

# THE MOAB ARCHAEOLOGICAL RESOURCE SURVEY: TEST EXCAVATIONS AND FAUNAL ANALYSIS FROM THE 2001 FIELD SEASON

*Stephen H. Savage and Mary L. Metzger*

## **Introduction**

The Moab Archaeological Resource Survey (MARS) accomplished its 2001 field season from July 20th through August 15th. Building on our successful initial field season in 2000, the MARS project continued its survey of the region indicated on **Fig. 1**, and conducted test excavations at the site of Khirbat Qarn al-Kabsh (خربة قرن الكباش). Our field crew consisted of Dr. Stephen H. Savage, Project Director, Mr. Sidney Rempel, Ms. Monique Blom, and Mr. Mohammad Khalifa (Malkawy). Ms. Caroline Puzinas also assisted us in the field. We had the pleasure of having Mr. Musa Malkawy as our Department of Antiquities representative. He ably represented the DOA, helped us communicate with local residents, and became a good friend of the entire crew. We would also like to thank Dr. Fawwaz al-Khraysheh, Director-General of the DOA, for his constant support of our research efforts. Thanks to the efforts of all, our 2001 field season was a tremendous success.

## **MARS Project Goals**

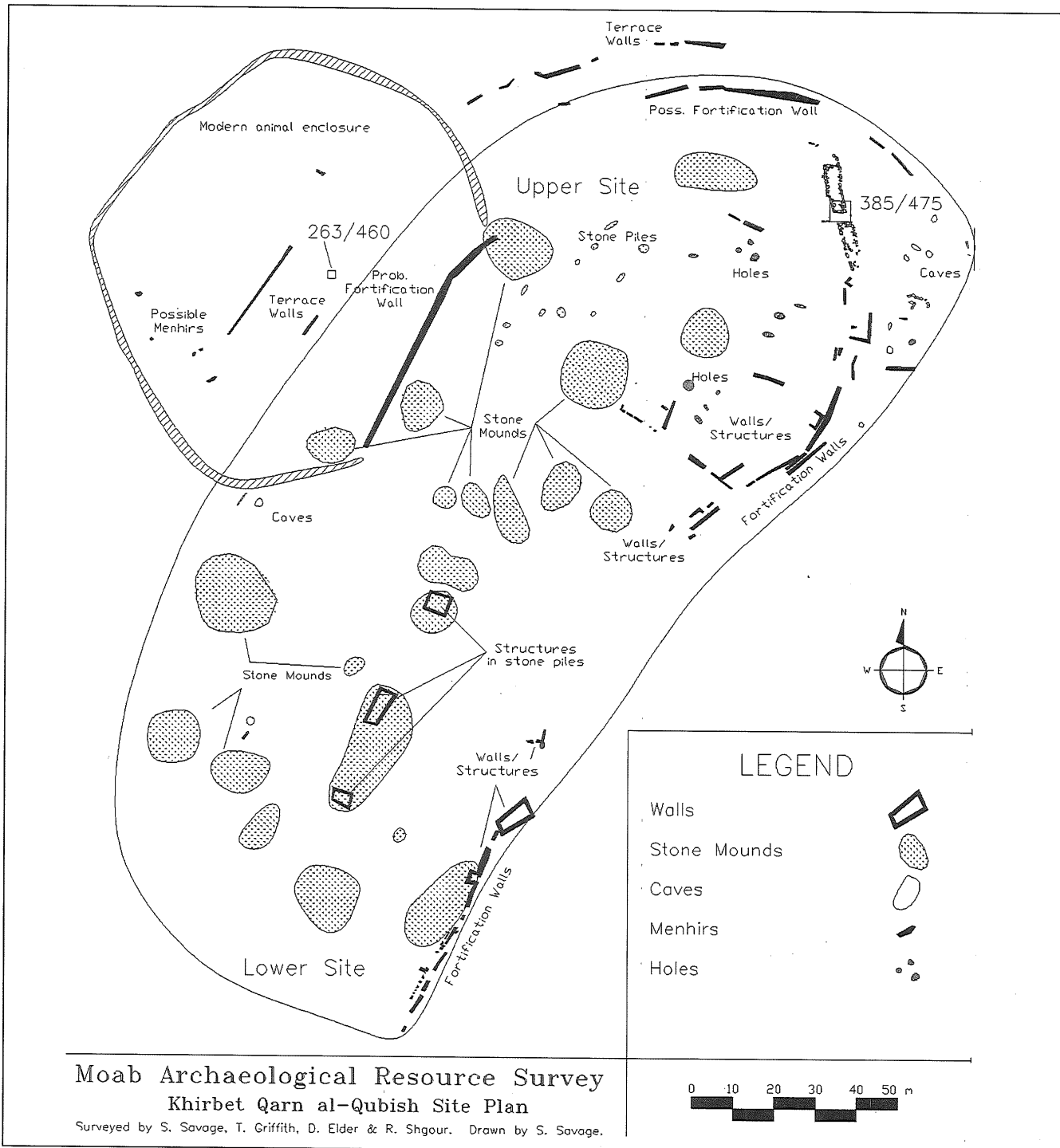
The Moab Archaeological Resource Survey was established to collect settlement, archaeological, and environmental data from the western part of the Mādabā Plain (سهول مادبا) in the highlands of central Jordan (Savage and Rollefson 2001: fig. 1). The field program for this long-term project includes detailed mapping, surface collections, and test excavations at known archaeological sites and pedestrian survey of the western Mādabā Plain to discover additional sites. The general goal of the fieldwork is to gather settlement, ceramic, lithic, faunal and botanical data from an area that appears to have contained a single cluster of sites (Savage and Rollefson 2001: fig. 2), and therefore probably a single settlement system, in the Early Bronze Age (EBA, ca. 3600-2000 BC). The lab program includes establishing an absolute radiocarbon chronology for the region, analysis of faunal and botanical remains to establish dietary parameters in the EBA, and lithic analysis (including raw material source investigations), and petrographic analysis of ceramics to investigate the nature of ceramic production/exchange in the settlement system. These

data will be used to test a model of early social organization based on heterarchy (see Crumley 1995 and Philip 2001). Our field and lab work will describe a single settlement cluster, and then compare 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 in the region. The unique contribution of this project 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.

## **Summary of Results from the 2000 Field Season**

In 2000, we conducted detailed mapping of surface features and 20 percent, random, stratified, non-aligned surface collections at Khirbat Qarn al-Kabsh (al-Qarn) and al-Murayghāt (المريفات). We collected over 7,000 sherds and more than 10,000 lithics from the two sites (see Savage 2001; Savage and Rollefson 2001). 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. This report will concentrate on our work at al-Qarn.

The village site of Khirbat Qarn al-Kabsh (**Fig. 1**) was initially founded during the Early Bronze I period, and reached its zenith in the Early Bronze III period. By that time, an extensive fortification system had been constructed around at least three sides of the hill (excluding the very steep south side). 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 — only a small percentage of the pottery from the surface collection could be assigned firmly to the early period. Most of the surface ceramic assemblage comes from the EB III period. There are a number of sherds that are assigned to the EB II/III period as



1. Khirbat Qarn al-Kabsh site plan. Excavation units were placed across the gateway (Unit 385/475) and in the midden (Unit 263/460).

well. Given the preponderance of EB III material at the surface, it seems likely that the EB II/III sherds probably 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 period.

By the 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.

**Goals of the 2001 Field Season**

We had a number of questions about al-Qarn after the 2000 field season, which could only be answered by test excavations: 1) What is the nature and extent of subsurface material in the midden on

the west side of the site? 2) When was the fortification system built? 3) Is there evidence of multiple occupational phases at the site? 4) What was the nature of the “food system” at the site? Answering these questions became the focus of our 2001 field season at al-Qarn. A testing strategy was developed that would help answer the questions, by excavating limited areas on the site with the following goals in mind:

- Place an excavation unit across the gate complex on the northeast side of the site, in such a way that part of the unit included the gateway itself (between the north and south flanking towers), and part of the unit was inside one of the towers.
- Collect artifacts and C-14 samples from the gateway that would help establish its dates of construction and use.
- Establish, through excavation, the method of construction of the gate complex, and any changes in its form through time.
- Place an excavation unit in the midden (trash deposit) on the steep west side of the site, in an area where our surface collection from the 2000 field season indicated a significant amount of sherds and lithics would probably be found.
- Collect ceramics, lithics, seeds and faunal remains from the site, to be used as the basis for comparison with similar collections from other EBA sites on the Mādabā Plain.
- Collect organic material for radiocarbon dating, to help sort out vexing chronological issues related to the EB II and EB III periods.

### Results from the 2001 Season

To accomplish the goals set for the 2001 field season, two units were excavated at al-Qarn (Fig. 1). These were:

1. Unit 385/475, placed over the south end of the north gate tower and the gateway, on the northeast side of the site;
2. Unit 263/460, placed in the midden on the west side of the site.

#### *Unit 385/475*

Placed across the gateway and the southern part of the northern gate tower, Unit 385/475 was a 5x5 meter square, excavated in order to understand the construction of the gate complex and obtain artifacts that could date its construction, use, and abandonment. The excavation accomplished all these goals. Our work established a number of important points concerning the gate complex:

1. The gate towers were constructed as solid structures, rather than rooms that subsequently filled in with rubble and post-abandonment debris.

