1984

Madaba Plains Project: A Preliminary Report of the 1984 Season at Tell el-'Umeiri and Vicinity

Oystein S. LaBianca
Andrews University, labianca@andrews.edu

Lawrence T. Geraty et al.
Andrews University

Madaba Plains Project: A Preliminary Report of the 1984 Season at Tell el-'Umeiri and Vicinity

Author(s): Lawrence T. Geraty, Larry G. Herr, Øystein S. LaBianca, James R. Battenfield, Robert G. Boling, Douglas R. Clark, John I. Lawlor, Larry A. Mitchel and Randall W. Younker

Source: *Bulletin of the American Schools of Oriental Research. Supplementary Studies*, No. 24, Preliminary Reports of ASOR-Sponsored Excavations 1980-84 (1986), pp. 117-144
Published by: The American Schools of Oriental Research
Stable URL: https://www.jstor.org/stable/20066661
Accessed: 06-12-2018 17:28 UTC

Madaba Plains Project: A Preliminary Report of the 1984 Season at Tell el-ᶜUmeiri and Vicinity[1]

LAWRENCE T. GERATY
Atlantic Union College
South Lancaster, MA 61561

LARRY G. HERR
Canadian Union College
Lacombe, Alberta, Canada TOC0Z0

ØYSTEIN S. LABIANCA
Andrews University
Berrien Springs, MI 49104

JAMES R. BATTENFIELD
Grace Graduate School
Long Beach, CA 90807

ROBERT G. BOLING
McCormick Theological Seminary
Chicago, IL 60637

DOUGLAS R. CLARK
Southwestern Adventist College
Keene, TX 76059

JOHN I. LAWLOR
Baptist Bible College
Clarks Summit, PA 18411

LARRY A. MITCHEL
Pacific Union College
Angwin, CA 95408

RANDALL W. YOUNKER
Andrews University
Berrien Springs, MI 49104

INTRODUCTION

The Madaba Plains region in Jordan is located in the highlands to the east of the Dead Sea's northern end and to the south and west of Amman (fig. 1). Between 1968 and 1981 field research focused on Tell Ḥesbân, approximately 9 km south of Naᶜūr along the road to Madaba.[2] Beginning in 1984, attention shifted to Tell el-ᶜUmeiri, 12 km northeast of Tell Ḥesbân along the new Queen Alia Airport Road.[3] These two sites and the territory east and west along a line stretching from Madaba to Amman defined the regional focus of the Madaba Plains Project.

Research since 1968 has come to focus on the cycles of intensification and abatement in settlement and land use that appear to have occurred since prehistoric times (Geraty and LaBianca 1985). These cycles are evidenced not only in the on-again off-again occupation of Tell Ḥesbân and its region (Ibach 1978), but also in the cyclic filling up and emptying out of the region surrounding Tell el-ᶜUmeiri. While this cyclic pattern is not unique to this region or to Jordan or the Middle East as a whole (Sauer 1980; Johnson 1973; Adams 1978), these cycles embody theoretically significant problems to which this project can contribute insights, given its geographical location and a promising data base.

A significant exception to the pattern is Tell el-ᶜUmeiri itself, where the expected cyclical occupation over the two-and-a-half millennia from the Early Bronze to the Iron Age is not apparent. Whereas in the regions surrounding Tell el-ᶜUmeiri and Tell Ḥesbân little sedentary activity occurred during the Middle and Late Bronze Ages, remains from both periods appear to be significant at Tell el-ᶜUmeiri. Our excavations, therefore, provide an opportunity to investigate the adaptive strategies of a settled population during a period of food system abatement in the surrounding region.

This situation provides a broader vantage point from which to view questions of traditional concern to biblical archaeologists.[4] For example, the historical identity and way of life of the peoples who occupied the Madaba Plains region during the Late Bronze and Iron Ages can be investigated more productively when those investigations are informed by theory about how food systems intensify and abate.

