeterminate blade	21	10.8%	20	3.0%	1	2.7%
Bladelet			2	0.3%	1	2.7%
Flake	100	51.3%	395	58.9%	20	54.1%
Core Trimming Element			3	0.4%		
Burin spall	1	0.5%	1	0.1%		
Microflake	10	5.1%	12	1.8%	2	5.4%
Debris	8	4.1%	9	1.3%	2	5.4%
Core	5	2.6%	27	4.0%		
Chunk			1	0.1%		
Unclassifiable	2	1.0%	7	1.0%		
Total	195	100.0%	671	100.0%	37	100.0%

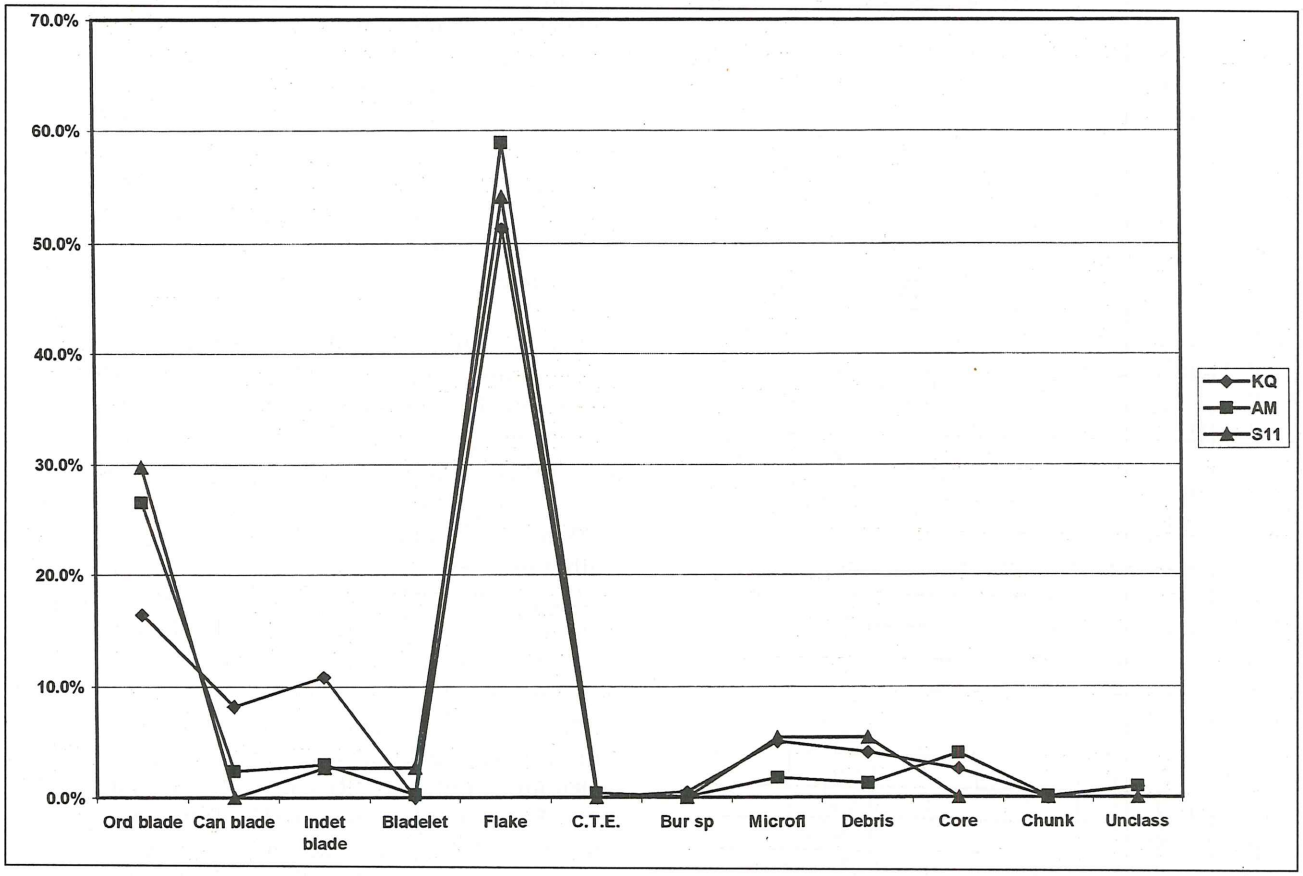
and do not bear distinctive features.

Core trimming elements (C.T.E.) are flakes that result from correcting or managing core faces and platforms. Microflakes are complete (or nearly so) chips with a maximum dimension smaller than 25mm; often they are flakes produced when regularizing cores, when retouching tools, or that result spontaneously when larger flakes or blades are detached from a core.