2. The gate towers are founded on soil, rather than bedrock. Some of this soil represents the original ground surface of the hill, but on the south side, the gate was built on a thin layer of soft, gray soil that is part of an early midden deposit from as early as the late EB I to Early EB II (based on a radiocarbon date, see below).
3. The tower was built and filled in course by course. Large boulders were placed around the perimeter of the tower; rock rubble and soil were dumped into the interior space to the top of the outer boulders. Then the next course of boulders was placed, and so on.
4. The construction of the tower has been firmly dated to the Early Bronze III period (ca. 2800-2350 BC), probably earlier in the period, rather than later.
5. A flagstone pavement was placed in the entranceway between the two gate towers. The pavement was later repaired by rimming its perimeter with rocks and filling in and leveling the interior with small cobbles and pebbles.
6. Thus, there are two clear use phases in the gateway; both originated in the same period as the gate towers (i.e. EB III), but they were built after the towers.
7. The entry pavement was covered with post-abandonment fill by the Roman/Byzantine period. Loci assigned during excavation of Unit 385/475 include:

*Locus 000:* This was the modern ground surface inside the north gate tower, at the time excavation began. Because of the way Unit 385/475 was placed on the tower and gateway, this locus included an area about 3m north-south by about 2m east-west. Our strategy was to excavate the interior portion of the tower separately from the entranceway, and separate from the narrow strip of Unit 385/475 that fell outside the fortification wall to the east. There were no artifacts on the surface inside the tower.

*Locus 001:* The north gate tower in its entirety was assigned locus number 001, but only the southern part of the tower was cleared. The tower is about 11.8m long by 4.3m wide overall; its long axis is oriented at about 343 degrees. The tower is thus an irregular rectangle, whose width varies somewhat. The tower was free-standing, boulder and chink construction, with rubble fill (Locus 002). Its perimeter consists of boulders, ranging in size from 25cm up to 1m across. About 75% of these were in the 0.75 to 1m range; about 20% were in the 0.5 to 0.75m range; the remaining 5% were in the 0.25 to 0.5m range. Chink stones between boulders and

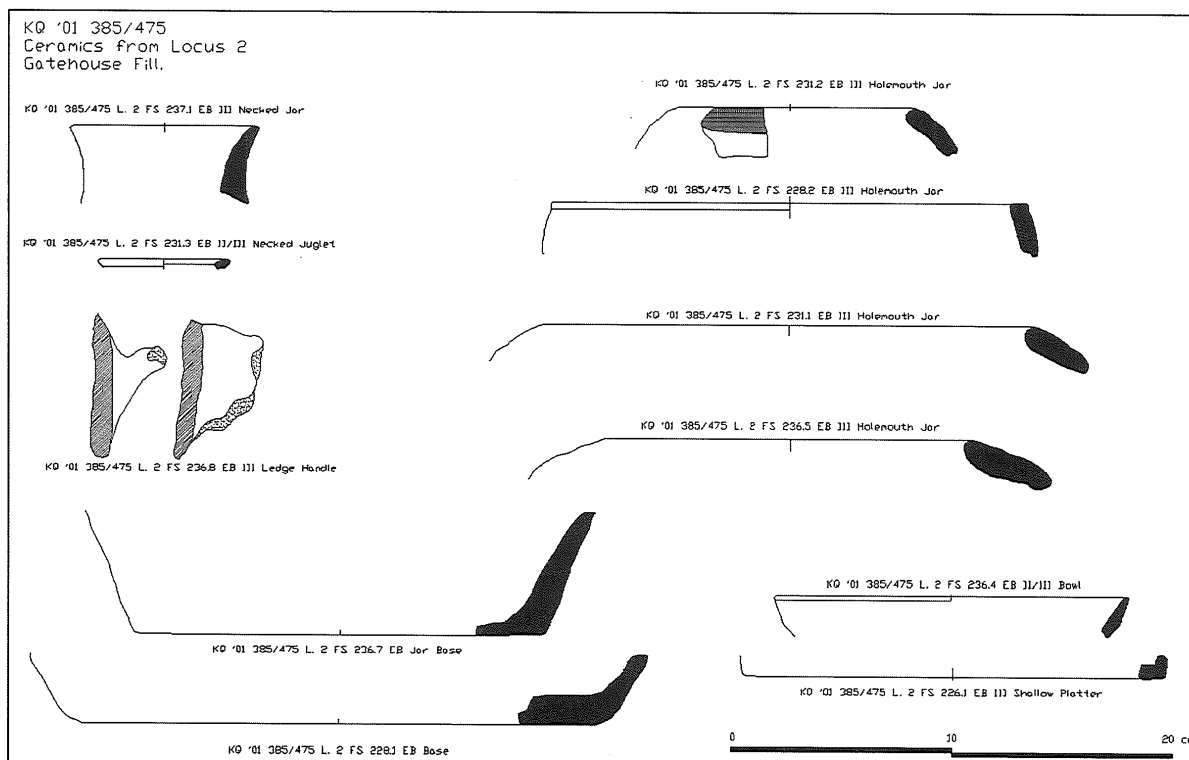
courses were cobbles in the 6-25cm range. The rocks comprising the tower were exclusively unhewn, hard limestone, and the tower was unfaced. Two courses were immediately visible, and a third was identified during excavation in the gateway. The outer perimeter is one row wide. There is no foundation trench. The tower rests partly on Locus 004 midden-like material, and partly on Locus 005, which was identified as the original ground surface. No artifacts were collected from Locus 001.

*Locus 002: Fill inside North Tower.* The fill inside the tower was given a separate locus number. The locus consisted of large pebbles (2mm-6cm) to medium sized boulders (>25cm) in a matrix of pale brown (Munsell 10YR 4/4 wet, 10YR 6/4 dry) loam. Following initial penetration of the surface, the fill was found to be very loose, slightly friable, and rubbly. The locus is entirely contained by, and seals against, the North Gate Tower (Locus 001). It

measured about 2.98m N-S by 2.5m E-W (on the north side of Unit 385/475, on the south side, the locus is about 2m EW). The locus represents deliberate fill, placed into the tower at the time of its construction. From the way the boulders in Locus 001 extended over the fill from Locus 002, it was clear that the fill had been placed in the tower in layers that correspond with the courses of the boulder perimeter (Locus 001). That is, a course of perimeter boulders was laid, and then filled in with rubble and soil to the top of the course. Then the next course of perimeter boulders was laid, and filled in with rock rubble and soil. Clearly, then, the Locus 002 material is contemporary with the construction of Locus 001, and therefore, Locus 001 was a solid construction, rather than a room or gatehouse that was filled later by post-abandonment collapse and deposition. **Table 1** summarizes the materials collected from Locus 002. **Fig. 2** illustrates diagnostic sherds from the gate tower fill,

Table 1: Items collected from Unit 385/475, Locus 002.

Artifact Type	Count (Ceramics) or Weight (gr)	Reading	Comment
Bone	30 g	Sheep/Goat	Fragmentary
Charcoal (C-14)	10 g		
Chipped Stone	295 g	Not diagnostic	Primarily debitage
Ceramics	221 (19 diagnostics)	EB II/III, EB III	



2. Sherds recovered from the gate tower fill at al-Qarn.

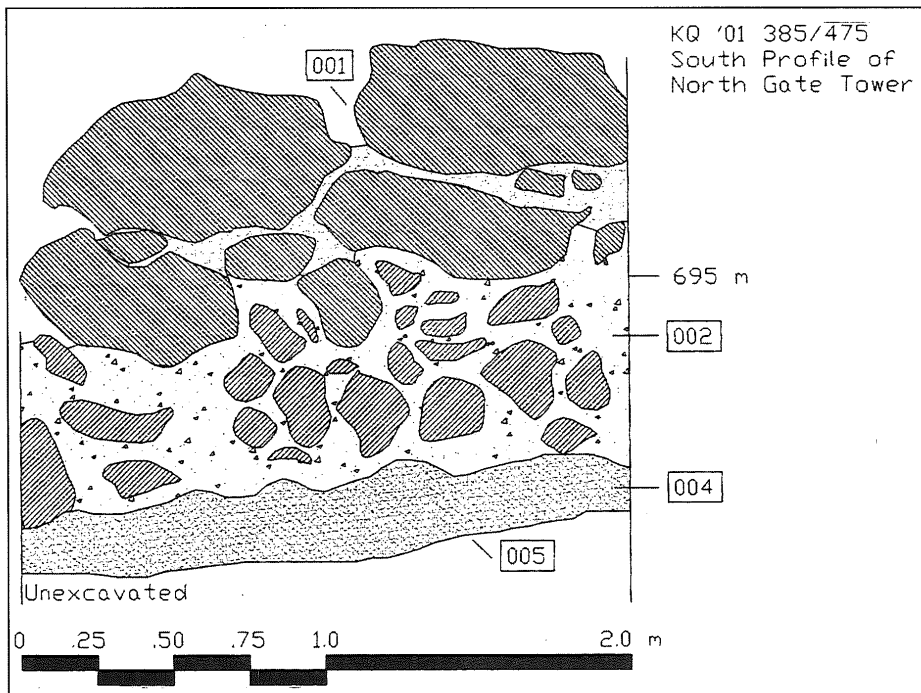
which, along with radiocarbon dates discussed below, enable us to say with certainty that the gate structure was built in the EB III period.