PREVIOUS WORK IN THE TELL EL-ᶜUMEIRI REGION

A few explorers in the 19th century visited the region of Tell el-ᶜUmeiri. Warren (1869: 291) was

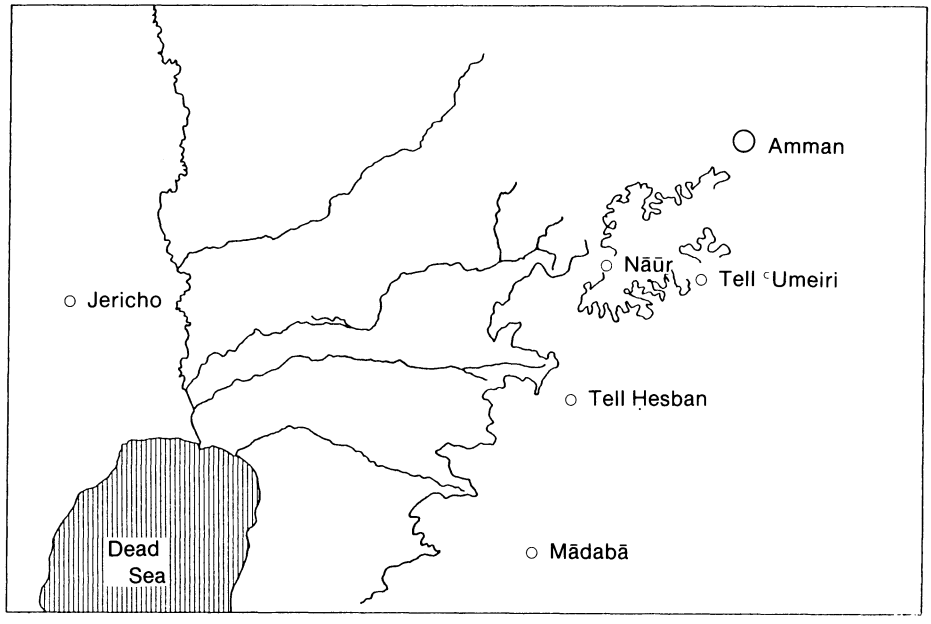

Fig. 1. Central Jordan. Tell el-ᶜUmeiri is located on the northern edge of the Madaba Plains in the foothills surrounding Amman.

among the first, in 1867, noting that "Amâry" is the name of the district as well as three ruins in it. Conder (1889: 19), while unable to locate the spring, did visit the region, and also referred to three tells in connection with "el ᶜAmeireh." Most explorers, however, missed the region, probably because it was not (until recently) near a main thoroughfare and because the other hills surrounding Tell el-ᶜUmeiri obscured its importance.

Motivated by a desire to discover the ancient borders of Ammon, four German scholars explored the region to the west (Gese 1958) southwest (Hentschke 1960; Fohrer 1961) and south (Reventlow 1963) of Amman in the late 1950s and early 1960s. Among their discoveries was a series of *Grenzfestungen* or boundary forts, which they believed represented the ancient western border of Ammon. Typically these forts consisted of a rectangular building with an adjacent watchtower. The present report holds that many of these watchtower sites were not, however, defense installations, but farmsteads.

The first thorough description of the site resulted from the Tell Ḥesbân regional survey of 1976 (Ibach 1978: 209). Tell el-ᶜUmeiri (West), Site 149, was noted as a major site of 16 acres with a spring, considerable evidence of architecture, and huge quantities of sherds. The sherds ranged from the Chalcolithic Age through Iron II with most intervening periods represented (Ibach 1978: 209). Tell el-ᶜUmeiri (East), Site 150, was described as a medium site with even more visible architecture, caves, and cisterns; its pottery ranged from the Iron Age through Umayyad and included Roman and Byzantine. A third ᶜUmeiri was noted to the north of these sites and contained mainly medieval Mamluk ruins.