The numbers in **Table 2** are dramatically displayed in **Fig. 7**, which shows nearly congruent patterns for the distribution of debitage types for all three Chalco/EB samples. This is strong evidence that none of the sites reflects the presence of a high degree of specialization in production, and that all three samples probably represent a relatively narrow time period during the Chalco/EB temporal range. Essentially, the debitage in the collections indicate that flakes were the principal product of lithic manufacture, although blades were by no means a negligible part of the process. One point of interest is the relatively high proportion of Canaanean blades at al-Qarn, where they are almost four times as important as at al-Murayghāt. Part of the distinction may have to do with a greater presence of sickles and knives at al-Qarn (see below).

In view of the very small subsamples from periods earlier than the Chalco/EB periods, no discussion of the debitage is warranted.

Tools: The absolute and relative frequencies of Chalco/EB tool and core classes are provided in **Table 3**. Before looking at the distribution, it would be useful to mention some of the aspects of the classes. The first thing to consider is that all three samples are surface collections, and almost all of the artifacts have been exposed to potential damage for more than 4,000 years. Traffic by sheep, goats, humans, and (in the past century) vehicles are all possible agents of alterations to the edges of flakes and blades that may not have been modified intentionally by the flintknapper. Thin edges, especially, might take on the appearance of "tools" even though they were possibly discarded on the spot as being useless, and the small size of many of the pieces indicates an improbable status as a tool. Nevertheless, persistent traffic can very easily produce results that are difficult to distinguish from actual use-wear and real retouch, and this is particularly the case for retouched flakes and blades, utilized pieces, notches and denticulates,



7. Comparison of the distribution of the Chalco/EB debitage types from KQ, AM, and S11.

Table 3: Absolute and relative frequencies of tool and core classes in the al-Qarn (KQ), al-Murayghāt(AM), and MARS Site 0011 (S11) samples.

	KQ		AM		S11	
Type	n	%	n	%	n	%
Sickle element	12	12.5%	5	2.7%		
Burin	1	1.0%	1	0.5%		
Truncation	6	6.3%	3	1.6%		
Endscraper	3	3.1%	12	6.5%	1	33.3%
Sidescraper	14	14.6%	41	22.3%	1	33.3%
Tabular scraper			3	1.6%		
Notch	6	6.3%	9	4.9%	1	33.3%
Denticulate	1	1.0%	7	3.8%		
Awl	1	1.0%				
Borer	1	1.0%	6	3.3%		
Biface			1	0.5%		
Axe/adze			1	0.5%		
Pick			1	0.5%		
Wedge	1	1.0%	2	1.1%		
Unifacial knife	4	4.2%	1	0.5%		
Backed element	3	3.1%	6	3.3%		
Other	7	7.3%	23	12.5%		
Retouched flake	6	6.3%	12	6.5%		
Retouched blade	2	2.1%	4	2.2%		
Utilized piece	21	21.9%	6	3.3%		
Unclassifiable tool	2	2.1%	10	5.4%		
Hammerstone			1	0.5%		
Flake core	5	5.2%	19	10.3%		
Blade core			2	1.1%		
Core on flake			1	0.5%		
Tested core			3	1.6%		
Unclassifiable core			3	1.6%		
Basalt bowl			1	0.5%		
Total	96	100.0%	184	100.0%	3	100.0%

and even scrapers and truncations. The values in **Tables 3 and 4** should be viewed with some caution as a consequence.

Tabular scrapers are tools made on relatively broad and thin cortical flakes. They represent a class that includes the more popularly known "fan scraper", although not all tabular scrapers need be so flamboyant (e.g. Rosen 1997: 71-80).

Among the cores, a "tested core" (or "casual core") is a nodule or chunk from which one to three flakes have been removed but which appears to have been rejected due to poor quality features. The "basalt bowl" from al-Murayghāt in **Table 3** is a small fragment of fine-grained basalt that had been pecked and ground into a hollow shape.

The figures in **Table 3** show that there are some differences between the samples from al-Qarn and al-Murayghāt (in view of the rare tools from Site 0011, the following discussion will not take the three pieces into consideration). The least reliable differences between the two samples are in the notch, denticulate, and utilized flake categories, as discussed above. The differences are as likely to be the result of the intensity of post-depositional damage as to anything else. Cores are more prevalent at al-Murayghāt than al-Qarn, although there was also a larger collection area here, and this might be responsible for the disparity.