*Locus 003: One by one meter probe.* After having excavated approximately 20cm of Locus 002, we placed a 1 x 1m test probe in the southeast corner of the north gate tower. The purpose of the probe was to determine the depth of Locus 002, and the nature of the deposit(s) underneath it. The upper 25cm of soil in the probe conforms to the Locus 002 matrix and rubble. Below this level, a light brownish gray, sandy clay loam was encountered, overlaying the natural slope of the hill. On the surface of the natural hill a few flat-lying sherds were noted. At this point, the probe was terminated. The lower soil deposit was designated as Locus 004, and the original surface of the hill was given locus number 005. Sixty-one sherds were collected from Locus 003; all were Early Bronze body sherds that could not be assigned to a specific sub-period in the EBA. In addition, 15 grams of bone fragments, 2 grams of charcoal, and 65 grams of lithic debitage were collected.

*Locus 004: Fill above Locus 005.* The Locus 004 deposit was identified in the Locus 003 probe discussed above. The matrix of Locus 004 was light brownish gray (Munsell 10YR 6/2 dry) sandy clay loam, which was loose, somewhat gravelly, and dry. There was a very low frequency of pebbles and cobbles, and boulders were not present. The locus lies under Locus 002, over Locus 005, and

seals against Locus 001. As such, its top surface represents the surface of the ground at the time the north gate tower was built. Since the rubble fill from Locus 002 and the boulder wall of Locus 001 are clearly above this locus, it is plain that the tower was built on soil rather than bedrock, and that there had already been some deposition on the original ground surface when the tower was built (see Fig. 3). Locus 004 varies in depth from about 20 to 40cm on the south side of the tower, but is not present on the north side of the excavation unit, having thinned out across the N-S extent of the area excavated inside the north gate tower. Two radiocarbon dates from Locus 004 are discussed below; they indicate that the locus had begun to form by as early as late EB I to early EB II. Five grams of bone, five grams of charcoal, 450 grams of lithic debris were collected from Locus 004. One hundred five sherds were recovered; of these, three were diagnostic of the EB II/III and EB III periods. In addition, five grams of olive seeds were collected. Together with the seeds and charcoal fragments collected from Locus 002, these will provide bracket radiocarbon dates for the construction of the north gate tower.

*Locus 005: Original ground surface.* Locus 005 was identified in the Locus 003 probe, and exposed across the full extent of the area excavated inside the north gate tower. It is a firm earthen surface that slopes from southwest to northeast, conforming to the slope of the hill upon which the tower was built. The locus was not excavated, because the excavation in the tower was already well below



3. South profile of the excavation inside the north gate tower.

the bottom of the fill associated with the construction of the tower, and had collected artifacts and organic samples that can be used to date the tower's construction. It is overlain by Locus 002 (in the north) and 004 (in the south).

**Locus 006:** Present surface of gateway. Once Locus 005 had been uncovered inside the north gate tower, our attention shifted to the entryway between the towers. Locus 006 was assigned to the present ground surface in the region between the towers. Three undiagnostic EBA sherds were recovered from the present ground surface.

**Locus 007: Fill in entryway.** The entry fill is post-abandonment colluvium and collapse from the towers. The entryway is approximately 3.35m long by 3m wide, but Locus 007 was initially set up as a 2m wide trench across the entryway. Subsequent expansion of the entryway excavation to the west included soil assigned to Locus 011, which is equivalent to Locus 007. The soil matrix was pale brown (Munsell 10YR 6/3 dry), silty loam that was loose, dry, and contained considerable gravel and rock rubble. Pebbles (2mm-6cm), cobbles (6-25cm) and boulders (>25cm) were present in the matrix, distributed at random throughout, at medium to high density. We also encountered one mud-brick fragment, approximately 12cm by 6cm, in the matrix. The upper surface of the locus slopes to the northeast, but the lower extent is relatively flat, overlaying Loci 008, 009 and 012. **Table 2** summarizes the artifacts recovered from Locus 007.

**Locus 008: Ashy fill above Locus 009.** Immediately below Locus 007 we encountered a thin lens of brown (Munsell 10YR 5/3 dry) silt loam, which was devoid of the large stones that characterized Locus 007, with a low frequency of pebbles and a medium frequency of small cobbles. The soil ma-

trix was loose, dry, and slightly gravelly/rubby in texture. The matrix was somewhat ashy, and probably represents cooking activity associated with a time period after the abandonment of the towers. Five grams of bone fragments, a few EB III sherds, and 15 grams of chipped stone were recovered from Locus 008.

**Locus 009: Entry pavement repair.** Below Locus 008, we encountered a surface that consisted of a high frequency of pebbles (2mm-6cm) and a medium frequency of cobbles (6-25cm) bordered by larger stones, in a matrix of pale brown (Munsell 10YR 6/3 dry) silty clay loam (**Fig. 4A**). The locus is a repair/rebuild of the entryway pavement (which was later identified as Locus 012). It has been designated as Field Phase 1. Locus 009 overlies Locus 012, seals against the two towers (Loci 001 [North tower] and 010 [South tower]), and is overlain by Locus 008 in the east side of the entryway and by Locus 011 in the western one-meter extension of the excavation. The repair of the entryway pavement was accomplished by placing a perimeter of relatively flat stones across the east side of the entryway, and along the faces of the towers. These stones served to contain the pebble/gravel fill that was used to level the surface of the entryway after the Locus 012 flagstone pavement had become uneven. Some of the stones used in Locus 009 were originally part of Locus 012 (**Fig. 4A, B**). A few EB III sherds were found in association with Locus 009, which thus dates this second phase of the entryway to later in the same period as its construction. Five grams of seeds (olive pits) were found in the soil matrix of the surface, which were submitted for radiocarbon dating to the University of Arizona AMS Radiocarbon Facility. The date on these seeds, plus the seeds and charcoal recovered from Locus 007, provides a date range between the construction of Locus 009 and its aban-

**Table 2:** Items collected from Unit 385/475, Locus 007.

Artifact Type	Count (Ceramics) or Weight (gr)	Reading	Comment
Bone	5 g	Sheep/Goat?	Fragmentary
Charcoal (C-14)	15 g		
Chipped Stone	930 g	Canaanite blade	Primarily debitage
Ceramics	46 (2 diagnostics)	EB III	Bowl/juglet rim, vat body sherd, roll rim jar sherd
Seeds	2 g	Olive pits	

donment. These dates are discussed below.

*Locus 010: South Gate Tower.* The south gate tower was designated as Locus 010, after the decision was made to extend the excavation of the entryway to the northern face of the south gate tower. During excavation of Locus 009, material between the south edge of Unit 385/475 and the north face of the south tower became unstable, because of the short distance involved. Therefore, to keep the lower levels from being contaminated by fill from higher strata, and to uncover the face of the south tower and full extent of the Locus 009 entry floor, the excavation was extended south to the north face of the Locus 010 tower. The material excavated from above Locus 009 was considered to be mixed — the equivalent of balk trimming soil — and was discarded. Locus 010 was not excavated. It is probably similar to Locus 001 (the north tower) in its construction date and techniques.

*Locus 011: One meter westward extension of entryway excavation.* The western part of the gateway was not uncovered in the initial two meter wide trench. The excavation was extended by one meter to the west to include the rest of the area between the gate towers. The locus is the equivalent of Locus 007, and need not be described again. Five grams of bone fragments, five grams of charcoal, 76 sherds (4 diagnostic), 315 grams of chipped stone, and five grams of olive seeds were recovered from the soil in Locus 011. We did not identify Locus 008 material below Locus 011, and Locus 009 was not well defined under Locus 011 either. Rather, large, flat flagstones belonging to Locus 012 were encountered. It is likely that some of these were re-used in the repair of the entryway that is represented by Locus 009. At its western edge, Locus 011 was clearly west of the entry pavements, which were not extended past the inside edge of the gate towers. Of the ceramics recovered from Locus 011, one was EB I, two were EB III, and one was from the Roman/Byzantine period. Since Locus 011 is, in origin, post-abandonment fill overlaying the gateway pavement, the presence of the Roman/Byzantine body sherd (the only one found in Unit 385/475) indicates that the gateway had been covered by colluvium and post-abandonment collapse by the Late Classical period. Clearly, the gateway itself dates to the EB III period. Loci 007, 008 and 011 must be assigned to Field Phase 1 (post-abandonment), Locus 009 to Field Phase 2 (second phase of the gateway), and the towers and original gateway to Field Phase 3. These were built upon