Von Rabenau (1978) appears only to have been concerned with Site 150. During a two month survey in 1979, Franken, with four others, completed the most thorough investigation to that date. Franken concluded that "from the archaeological remains and objects found, tell Emairi and its immediate surroundings seem to reflect nearly the entire cultural history of the country" (Franken and Abujaber 1979: 1). Dividing his findings into four "cycles" (Neolithic through Early Bronze, Middle Bronze through Iron Age, Roman through Islamic periods, and 1850 to the present), he advocated urgent investigation not only of the promising tell but also of the rural landscape with its agricultural installations, cemeteries, and water sources (Franken and Abujaber 1979: 61).

In 1981 Redford visited the ᶜUmeiri region during a three-week survey in which he sought to identify Nos. 89–101 of Thutmose III's list of

Asiatic toponyms with a series of sites in Transjordan. After sherding Tell el-ᶜUmeiri (West) and studying its topography, Redford concluded that it "fulfills all the criteria posed by Nos. 95–96 in Thutmose III's list. It has the largest perennial spring anywhere in the vicinity; it was occupied during MB/LB, and is in a strategic location on a transit corridor of easy passage. . . . The evidence thus seems strong that *ᶜyn/krmn*, or the Abel Keramim of the Bible, is indeed to be sought at the site of ᶜUmeiri west" (Redford 1982: 69–70).

Finally, Abujaber (1984), ᶜUmeiri's landowner, completed his own research on the development of agriculture in the region during the 19th century, a development to which his own forebears contributed substantially.

OBJECTIVES[5]

The Food System Perspective

The "food system" concept played an important role in the conceptualization of our objectives for 1984, as it had earlier at Tell Ḥesbân. This concept has helped us see the way in which many seemingly unrelated lines of evidence fit together (Geraty and LaBianca 1985, LaBianca, 1985b). It has furnished a basis for assuming that changes that turn up archaeologically in settlement and land-use patterns, operational facilities (such as tools and farm equipment, storage installations, wine presses, terraces, tabûns, and even defenses), and diet—whether in the data from the tell or in the surrounding regional survey—have been determined largely by changing strategies for obtaining food. A food system, thus, consists of all of the purposive, institutionalized, and interconnected activities people carry out in their quest for food (Dyson-Hudson and Dyson-Hudson 1970).

Such an assumption seems justified because traditionally, at least, activities related to the quest for food have taken up the largest share of most people's time and energy. Our conception of the food system is a broad one, of course, for we regard the construction of water works, villages, and terraces; the introduction of markets and roads in rural areas; and arrangements for storing, preserving, preparing, and serving food as ultimately interconnected, and hence, analytically integrable. Furthermore, the concept recognizes that the food production strategies of camel nomads and transhumant sheep and goat pastoralists are as important analytically as the more sedentary food production strategies of villagers and townspeople. Thus the concept helps dispel the bias in favor of sedentary agriculture, which has until recently dominated much of the writing about the rural landscape of Palestine.

Sedentarization and Nomadization

When food systems change they either intensify or abate as a result of increased or decreased input of human management and energy. In our region, intensification and abatement appear to be reflected in the tension between the processes of sedentarization and nomadization, which seems to have existed in this region since antiquity. Sedentarization deals with the gradual establishment of farmsteads, villages, and towns whose inhabitants engage in the production of crops. Nomadization, on the other hand, accompanies the abatement of sedentary food production with resultant changes in food production strategies, the direction of pastoralism.

Based on the findings of the Tell Ḥesbân Expedition, it seems that sedentarization and nomadization have occurred side by side in the Madaba Plains since antiquity; hence the constant tension between the desert and the sown in this region. The repeated cycles of intensification and abatement reflected in the longterm settlement patterns of the Madaba Plains are accounted for by the varying rates at which sedentarization and nomadization have occurred. An important task, therefore, is to ascertain the factors contributing to changes in the rate of sedentarization and nomadization over the time range in which this region was occupied.