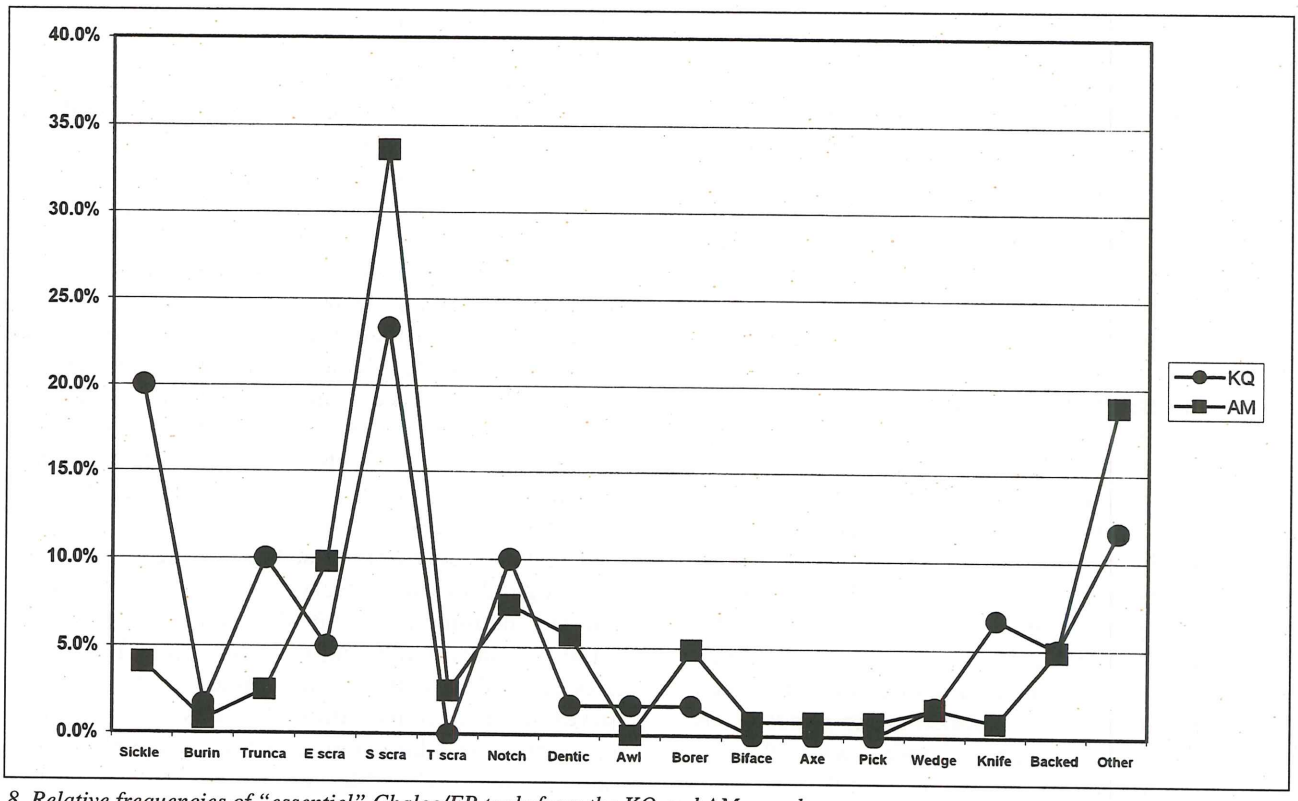
But the figures in **Table 3** contain a lot of extraneous "noise" when considering the relative importance of tool types, so **Table 4** presents the "*essentiel*" counts that ignore cores and retouched or utilized pieces, leaving only what appear to be intentionally shaped tools for interpretation. There is a stark difference in the popularity of sickle elements at the two sampled areas, and this could reflect a work area at al-Qarn that concentrated on cutting grain stalks or reeds. The higher truncation counts at al-Qarn are more ambiguous, since it is not clear what the function of these tools may have been.

On the other hand, all three scraper classes are much more frequent at al-Murayghāt (46% vs. 28%), which suggests a different focus of tool use at al-Murayghāt (the functions of "scrapers" are also not clear, and it is likely that scrapers served several different purposes, ranging from wood working and general purpose cutting to hide/ leather processing).

Despite the differences seen in **Table 4**, the distributions in **Fig. 8** reveal a remarkably similar and generalized pattern, and it is tempting to see this relationship of tool classes as a "domestic" and perhaps "rural" pattern. Strong similarities in the pattern from the MARS samples are also shown at ar-Rujūm/ Yiftahel (Rosen and Grinblat 1997: 135), En Shadud (Rosen 1985: 166), and Hartuv (Rosen 1996: 43), for example. In these cases, the shape of the curve in **Fig. 8** is maintained although there are differences in the amplitudes of the peaks.