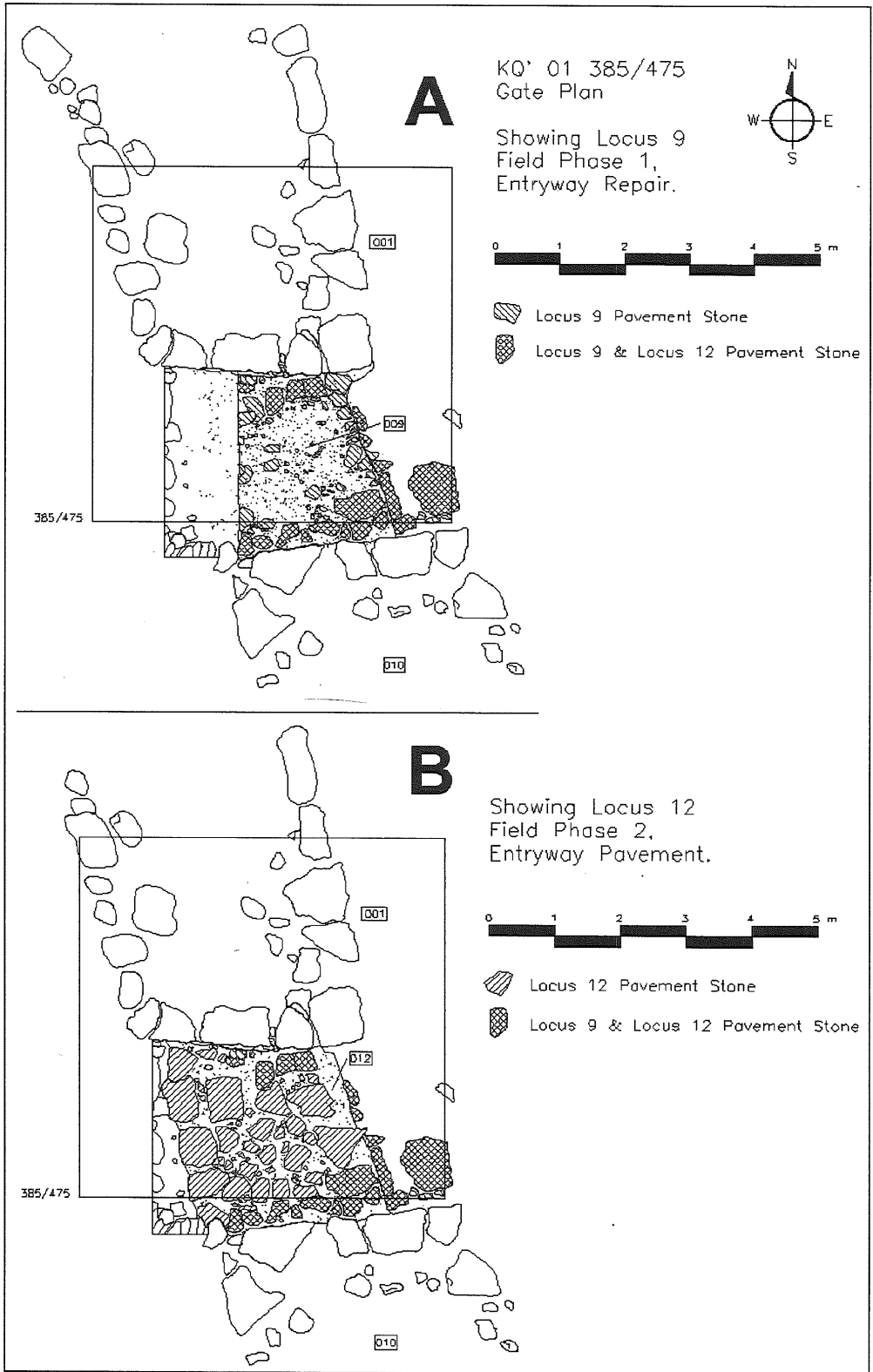
soil from Locus 004, which is assigned to Field Phase 4.

*Locus 012: Entryway pavement.* Below the Locus 009 pavement repair/rebuild, and below the Locus 011 post-abandonment fill, we encountered the original entryway pavement (Fig. 4B). Locus 012 consists of an irregular flagstone pavement that extends between the two towers, but ends at their inside (western) edge. No artifact concentrations or activity areas were found on the surface. The pavement was contiguous across the entire gateway, but highly uneven. Presumably, the flagstones had begun to settle during the EB III period after some undefined length of use. At that point, the residents of al-Qarn repaired the surface in the manner described under Locus 009. There are clear threshold stones along the eastern side of the pavement, and a very large, flat boulder set into the ground outside the gateway. It is possible that this boulder represented an extension of the entry pavement outside the gate complex. Overall, it seems clear that Locus 012 must date to shortly after construction of the two gate towers. It is part of Field Phase 3, which includes the towers and the pavement.

*Locus 013: Probe against Locus 001 southeast corner.* Excavation in the gateway was terminated at Locus 012. A final locus in Unit 385/475 was assigned to a one by one meter probe placed against the outside of the north gate tower, at its southeast corner. The purpose of the probe was to try to reach bedrock, but a large quantity of post-abandonment rubble and wall collapse was encountered within about 20cm of the surface. The locus was terminated when it no longer became possible to excavate without enlarging the probe to remove the large boulders fallen from the gate tower. Consequently, the base of the locus is highly uneven, and marked by rubble and collapse. The soil matrix was brown (Munsell 10YR 5/3 dry) silt loam, loose and gravelly. It contained a high percentage of cobbles (6-25cm) and boulders (>25cm). Five grams of bone, ten grams of chipped stone debris, and a few undiagnostic EB body sherds were recovered from the locus.

*Unit 385/475 Summary:* Based on the excavations inside the north tower and across the gateway between the entry towers, it is clear that there are four field phases represented. These include:

1. *Post-abandonment fill*, represented by Loci 007, 008 and 011 in the entryway. These loci are essentially equivalent. While no ceramics later than EB III were found in Locus 007, a single



4. Two phases of entry pavement between the gate towers at al-Qarn.

Roman/Byzantine body sherd was found in Locus 011. Thus, it is clear that the gateway floors had already been covered over by post-abandonment colluvium and collapse by the Roman/Byzantine period. This finding is consistent with the assessment we made in 2000, based on the surface collection. The Roman/Byzantine

presence on the site is essentially “camping”, or related to temporary use such as pastoralism, which probably occurred with some frequency from the time of the site’s abandonment. The thin lens of ashy soil that comprises Locus 008 seems to be exemplary of this kind of behavior. Clearly, the architecture of the gate complex



dates to the EB III period, and was already in ruin by the Roman/Byzantine period.

2. *Entryway repair/rebuild*, represented by Locus 009. This field phase represents a repair or rebuilding of the entryway pavement, probably after it had become uneven due to a poor foundation. Artifacts recovered from Locus 008, immediately above Locus 009, indicate an EB III date.
3. *Construction of the gate and entryway*, represented by Loci 001, 002, 010 and 012. It is clear from the associated artifacts that the towers and gateway were constructed in the EB III period, and from stratigraphic relationships, prior to the Locus 009 repair to the entry pavement. Since the EB III period is over 400 years long, it is not possible to discern the length of time between Field Phases 2 and 3. However, enough seeds were recovered from the various loci that radiocarbon dates bracketing the construction of the tower and two pavement phases are possible, and initial results of radiocarbon dating are presented below.
4. *Pre-fortification deposition*, represented by Locus 004, found to underlay the south end of the north gate tower, which belongs to Field Phase 3.

Of the more than 500 sherds recovered from the gate tower and entryway, 471 were unspecified EBA, and 28 were judged to be EB III. Only one sherd was later than the EB III period — the Roman/Byzantine sherd found in the Locus 011 post-abandonment fill in the gateway. Thus, it is clear that the gate structure and entryway are to be dated to the EB III period. Most of the diagnostic forms were storage vessels, principally holemouth jars. This is consistent with the findings of the surface collection from the 2000 field season. Storage appears to have been an important function of the site as a whole, and the fortification clearly implies guarded storage.

The construction of the north gate tower is remarkable because it is not founded on bedrock. It rests on the soil of Loci 004 and 005. This gives the impression that the fortification system was built quickly, perhaps in response to a perceived emergency or threat. The abundance of storage vessels indicated by the surface collection and excavation further suggest the accumulation of supplies in a secure, fortified site.