THE REGIONAL SURVEY

The regional survey had the specific objective of recovering data pertinent to understanding the food production activities of the ancient inhabitants within a 5-km radius of Tell el-ᶜUmeiri. Aerial surveying, random sample surveying, judgment sample surveying, environmental surveying, and ethnographic surveying comprised the research strategies pursued by the survey team.[6]

The Site-finding Process

The most extensively-used surveys were the random and judgment sampling surveys. The former resulted in the examination and recording of 38 "random squares"; the latter resulted in the

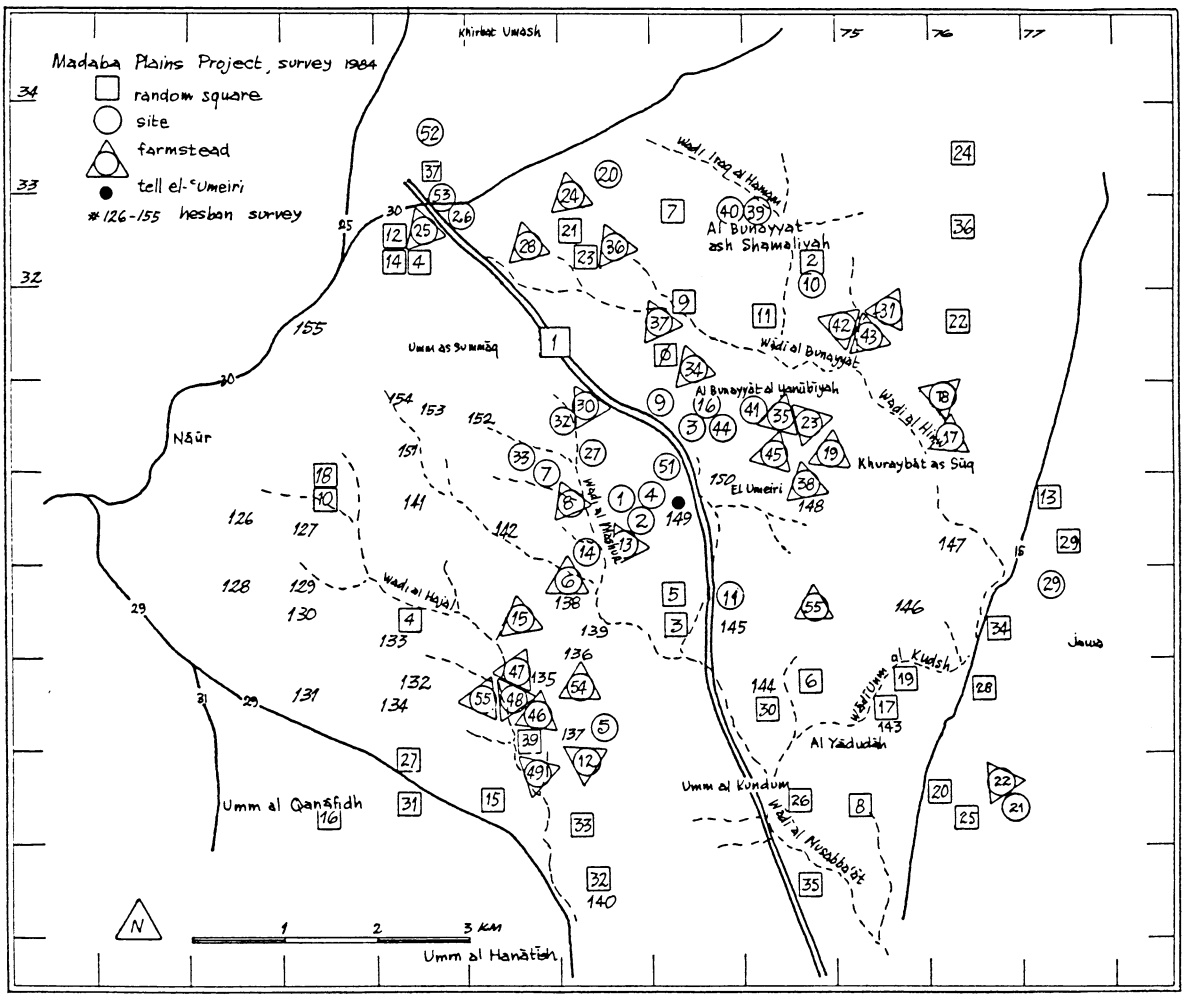

Fig. 2. ᶜUmeiri Regional Survey. From Tell el-ᶜUmeiri West, Site 149, the regional survey covered sites within a 5-km radius of the tell.

identification of 55 "sites" (fig. 2). To these can be added studies of a number of agricultural installations and environmental habitats found in the aerial and environmental surveys and the information provided by local informants in response to ethnographic inquiries.

Because ancient human artifacts—pottery sherds at the very least—appeared in all the random squares, whether or not a "site" was present, a definition of the term "site" must be determined. Although it is beyond the scope of this report to settle this issue (see Plog, Plog, and Wait 1978), we have followed conventional usage in designating a place as a "site" if clustered evidence of ancient human handiwork can be found there. A site may be a town, a village, a road, a cemetery, an isolated tomb or tower, or even a distinct sherd scatter. Thus a "site" may be located inside a random square or it may overlap with one.

Leads provided by the random sampling survey influenced the other surveys. For example, Random Square (RS) 2 led to the discovery of a pair of hilltop farmsteads (Sites 10 and 40) and a columbarium (Site 39). Traces of an ancient road intersection (Via Nova?) and the remains of two Roman milestones were found, thanks to the random square survey (RS 20, 17, and 19, respectively). Site 53, a rich Palaeolithic site, was found because of its proximity to RS 37. RS 39 led to the discovery of Sites 46, 50 and 54.