Table 4: Absolute and relative frequencies of "essentiel" tool classes from the three Chalco/EB samples.

	KQ		AM		S11	
Type	n	%	n	%	n	%
Sickle element	12	20.0%	5	4.1%		
Burin	1	1.7%	1	0.8%		
Truncation	6	10.0%	3	2.5%		
Endscraper	3	5.0%	12	9.8%	1	33.3%
Sidescraper	14	23.3%	41	33.6%	1	33.3%
Tabular scraper			3	2.5%		
Notch	6	10.0%	9	7.4%	1	33.3%
Denticulate	1	1.7%	7	5.7%		
Awl	1	1.7%				
Borer	1	1.7%	6	4.9%		
Biface			1	0.8%		
Axe/adze			1	0.8%		
Pick			1	0.8%		
Wedge	1	1.7%	2	1.6%		
Unifacial knife	4	6.7%	1	0.8%		
Backed element	3	5.0%	6	4.9%		
Other	7	11.7%	23	18.9%		
Total	60	100.0%	122	100.0%	3	100.0%



8. Relative frequencies of "essentiel" Chalco/EB tools from the KQ and AM sample.

Where strong differences in patterns appear, the departures might be explained by environmental or social conditions; such appears to be the case for the assemblage from Har Horsha in the central Negev desert (Rosen 1991: 170), for example, and the urban setting of Bāb adh-Dhrā' (McConaughy 1979: 42). Some of the differences may be due to different typing criteria, especially for Bāb adh-Dhrā'.

Tool-Debitage Correlations: The selection of particular kinds of blanks for the manufacture of tools is very different at the two principal MARS lithics sites (**Table 4**). At al-Murayghāt, 79 of the 122 tools (64.8%) were made on flakes, while only 46.7% of the tools from al-Qarn used flakes as the blank (g-square probability = .001). The domination of blades at al-Qarn is true for ordinary, Canaanean, and indeterminate categories; also note the high preponderance of Canaanean blades used for sickles at al-Qarn (the indeterminate category very likely includes some Canaanean examples as well).

Ordinary blades reveal a broad spectrum of use at both sites, as do flakes. Canaanean blades, on the other hand, are more restricted, probably reflecting their increased cost if they were obtained from a specialist network in blade distribution through the settlements. Recalling the earlier discussion on the reliability of tool classification among delicate edges exposed to surface traffic, it might be concluded that the denticulate and the truncation made on Canaanean blades at al-Qarn are in fact not real tools at all, for these expensive blades may have been reserved for sickles and knives.

The small numbers for many of the tool classes makes any meaningful interpretation of the cross-tabulations impossible. Sickles and knives tended to be made on blades, scrapers overwhelmingly on flakes.

Concluding Remarks on the Chipped Stone Samples: There are many aspects of the lithics samples that have not been treated here, especially density distributions that might show activity areas that might be correlated with specific economic undertakings. But the samples themselves are limited, both in size and quality (due to the extensive recent edge damage exhibited by the vast majority of both debitage and tools alike), so such analyses would be premature. Nevertheless, one observation might be made here that does not rely on any statistical rigor: there are examples of high skill in chipped stone tool manufacture, just as there are obvious (and much more frequent) examples of an ad hoc approach involving more pedestrian efforts. Where and perhaps why these different tactics were em-

ployed would be an intriguing research direction in future field work.

Another aspect not addressed in this brief report is the quality of the chert and flint resources selected by the flintknappers. The quality of some of the material is superb, and as was the case with Canaanean blades, it would be instructive to examine the relationships of tool types and raw material quality. Future survey seasons should also consider identifying likely sources of the different kinds of chert and flint revealed in the surface samples at the sites.

The understanding of Chalco/EB strategies of stone tool manufacture and use would certainly be improved if artifacts from *in situ* deposits could be recovered through excavation. The surface scatters are just that: scatters whose original artifactual relationships have been lost through a variety of agents. Tools and debitage retrieved from layers where the edges of the pieces have been protected from post-depositional damage would also enhance our perceptions of contextual associations between these two categories of chipped stone material, as well as correlations of these elements with other artifact classes such as architecture and other features, animal bones, groundstone, and pottery.