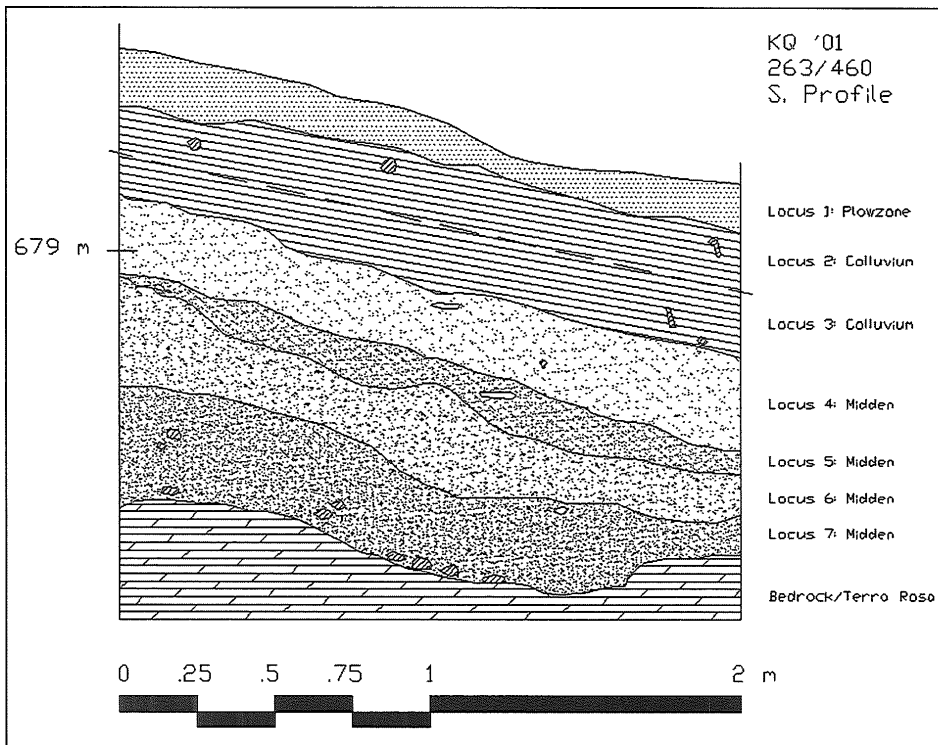
#### *Unit 263/460*

One of the primary goals of the 2001 field season at al-Qarn was to collect ceramics, lithics, bone and seeds in quantities sufficient to allow comparison with other collections from sites such as Tall

Mādabā تل مادبا (Harrison and Savage 1997; Harrison *et al.* 2000), and Tall al-‘Umayrī تل العميري (Harrison 1997; 2000). Furthermore, one of the larger goals of the MARS project is to collect similar samples from other Early Bronze Age sites in the Mādabā Plain Site Cluster. Since extensive samples of this kind are not to be expected in public architectural spaces such as the gate tower and entryway, we turned to the midden at al-Qarn for these materials. Unit 263/460 is located on the western slope of the site, outside the fortification wall, but inside a lower series of terrace walls (see Fig. 1, above). The location for the midden excavation was chosen based on the results from the 2000 surface collection; the two-by-two meter test unit was placed in the southeast corner of one of the ten-by-ten meter surface collection units. The unit was chosen because it had an abundance of ceramic and lithic material in the surface collection (it was in the highest range collected for both sherds and lithics). Our expectations were fulfilled; we collected more than 4,000 sherds (217 diagnostics), 2,615 grams of bone, 15 grams of charcoal, 6,410 grams of lithic material, and 42 grams of seeds from the unit. In addition, we collected 21 soil samples for floatation, which will enable us to recover smaller seeds and plant pieces. Loci assigned in Unit 263/460 include the following:

*Locus 000: Present Surface.* The ground surface at the time the excavation began was designated as Locus 000. Ceramics and lithics were collected from it. Ceramics date to the EB III period, and include two diagnostic ledge handles and other rim sherds. The unit is located in the animal enclosure built about 80 years ago, and the site is used daily by flocks of sheep and goats. It was also clear that the slope (and parts of the top of the site) had been farmed during the previous winter. Obvious plow marks and the stubble left from a wheat crop were present on the surface.

*Locus 001: Plowzone.* Thus, the top level of the excavation was plow disturbed, and, therefore, mixed (Fig. 5). Plowing has been shown to drag artifacts for some distance, but it is clear that the plowing practiced on the slope at al-Qarn was shallow (Locus 001 was about 10-20cm deep), and was probably done with animal power, rather than a tractor (which would leave deeper plow scars). The soil in Locus 001 was a fine, silt/loam (loess), and brown in color (Munsell 10YR 5/3 dry). It was very loose, very dry, and full of gravel and small cobbles. Moreover, the constant grazing activity on the hillside have given the soil a distinctively organic con-



5. Unit 263/460, south profile.

tent. The locus was formed by wind deposition, downslope erosion, grazing, and subsequent plowing. It bottoms out on a clear interface that is harder and more compact than the Locus 001 material (this would correspond to the “hard pan” that forms below plow zones when they are repeatedly plowed to the same depth). Of the 184 sherds recovered from the plowzone, 8 were diagnostic of the EB III period.

*Locus 002: Colluvium-Post Abandonment Deposition.* Similar in composition to the Locus 001 material, Locus 002 was assigned when the bottom of the plowzone was reached. However, it is clear that the matrix of Locus 002 is of the same origin as that in Locus 001 (except that it has not been plowed). The soil in Locus 002 was a fine, brown (Munsell 10YR 5/3 dry) silt/loam (loess). It was full of gravel and small cobbles, but was considerably more firm than Locus 001. Of the 406 sherds recovered from Locus 002, 15 were temporally diagnostic. Periods represented include EB I, EB II/III, EB III, and Roman/Byzantine. It was clear from the nature of the deposition that this soil layer was the result of downslope erosion and wind-deposited loess, and that it represents post-abandonment soil accumulation. Thus, the single Roman/Byzantine sherd (the second of only two found in the 2001 season) confirms that the site had been abandoned by the Late Classical period, and the midden was already being covered by colluvial deposits. In addition to the ceramics, 75 grams of

bone fragments were recovered; 515 grams of lithic debris were collected. The locus was terminated at an arbitrary level, after approximately 20cm of soil was excavated, in order to begin a new locus and isolate material in the upper part of the soil deposit from that in the lower part of the layer.

*Locus 003: Colluvium-Post Abandonment Deposition.* Locus 003 is a continuation of Locus 002. It is identical in color, texture, composition and origin. Eight diagnostic sherds were identified from the 458 recovered. They are all from the EB II/III and EB III periods. One hundred eighty-five grams of bone, 650 grams of lithic debris and 7 grams of seeds (mostly olive pits) were also collected. Locus 003 was terminated when the soil color changed to a darker grayish brown color, which indicated the beginning of the midden deposit in the unit.

*Locus 004: Midden Level 1.* Below Locus 003 we encountered the top of the midden deposit from the EBA occupation of the site. The matrix was dark grayish brown (Munsell 10YR 4/2 dry) silt loam. It was moderately firm and contained a low frequency of pebbles (2mm-6cm) and small cobbles (6-25cm). Its origin is random deposition associated with trash dumping activity on the site in the EBA. The matrix contained some pockets of softer, slightly more ashy soil, and some pockets almost the texture of mudbrick fragments. It thus represents mixed origins and multiple depositional episodes, which is consistent with true midden depos-

its. Fifty-three of the 907 sherds recovered were diagnostic of the EB I, EB II/III and EB III periods. Over 1,100 grams of bone fragments were collected, and identifiable parts come from sheep, goats, and small birds (see below). There was more than twice as much lithic debris in Locus 004 as in the previous locus (1,315 grams), plus ten grams of seeds (mostly olive pits).

*Locus 005: Midden Level 2.* Locus 005 represents a level in the midden that is slightly darker in color than Locus 004. The locus was uneven in thickness, from 1-20cm, and sloped from the northeast corner to the southwest. The soil texture is essentially the same as Locus 004; inclusions such as pebbles and small cobbles are similar as well. One ca. 20cm chunk of mudbrick was noted. The locus was terminated when a slightly more yellow soil was noted. Seven hundred thirty-three sherds were recovered; 41 were diagnostic of EB I, EB II, EB II/III and EB III. Of particular note was the presence of small amounts of a highly fired gray ware, which appears similar to Metallic Ware. These were exclusively body sherds, so no forms could be identified, but their presence may be a significant indicator of the EB II period, and suggests contacts between al-Qarn and locations further to the north and west. We also recovered 275 grams of bone, 5 grams of charcoal, 1,075 grams of lithic debris, and 10 grams of seeds from Locus 005.

*Locus 006: Midden Level 3.* Locus 006 was initiated when we noted a change in soil color and texture. Here, the soil matrix is dark brown (Munsell 10YR 4/3 dry), and was slightly moist, moderately crumbly, silty clay loam. There was a low frequency of pebbles (2mm-6cm). Like the midden levels above it, this locus was formed by random episodes of dumping, and contains abundant ceramics (904 total, 49 diagnostic of the EB I, EB II, EB II/III and EB III periods), 575 grams of bone (mostly sheep and goats, but some small birds and fish bones also), 1,235 grams of chipped stone debris and 10 grams of seeds (olive, grape, and charred wheat). The locus was terminated when bedrock was reached in the northeast corner of the unit, and the soil color changed.

*Locus 007: Midden Level 4.* The lowest level of the midden was a very dark gray brown (Munsell 10YR 3/2 dry) silty clay loam, situated over a bedrock step. The soil matrix was slightly moist due to its proximity to bedrock, loose, and very rubbly. It contained a high frequency of small cobbles (6-25cm), located primarily in pockets in the lime-

stone bedrock. Because bedrock had been reached in the northeast part of the unit, the locus was approximately 2m by 1m, on the west side of the unit, instead of the usual two by two meters. It varied in thickness from about 8 to about 30cm, and clearly overlaid bedrock and *terra rosa* soil (which was deposited in cracks in the bedrock). A significant discovery was a single body sherd of burned, Red Burnished Ware on the bedrock near the west side of the unit, as well as several red "trickle painted" jar rims. We also recovered 440 grams of bone from sheep/goat, birds, and fish, 10 grams of charcoal, 615 grams of chipped stone debris and 5 grams of seeds (olive pits). The locus was terminated when bedrock or *terra rosa* soil was found across the floor of the unit.