Two additional factors influenced the site-finding process. The first was the decision to concentrate the judgment sample survey in the northern portion of the project area. This area was chosen

over the southern portion because the latter had already been surveyed by the Ḥesbân Regional Survey (Ibach 1978), and because the northern portion is currently undergoing the most rapid urbanization. The second influencing factor—especially toward the end of the season when the telltale signs of ancient farmsteads were better understood—was the deliberate attempt to locate many such farmstead sites for comparison and documentation.

The Project Area Today

Climate. The geological features of the west bank and the Jordan Valley play a significant role in controlling the microclimate of the ᶜUmeiri region. Because of the relatively high north–south ranging mountains on the west bank, as well as the presence of the Jordan Valley itself, Transjordan experiences the "rainshadow effect"; it receives less precipitation than Cisjordan, the clouds having already dropped most of their moisture over the mountains to the west. Nevertheless, the elevation of the Jordan Plateau is sufficient to draw cloud cover enough to yield an annual precipitation that varies between 300 mm and 500 mm in the Tell el-ᶜUmeiri region. The monthly temperature means range from 20° C in July to 12° C in January (Abu Howayej 1973).

These conditions are adequate to support a richer (though certainly not exuberant) variety of floral and faunal communities than exists at present. This conclusion is supported by the success of the forests introduced into the area by the Jordanian Department of Forestry since 1948 (Aresvik 1976: 182), as well as by the survival of remnants of indigenous forests still visible throughout Jordan (Aresvik 1976: 176–81). Data collected by the expedition's environmental survey indicate that in antiquity such forests were much more widespread. The present lack of more abundant biotic communities can best be attributed to the impact of humans on the natural environment.