Summary and Conclusions

There are striking differences in the ceramic, lithic, architectural, and ceremonial evidence from the major sites in the Mādabā Plains Cluster that have been examined to date, including the sites from our 2000 field season, and the "Tell Madaba Archaeological Project" (Harrison *et al.* 2000; Harrison and Savage 2001). These differences highlight the essentially "distrubuted" nature of the EBA economy, both in its subsistence and its social aspects. Clear differences in the ceramic and lithic assemblages between al-Qarn and al-Murayghāt are explained partly by their different topographic and ecological setting, where al-Qarn occupies a region more suitable for olive and grape production, whereas al-Murayghāt is located in a region that may have been better suited to pastoral pursuits. There seems little evidence that production was centralized. Rather, production is dispersed to several sub-regions, with predictable artifactual consequences. Furthermore, the sites are quite different architecturally. Al-Qarn's fortification system is entirely lacking at al-Murayghāt, though there are good indications that the large wall surrounding the acropolis at Mādabā was perhaps founded in the EBA. al-Murayghāt's ceremonial structures and dolmen fields are certainly not duplicated at al-Qarn or Mādabā.

We believe these differences illustrate the existence of an essentially heterarchical social organization on the Mādabā Plain during the EBA. Our preliminary evidence suggests that walled communities first appeared during this period, which reflects probable settlement concentration and a trend toward somewhat more hierarchical social organization, in concert with the first episode of intensification in the Central Highlands. However, in spite of this trend, it seems clear that ceramic and lithic production/use was distributed and variable across the Mādabā Plain, even in EB II-III. Early Bronze Age social organization in the region appears highly flexible and adapted to specific microenvironments, both socially and environmentally, which is the defining characteristic of heterarchical organization.

The very successful first year of the Moab Archaeological Resource Survey was able to conduct detailed mapping and controlled surface collection at the two sites which had been scheduled for these efforts, while beginning to conduct a pedestrian survey in the regions around the sites to fill in current gaps in our knowledge of the local settlement patterns. We collected thousands of sherds and lithic specimens, and firmly dated Khirbat al-Qarn and al-Murayghāt based on the diagnostic artifacts. Furthermore, areas of each site that have deep deposits were located, which promise to yield important diachronic environmental and cultural data upon excavation and further analysis. Both sites are currently being impacted by the growth of modern Jordan, and excavation is called for, before those impacts destroy the archaeological record at the sites.

The fieldwork we accomplished this year, and that which we will conduct in the near future, promises to have a significant impact on our understanding of the south Levantine Bronze Age, and through its connections to Egypt and Syria (see Algaze 1993; Esse 1991; Harrison 1993; Moorey 1987; Oren 1973; 1989), to a much wider part of the Near East. Falconer and Savage (1995), Savage (1997; 1998) and Savage and Falconer (in prep.) have stressed the need for settlement pattern analyses at multiple scales, beginning at the level of the site cluster. No studies in the Southern Levant have taken this approach to date, though regional surveys have clearly contributed much settlement data, and innovative ceramic analyses (e.g. Jones 1999) have suggested that economic relationships between sites and regions are recoverable. By thorough analysis of a single settlement cluster, the project will allow disparate elements of a settlement system to be more completely articulated.

The greater understanding of how the various parts of this settlement cluster functioned with respect to each other and to sites from other clusters (e.g. al-'Umayrī throughout the Early Bronze Age will allow us to build a more complete picture of the first cycle of intensification-abatement in the region, and connect the results with those from other regions, not only in Jordan, but in Palestine, Egypt, Syria, and Lebanon.

Furthermore, the diverse topographic and ecological nature of the Mādabā Plains settlement cluster and the scale of the work undertaken by the MARS project will provide essential data to test the efficacy of the heterarchy-hierarchy model. Rogers (1995) has shown that the heterarchy model unites disparate data streams in the southeastern United States, explaining diverse social and political developments among tribal configurations. Potter and King (1995) demonstrate that the approach contributes to a more thorough understanding of more complex societies such as the Lowland Maya, while J. Levy (1995) and Wailes (1995) use the heterarchy model to frame studies of chiefdom type societies in Bronze Age Denmark and early medieval Ireland. Their research shows that the heterarchy model works in many diverse regions and time periods. The current project provides essential data to test the model in an important Old World region.

Earlier paradigms emphasized excavation of single sites or surveys of large regions in the southern Levant. Their strengths will be preserved through the application of the large body of knowledge accumulated about material culture and settlement patterns of the southern Levant to the study area, along with the appreciation of cycles of intensification and abatement that have occurred in central Jordan. Building on the important foundations of past research, the proposed project will unite a methodological emphasis on the settlement cluster as the appropriate level of analysis with the theoretical underpinnings of the heterarchy model, promising to provide exciting new interpretations of early social organization in the Near East. Taking this approach, this project is recovering not just the settlement pattern in a region of the Mādabā Plain heretofore unexamined, but is supplying essential data to illuminate details of the early settlement system that laid foundations for social configurations that continue to reverberate in modern Jordan and the Middle East.

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