#### *Summary of Unit 263/460*

The excavation in the midden at al-Qarn was a tremendous success. We recovered more than 4,000 sherds, and abundant quantities of bone, seeds, and lithic debris. These materials are exactly what we had hoped to find when we planned to open a unit in the midden, and will provide important comparative material for the site. The ceramics clearly indicate that the upper levels of the midden in this area were formed during the EB III period, and the lower levels during the EB I period. Significantly, there is no obvious gap in the occupation of the site, based on the midden formation. This suggests that the site was occupied from EB I through EB III. EB II is difficult to distinguish from EB III on the Mādabā Plain, because several of the temporal markers (such as true "Metallic Ware") that are indicative of EB II further north are not generally found as far south as the Mādabā Plain. However, the quantities of seeds and charcoal we recovered will allow us to date the site independently of the ceramic assemblage, and suggest continuous occupation from EB I to III (see below).

#### *Radiocarbon Dates from al-Qarn*

Thirteen samples were submitted for radiocarbon dating to the University of Arizona's AMS Radiocarbon Dating Facility. Twelve usable dates were received; **Table 3** lists each raw date and the individual calibrated date range(s) for one and two-sigma confidence intervals, using the OxCal Program, version 2.18 (Bronk-Ramsey 1995). The dates generally confirm the EB I to EB III occupation range for the site (**Table 4**, from Philip 2001: table 5.1).

The individual dates from the gateway strata are instructive by themselves, but can be a bit confus-

Table 3: Radiocarbon dates from al-Qarn.

Unit	Locus	Material	Sample #	Raw Date	1 Sigma Cal. <sup>1</sup>	2 Sigma Cal. <sup>1</sup>
385/475	002	Olive Pits	2001-001	4,054+-66	2840BC (0.08) 2810BC 2670BC (0.92) 2470BC	2880BC (1.00) 2460BC
385/475	004	Olive Pits	2001-003	4,061+-77	2860BC (0.14) 2810BC 2680BC (0.86) 2470BC	2900BC (1.00) 2350BC
385/475	004	Charcoal	2001-004	4,346+-61	3080BC (0.04) 3070BC 3030BC (0.96) 2890BC	3330BC (0.05) 3230BC 3120BC (0.95) 2870BC
385/475	007	Charcoal	2001-005	4,072+-40	2840BC (0.13) 2810BC 2670BC (0.69) 2560BC 2530BC (0.19) 2490BC	2860BC (0.15) 2810BC 2750BC (0.04) 2720BC 2700BC (0.81) 2470BC
385/475	007	Olive Pits	2001-006	4,001+-41	2570BC (1.00) 2460BC	2630BC (1.00) 2400BC
385/475	009	Olive Pits	2001-013	4,096+-78	2870BC (0.22) 2810BC 2760BC (0.71) 2560BC 2520BC (0.07) 2490BC	2880BC (1.00) 2470BC
263/460	004	Olive Pits	2001-007	4,600+-130	3520BC (0.66) 3260BC 3240BC (0.34) 3100BC	3650BC (1.00) 2900BC
263/460	005	Olive Pits	2001-008	4,079+-45	2860BC (0.19) 2810BC 2680BC (0.68) 2560BC 2520BC (0.13) 2490BC	2870BC (0.17) 2800BC 2780BC (0.83) 2470BC
263/450	005	Charcoal	2001-009	4,010+-68	2830BC (0.02) 2820BC 2660BC (0.03) 2650BC 2630BC (0.93) 2450BC 2420BC (0.02) 2400BC	2900BC (1.00) 2300BC
263/460	006	Olive Pits	2001-010	4,143+-61	2870BC (1.00) 2600BC	2890BC (0.99) 2570BC 2520BC (0.01) 2500BC
263/460	007	Olive Pits	2001-011	4,328+-51	3020BC (1.00) 2880BC	3100BC (1.00) 2870BC
263/460	007	Charcoal	2001-012	3,970+-51	2580BC (0.96) 2400BC 2370BC (0.04) 2350BC	2620BC (1.00) 2300BC

<sup>1</sup> Individual dates calibrated with the OxCal Program. The Bayesian post-probability estimate for each individual date's possible range is given in parentheses.

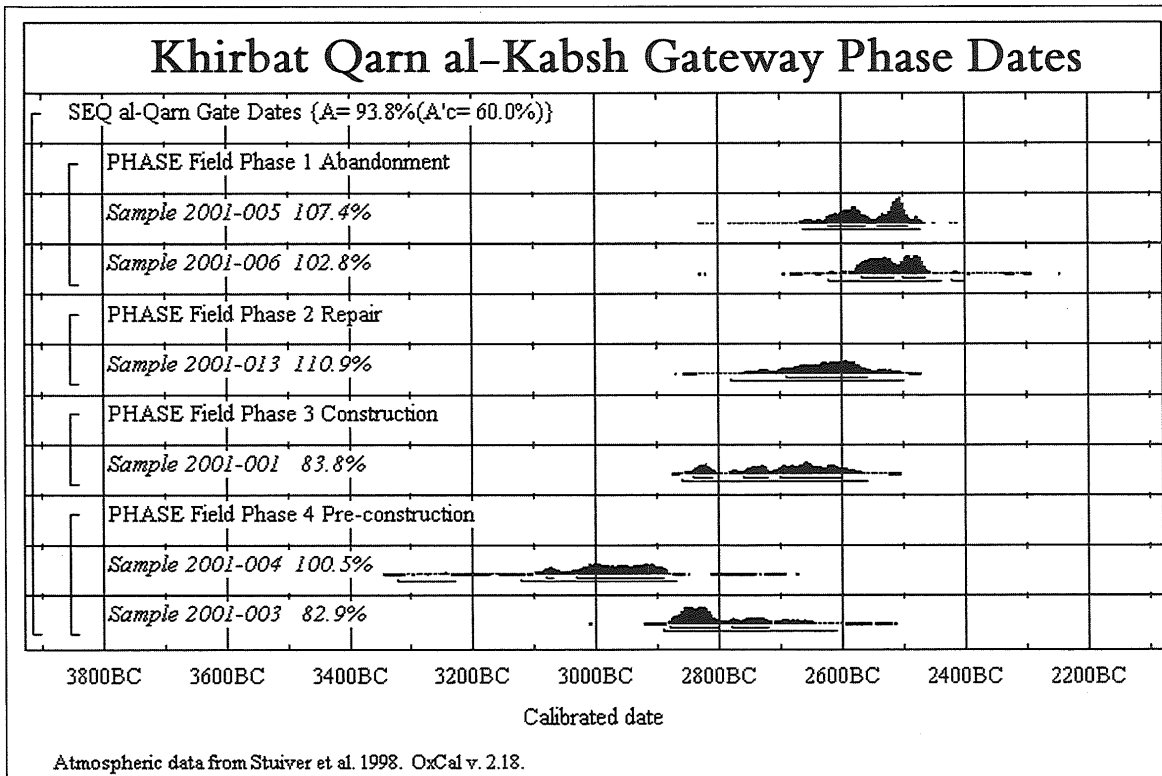
Table 4: Radiocarbon chronology of the Early Bronze I-III periods.

Period	Absolute Dates BC
Early EB I	3600/3400 to 3300
Late EB I	3400/3300 to 3100/3000
EB II	3100/3000 to 2850/2750
EB III	2850/2750 to 2400/2300
Dates from Philip 2001:Table 5.1.	

ing, because of the clear overlapping between them. Combining the dates with their stratigraphic and phase information yields a better sense of the likely chronological relationships between the four observed field phases. The OxCal Program allows sequences of phases and dates to be created, then calibrates the dates, and performs a Gibbs Sampling algorithm on the dates, as they are constrained by the sequence and phases. The program calculates the agreement between Bayesian post- and prior probabilities for individual dates and the overall sequence (Bronk-Ramsey 1995). The overall agreement for the six dates related to the gateway, A, was 93.8 %. The threshold value for deter-

mining good agreement for the sequence is approximately 60% (Bronk-Ramsey 1995), so there is good agreement between the dates (Fig. 6).

These results indicate that the gate complex was built on Field Phase 4 deposits that probably date from the late EB I through the EB II periods (Fig. 6: Sample 2001-004 and Sample 2001-003, respectively). Sample 2001-004, with a date in the late EB I to early EB II, has an agreement index greater than 100%, indicating that the date fits well with the stratigraphic sequence. Sample 2001-003, is later, dating within the EB II, and probably falling between 2900 and 2800 BC; this sample's agreement index is 82.9%, less than the earlier sample from Locus 004, but still well above the agreement threshold of 60%. The dates from Locus 004 in Unit 385/475 are significant for three reasons: 1) they indicate that al-Qarn was probably occupied throughout the EB II period, as well as in the EB I and EB III, which had been indicated by the ceramic evidence; 2) they show that the early occupation of the site was more extensive than previously appreciated, being found now on the east side of the site as



6. Khirbat Qarn al-Kabsh gateway radiocarbon phase dates, based on constrained sequence and field phases.

well as at the base of the midden on the west side; 3) they indicate that EB I and EB II deposits are to be found under EB III strata, which holds out great prospects for discovering an entire stratified EB I-III sequence in the area of the site where extensive EB III walls are present at the surface (Fig. 3).