Plant Communities. The present plant communities of the Tell el-ᶜUmeiri region reflect the uniqueness of the location of Palestine at the convergence point of four phytogeographical regions: the Mediterranean, the Irano-Turanian, the Saharo-Sindian, and the Sudano-Deccanian (Zohary 1962: 52). The Tell el-ᶜUmeiri environment falls within the East Mediterranean subregion of the Mediterranean, although it is bordered, not far to the east, by the Irano-Turanian. It is not surprising, therefore, to find a few elements of the latter region encroaching on the area around the tell.

Four basic plant communities exist in the immediate vicinity of Tell el-ᶜUmeiri: (1) a batha community led by thorny burnett (*Sarcopoterium spinosa*); (2) a semisteppe batha community led by common ballota (*Ballota undulata*); (3) a semisteppe maquis community led by hawthorn (*Crataegus azarolus*?); and (4) a forest community led by aleppo pine (*Pinus halepensis*) and including cypress (*Cupressus sempervirons*), juniper (*Juniperus phoenicia*), common oak (*Quercus calliprinos*) and *hypericum*. With the important exception of common oak, however, most of the members of the latter community have been introduced recently by man, leaving the dwarf shrubs led by thorny burnett as the most widespread and dominant natural community.

Topography. The topography of the Tell ᶜUmeiri region consists of gently sloping hills bordered on the south by the Madaba Plain. This is in contrast to the hill country of the west bank where the angle of the slopes is generally greater. Thus, terracing, a common feature on the west bank, does not appear as frequently on the hills in the immediate vicinity of Tell el-ᶜUmeiri.

The tell occurs on an eastern projecting spur of a generally north–south trending ridge. While the elevation of the tell proper is 913 m, ridges to the northeast, northwest, west, and south have peaks with respective elevations of 923 m, 931 m, 937 m, and 929 m. This provided the inhabitants of ancient Tell el-ᶜUmeiri a clear distant field of vision only to the east. This situation obviously presented the city with a peculiar strategic defense problem, particularly on its southern approach. An observation tower discovered on the southern ridge therefore came as no surprise to the team. Although the tower was tentatively dated to the Early Bronze period, such an installation probably existed somewhere on this ridge throughout most of Tell el-ᶜUmeiri's existence.

Present Settlement and Land Use. The process of sedentarization, which has occurred within the project area over the past 150 years, generally follows the pattern that has been documented in the vicinity of Tell Ḥesbân (Geraty and LaBianca 1985). For example, the team visited numerous caves which, during the earlier part of this century and throughout the previous Ottoman period, had

Fig. 3. Fortified farmhouse, typical structure from the late Ottoman period.

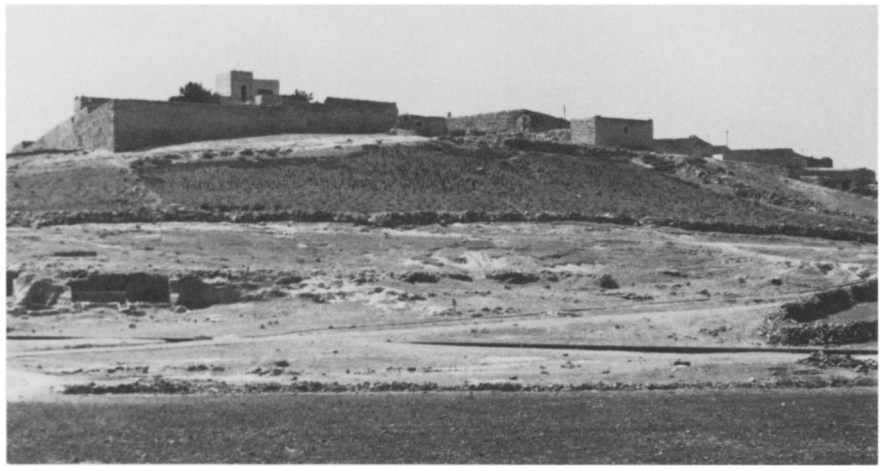

Fig. 4. Yadudah. The Abujaber family fortified village from the late Ottoman period.