The Field Phase 3 deposit, discussed above with Unit 385/475, is dated on olive pits recovered from the fill of the north gate tower. Taking the stratigraphic and phase information into account, the most likely date for the construction of the gate complex is early EB III (Fig. 6: Sample 2001-001), which confirms the estimation made in the field, based on ceramics and stratigraphy. Sample 2001-001 has an agreement index of 83.8%, well above the 60% agreement threshold. Within this period, construction of the gate tower (and very shortly thereafter, the first entry pavement) most likely occurred around 2650 BC, or slightly earlier.

It does not appear that much time elapsed before the repair of the pavement was made, which is assigned to Field Phase 2 at the gate complex. A date on olive pits found on the Locus 009 repaired surface, combined with phase and stratigraphic information (Fig. 6: Sample 2001-013), suggests the repairs occurred sometime around 2600 BC. This sample's agreement index was 110.9%, which achieved the highest agreement of any of the samples from the gate complex. These results are quite

satisfying, since the date on the final gateway surface is probably the most critical of the sequence.

Two samples, one on charcoal (Sample 2001-005) and one on olive pits (Sample 2001-006) were recovered from the Locus 007 material, which represents post-abandonment colluvium that covered the gateway pavements in Field Phase I. Both dates have agreement indices greater than 100%, and together, they suggest that the gate complex was abandoned by about 2500 BC (Fig. 6: Samples 2001-005 and 2001-006).

Taking all the dates from the gate complex into consideration with their stratigraphic and field phasing, it seems that the gate complex was probably in use for about 150 years, from its construction around 2650 BC to its abandonment around 2500 BC. These dates place the gate complex (and probably the rest of the fortifications, firmly in the middle of the EB III period (see Table 4). At this point in our research, we do not know firmly if the site continued to be occupied after the gate complex was abandoned, but some dates from the midden (Unit 263/460) suggest that it was.

Six dates were run from materials recovered in the midden excavation, Unit 263/460 (Table 3). The dates range from EB I through EB III, but are mixed stratigraphically. The mixing is typical of middens, which are a mixture of individual deposition episodes, as well as ongoing downslope ero-

sion and other disturbances during the formation of the midden. Thus, while it would be desirable to find only early dates in the lower levels of the midden, and later ones in the upper levels, it is not unusual to see mixing.

The dates clearly show that the midden began to form at al-Qarn by the EB I period (perhaps as early as 3650 BC, based on the two-sigma calibrated date from Locus 004, Sample 2001-007), and continued to develop until as late as 2300 BC (based on the two-sigma date from Locus 007, Sample 2001-012). These dates indicate that al-Qarn was occupied probably from early EB I through late EB III (Table 4).

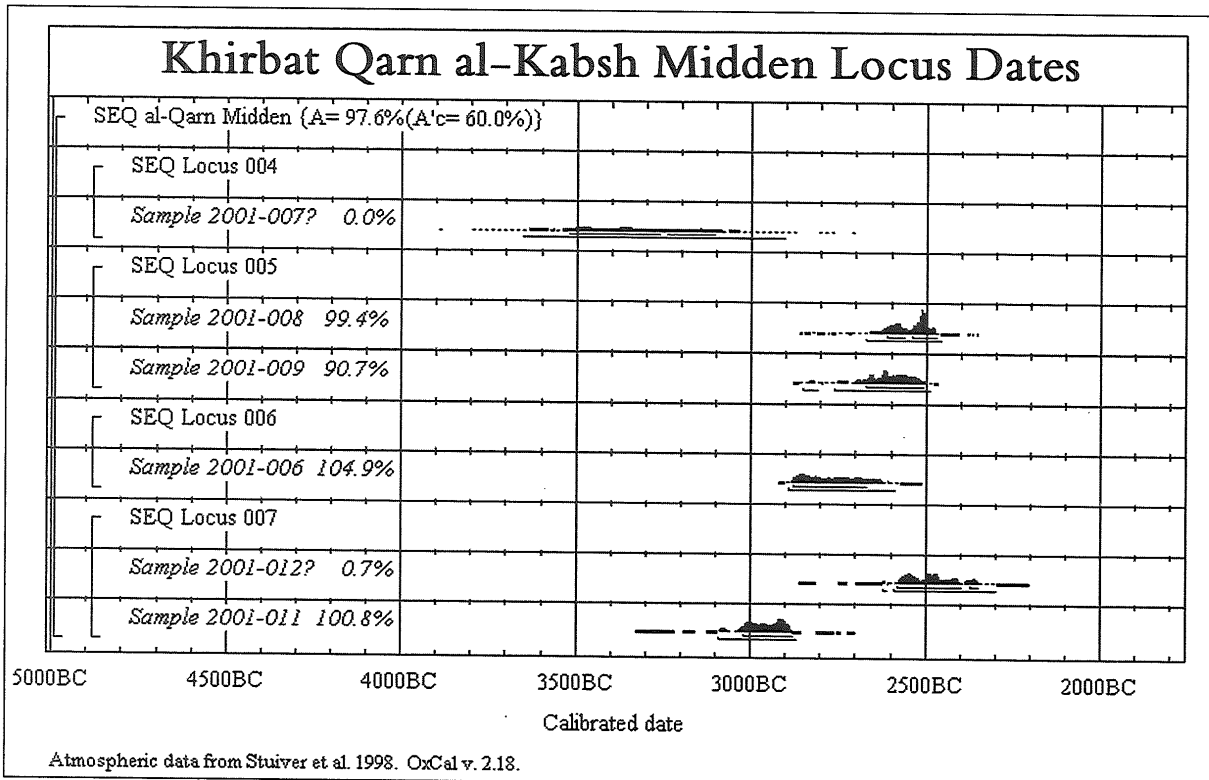
However, Samples 2001-007 and 2001-012 are clearly out of stratigraphic position. Sample 2001-007, the oldest sample date returned, is in the upper strata of the midden (Locus 004), while Sample 2001-012, the youngest recovered, is in the lowest level of the midden (Locus 007). These samples are clearly the result of mixing in the midden, perhaps due to episodic deposition, downslope erosion, and rodent disturbances. As such, they do not contribute to the overall dating of the midden layers, though they do clearly indicate that the site was in use during these earlier and later years.

The overall dating of the midden (Fig. 7) can be accomplished once again using the OxCal Program, including the sequences of dates as assigned to their various loci. For this calculation, a question

mark after Samples 2001-007 and 2001-012 tells the program to not use these dates in calculating the sequence, but will give the probability that the date occupies this position in the sequence. The results show that these dates have virtually no chance of being in sequence. Beyond clearly excluding these samples, OxCal shows that the overall agreement for the rest of the midden samples is 97.6%. We can say with considerable confidence that Locus 007 dates to late EB I through early EB II (which makes it contemporary with Field A at Tall Mādabā). Locus 006 dates to the EB II period, and Locus 5 to the EB III period. Comparing Figs. 6 and 7, we can see that the construction and repair of the gateway complex overlaps the deposits in Locus 006 and Locus 005 in the midden, and that midden Locus 005 may have continued to be in use beyond the abandonment of the gateway. Although Sample 2001-012 is clearly out of place in the midden developmental sequence, it may help corroborate the use of the site beyond the abandonment of the gateway.

**Faunal Remains from al-Qarn**

The 2001 faunal collection from al-Qarn consists of 692 bones, teeth, and fragments. Within this assemblage are 122 identifiable bones, teeth, and fragments and 570 fragments that are too small to be identified as to species and bone element. The faunal material was sorted initially to



7. Khirbat Qarn al-Kabsh midden radiocarbon dates, based on constrained stratigraphic sequence.

divide identifiable from non-identifiable fragments. Within the identifiable sample, bones of the left and right side were separated. Age-at-death was determined for the bones using Silver (1969). Sheep bones were distinguished from goat bones using criteria established by Boessneck, Muller and Teichert (1964) and Boessneck (1969). The collection totals, listed by field specimen (FS), are presented in **Table 5**. Most of the faunal specimens (638) were recovered from Unit 263/460.

#### Species Present

Eighty-one bones are clearly identifiable as to species and element. Of this total, 66 of the bones represent sheep (*Ovis aries*) or goats (*Capra hircus*). Within the sheep/goat collection, 13 bones are from sheep, and two are from goats. The MNI, based on the sample of distal humerii, is 5, although more individuals may have been used at the site. Several specimens within the sheep/goat collection demonstrated features relevant for both sheep and goats, and so could not be confidently classified as one or the other. Seven bones and teeth represent cattle (*Bos taurus*). Five bones represent small mammals, the precise identification of which is in progress. Final identification is also in progress for the two bird bones, and the lizard mandible.

The ancient human community whose activities these bones represent husbanded a mixed flock of sheep and goats, supplemented by cattle. Members of the community may have also occasionally hunted gazelle. While none of the clearly identifiable bones represent gazelle, the animals were not uncommon in the area (Atallah 1977/8) and most smashed gazelle bone fragments are nearly indistinguishable from those of sheep and goats. Therefore, the possibility that some of the bone fragments, such as broken vertebrae and ribs, may represent gazelle is suggested. The precipitation limitations of the al-Qarn area may explain the absence of pig bones in the collection.