been utilized as seasonal dwellings by transhumant members of the Ajarmeh tribe. There also were several caves in the vicinity of the ruins at Umm el-Kundum; one of them measured 9 m wide and 8 m deep and had a hearth in the center near the entrance. The ceilings of all these caves were typically black from soot, even though makeshift chimneys had been built over the hearths of many. As the tribesmen settled into villages they built the characteristic fortified farmhouses seen throughout many villages in Jordan dating to the early part of this century (fig. 3). Such dwellings can be found, for example, at the Ajarmeh village of Al-Bunayyat, immediately north of Tell el-ᶜUmeiri. Today most of these dwellings have been replaced by modern Jordanian cement houses.

In addition to the Ajarmeh, the Beni Sakhr Bedouin also utilized the pastures and ruins of this region in previous decades, and their descendants were found in several of the villages of the project area. Of particular importance, however, was the village of Al-Yadudah, for its establishment in the last century by members of the Abujaber family played a crucial role in the transformation of the landscape of this region from pasture to sown. The massive perimeter walls of this village reflect the hostilities these pioneer settlers had to overcome in leading the way toward more intensive land utilization in this region (fig. 4).

In 1977–78 an estimated population of at least 3200 people inhabited at least seven villages within

the project area. (It has probably doubled at least once since then.) While the older tribes and families are still well represented in some of the villages, the hostilities of the past are largely forgotten. Together, and with the added cooperation of newcomers, especially Palestinians, the rural landscape of the project area is rapidly undergoing intensification. The large tracts of land which in previous decades were planted to fieldcrops are today being planted to fruit trees and vegetables. Rapid urbanization of the northern territory is totally removing the northern portion of the project area from farm use.

In an effort to uncover epidemiological correlates of sedentarization, the team initiated an investigation of the dental health of children encountered during the survey. More than 300 photographs were taken of the teeth of as many children. Although the final results are still pending, this may prove a fruitful line of inquiry, given the systematic patterning established in the data. Since teeth are usually well preserved archaeologically, they may furnish an independent line of evidence of food system change in antiquity as well.

The Ancient Environment

It was noted above that although the present dominant plant community consists of dwarf shrubs, endemic factors such as rainfall, temperature and soil conditions are sufficient to support a richer biota. That such a biota existed in the past is supported by several lines of evidence. Previous studies of plant successional patterns (vegetation dynamics) in this general region indicate that the dwarf shrubberies dominating the landscape are not the natural floristic climax community, but rather a seral community. The original climax community consisted of an oak woodland or maquis (Zohary 1962: 10, 74, 75). The environmental survey team confirmed this fact, observing that common oak (*Quercus calliprinos*) was making a natural comeback in the shady areas of the pine forest artificially introduced on the ridge immediately south–southwest of the tell (Zohary 1962: 90; Weier 1970: 373).

Faunal remains on the tell also testify to the existence of such a plant community. Preliminary identification includes remains of animals such as wild pig and fallow deer, which require a more lush habitat than currently exists (cf., Boessneck and von den Driesch 1978: 269). The occurrence of these animal bones in the archaeological record presupposes a contemporary existence of a forest or maquis, and means that these bones can serve as an indicator as to when, through the lifetime of Tell el-ᶜUmeiri, this biotic community existed. Based on such evidence, our preliminary examination of the bone material indicates the presence of such a community from the Iron II back through the Early Bronze periods.

Ancient Farmsteads

Consistent with the food system perspective has been the search for evidence of ancient food production activity areas. The environmental team constructed a map, based on the environmental data, which attempted to differentiate between areas that in antiquity were most likely covered by natural vegetation and those that were probably utilized for agriculture. Several factors were considered, including present land use, soil types, natural water availability, and the present distribution of subclimax floral communities.