#### Carcass Distribution

The carcass distribution pattern (see **Table 6**) at al-Qarn illustrates a pattern of primary butchering. The presence of bones with low meat utility is characteristic of communities which generally are consuming meat from animals culled from within the community's flock. The distribution pattern also reflects preservation factors. The faunal elements that tend to occur in greatest numbers in archaeological sites are early-to-fuse specimens as well as elements that are durable. The early fusing specimens include phalanges, proximal metapodi-

als, distal humerii, and proximal radii. Durable elements include teeth and ankle bones, such as astragali. Phalanges did not present cut marks, which can be an indicator of skinning activities. The asterisk marking vertebrae and rib fragment categories in **Table 4** indicates that some of these fragments may belong to gazelle.

#### Slaughter Schedule

The slaughter schedule can be assessed from data presented in **Table 7**, which lists mature and immature ovi-caprid bones. The bones listed belong to midden loci 003-007. The bone fusion

Table 5: Faunal assemblage totals.

FS	Unit	Locus	Number
235	385/475	002	5
239	385/475	002	11
244	385/475	003	12
249	385/475	002	12
255	385/475	004	13
268	385/475	007	1
279	263/460	001	8
284	385/475	008	3
287	263/460	002	11
291	263/460	002	26
297	263/460	003	49
305	263/460	003	25
320	263/460	004	86
324	263/460	005	94
333	263/460	006	71
338	263/460	006	71
342	263/460	007	127
356	385/475	011	3

Table 6: Small ungulate bones, teeth, and bone fragments.

Element	Number
Skull	1
Jaw & Teeth	11
Vertebrae*	16
Rib*	30
Scapula	3
Humerus	9
Radius	4
Ulna	3
Metapodial	6
Innominate	3
Femur	1
Tibia	3
Ankle	4
Phalanges	16

Table 7: Fused and unfused small ungulate bones.

Fusion age	Element	007 U	007 F	006 U	006 F	005 U	005 F	004 U	004 F	003 U
6-8 mo.	Scapula								1	
6-10	Innominate				2			1		
10	Distal Humerus		2	2	2	1				
13-16	Phalange 1			1	1	2		1	1	
13-16	Phalange 2			3						1
13-16	Distal Tibia			1						
20-28	Distal Metatapodial	1								
30	Proximal Ulna		1			1				
30-36	Calcaneus			2						
30-36	Proximal Femur				1					
36	Distal Radius	1								
36-42	Proximal Humerus		1				1			
		2	4	9	6	4	1	2	2	1

timetable is based on Silver (1969). Each column represents the midden locus (003, 004, 005, 006, or 007) and whether the bone was mature (fused=F) or immature (unfused=U). While most of the bones are from Locus 006, the general pattern for midden loci 003-007 is that animals were usually slaughtered within the first two years. A small number of bones represent animals over two years. Mature bones that fuse after age three are not present. The sample of teeth in the collection is quite small and does not permit design of a slaughter schedule based on tooth wear. However, there is one M3 in the collection which can be aged at 3+ years. In general, the slaughter pattern suggests a cull skewed toward young animals. This pattern very likely reflects a goal to obtain meat and milk (Payne 1973). Certainly, the absence of fused specimens over three years points away from a strategy of keeping older animals for wool.

**Botanical Remains from al-Qarn**

Most of the seeds recovered from screening are olive pits, with a few grape seeds and some charred wheat. Flotation of the soil samples taken from each locus will probably provide additional data on plant species. These initial observations are consistent with the location of al-Qarn and appear to be precursors of the current agricultural economy of the region. In the present, wheat is grown on the flatter areas where there is sufficient soil formation; olive trees and grapevines are currently grown in areas where bedrock steps dominate the landscape. Often, such steps have natural pockets between fractures in the bedrock, which are frequently filled with soil, and have been planted with olive trees or grapes. Thus, EBA al-Qarn appears to have established a pattern that continues to resonate to

the present day.

**Conclusions**

Although brief, and staffed by a small crew, the 2001 field season of the Moab Archaeological Resource Survey was completely successful. At al-Qarn we were able to conclusively demonstrate that the gate complex on the northeast side of the site was built in the EB III period on soil deposition dating from the late EB I and EB II periods. The gateway has two architectural phases, represented first by the gate towers and a flagstone entryway, and second by a repair/rebuild of the entry pavement using small cobbles framed with larger stones. The upper surface was sealed by more than 50cm of post-depositional fill, which contained EB III material and a single Roman/Byzantine sherd. Thus, it was clear that the site had been abandoned, and was being filled with wind deposited soil and collapse by the Late Classical period (and probably since the end of the EB III period). We were able to recover a number of seeds and charcoal samples from the various loci associated with the gate tower and entryway, which have been used in conjunction with the ceramic and stratigraphic evidence to provide a fine-grained chronology for the fortification system.

The excavations in the midden uncovered significant amounts of ceramics, lithic debris, bone, and seeds; radiocarbon dates from the midden, while somewhat mixed due to the nature of midden formation processes, nevertheless indicate that al-Qarn was occupied from early EB I through late EB III, perhaps after the gateway complex had been abandoned.

Faunal remains, mostly from the midden excavation, show that residents of al-Qarn relied mostly



on sheep and goats, with some evidence of cattle and possibly gazelle. The carcass distribution suggests that the animals were culled from the community's flock, mostly within the first two years. A few small bird bones were also recovered. These faunal remains will be comparable to materials collected from other EBA sites on the Mādabā Plain, to help establish the nature of production and exchange among the EBA sites in the Mādabā Plain Site Cluster. As this evidence accumulates through additional survey and testing of other parts of the project area, we will, in the future, be able to determine how various sites in the cluster are related to each other and to the local economy in the Early Bronze Age.

The Early Bronze Age represents the first in a series of cycles of settlement development and decline, and established patterns of social organization, land use, construction and environmental utilization that resonate even to the present day. As Philip (2001: 202) has stressed, "From the later fourth millennium BC onwards, the inhabitants of Jordan would have moved within a landscape much of which originated in the Early Bronze Age". Thus, continued exploration of EBA settlement, subsistence, and social relations should be one of our primary concerns. The site of Khirbat Qarn al-Kabsh presents an excellent opportunity to explore these factors as they were articulated at a small, agricultural village, which formed part of a larger group of communities on the southwestern part of the Mādabā Plain.

S.H. Savage  
Department of Anthropology  
Box 82402  
Arizona State University  
Tempe, AZ 85287-2402  
USA

M.C. Metzger  
Department of Humanities and Social Sciences  
331 Cullimore  
New Jersey Institute of Technology  
University Heights  
Newark, NJ 07102  
USA

#### References Cited

- Atallah, S.I.  
1977/8 Mammals of the Eastern Mediterranean Region; their Ecology, Systematics and Zoogeographical Relationships. *Saugetierkundlichen Mitteilungen* 25: 241-320; 26: 1-50.
- Boessneck, J.  
1969 Osteological Differences Between Sheep (*Ovis aries* Linne) and Goat (*Capra hircus* Linne). In D.R. Brothwell and E.S. Higgs (eds.), *Science and Archaeology*. New York: Praeger.
- Boessneck, J., Muller, H.-H. and Tiechert, M.  
1964 Osteologisch Unterscheidungsmerkmale zwischen Schaf und Ziege. *Kuhn-Archiv* 78: 1-129.
- Bronk-Ramsey, C.  
1995 *OxCal User's Manual, Version 2.18*. Oxford: Oxford Radiocarbon Accelerator Unit.
- Crumley, C.  
1995 Heterarchy and the Analysis of Complex Societies. Pp. 1-6 in R. Ehrenreich, C. Crumley and J. Levy (eds.), *Heterarchy and the Analysis of Complex Societies*. Archaeological Papers of the American Anthropological Association Number 6. Arlington, Virginia.
- Harrison, T.P.  
1997 Shifting Patterns of Settlement in the Highlands of Central Jordan during the Early Bronze Age. *BASOR* 306: 1-37.
- 2000 The Early Bronze III Ceramic Horizon for Highland Central Jordan. Pp. 347-364 in G. Philip and D. Baird (eds.), *Ceramics and Change in the Early Bronze Age of the Southern Levant*. Sheffield: Sheffield Academic Press.
- Harrison, T.P. and Savage, S.H.  
1997 The 1996 Field Season at Tell Madaba. *AJA* 101(3): 508-510.
- Harrison, T.P., Hesse, B., Savage, S.H. and Schnurrenberger, D.  
2000 Urban Life in the Highlands of Central Jordan: A Preliminary Report of the 1996 Tall Madaba Excavations. *ADAJ* 44: 211-229.
- Payne, S.  
1973 Kill-off Patterns in Sheep and Goats: The Mandibles from Asvan Kale. *Anatolian Studies* 22: 281-303.
- Philip, G.  
2001 The Early Bronze I-III Ages. Pp. 163-232 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press.
- Savage, S.H.  
2001 The Moab Archaeological Resource Survey – 2000 Season. *AJA* 105(3): 431-433.
- Savage, S.H. and Rollefson, G.O.  
2001 The Moab Archaeological Resource Survey: Some Results from the 2000 Field Season. *ADAJ* 45: 217-236.
- Silver, I.A.  
1969 The Aging of Domestic Animals. In D.R. Brothwell and E.S. Higgs (eds.), *Science in Archaeology*. New York: Praeger.