At the same time, the random survey team noted the presence of cisterns, wine presses, grinding stones, dams, and terraces in their random squares; they also began observing a number of round or rectangular structures, often surrounded by a perimeter wall. The dimensions of the rectangular structures had varied from 5×7 m to 15×16 m, most of them tending toward the smaller end of this spectrum.

The foundation stones of these structures were large boulders, often averaging $0.90 \times 0.75 \times 0.50$ m. This size initially gave the impression that the structures were defensive towers of some sort, similar to others in the Amman hinterlands. The surface sherds also indicated the same periods of occupation as certain of the Amman structures. Defense was later ruled out as the primary function of the Tell el-ᶜUmeiri "towers" because, although they generally surrounded the tell, they were not placed strategically for either defense or communication. Indeed, most of them were located on the sides of hills and an approaching enemy could easily sneak up the other side, or even up the main tell, without being seen.

On the other hand, all the structures have excellent vantage points for overlooking the prime agricultural farmland. Usually these structures were placed in a centralized location at the junction of two or more arable wādīs, on the edge of prime agricultural ground but never upon it. This

land was too precious to be used for anything but agriculture.

At least 32 of the 55 sites examined by the survey team may turn out to be farmsteads, judging on the basis of their location and content. The pottery from these 32 sites reflected both sedentarization and nomadization processes. The Iron Age cycle, for example, emerged out of the Late Bronze, with only 3 sites, to a buildup of 10 sites during Iron I and 23 sites during Iron II. This buildup was followed by a period of nomadization that reached its peak during Hellenistic times. Another buildup began during the Early Roman period with 9 sites and reached its peak of intensification during Byzantine times, with 23 sites. A process of abatement then followed during Umayyad times, with 9 sites, which led to a nearly complete return to nomadism during the Abbasid, Fatimid, and Seljuq–Zengid periods. A brief return to sedentary farming occurred again during Mamluk times, represented at two farmstead sites, only to be followed again by an extended period of nomadic occupation throughout the Ottoman period.

In addition to the remains of stone towers and rectangular buildings many of the farmstead sites also contained the remains of perimeter walls (at 15 of the 32 sites), cisterns (14 sites), connecting roads (8 sites) and millstones (3 sites). Given their characteristic location on hills and spurs overlooking fertile valleys and their towers, perimeter walls, cisterns and presses, some of these farmsteads must have resembled those of the vineyard described in Isa. 5:1–7.

Roads and Milestones

Fifteen of the 55 sites examined during the 1984 season contained the remains of ancient roadways (fig. 2). Seven of these sites were located within 2 km to the north of Tell el-ᶜUmeiri (Sites 1, 9, 23, 27, 30, 32, 51). Another four are in the vicinity of the village of Yadudah (Sites 17, 18, 31, 43). Sites 20 and 55 are ca. 3.5 km north of Tell el-ᶜUmeiri; Site 47, ca. 3 km southwest; and Site 41, ca. 2 km northeast.

At Site 18 an ancient road marked by parallel curbstones was traceable for nearly 0.5 km. Measuring ca. 4.5 m wide, it ran northwest–southeast along the flank of Wādī el-Ḥīnū. Alongside this road are the remains of several buildings, including a small circular structure, ca. 3.1 m in diameter; the foundation of a large rectangular building, ca. 5 × 6 m and built of very large cut blocks; and a smaller square building ca. 4.1 × 4.1 m built of unfinished boulders. These features, along with the discovery of three milestones—one along the road and two in secondary use in the village of Yadudah—established again the existence of a portion of the route of the Via Nova as well as the possible existence of a Via Nova waystation south of Amman.

Funerary Sites

Of the 17 locations (fig. 2) where funerary sites were noted, 11 were located within a radius of 2 km of Tell el-ᶜUmeiri (Sites 2, 3, 6, 9, 11, 16, 27, 32, 33, 44, 51). Other funerary sites included Sites 20, 26, 28, 39, 40, and 50. Sites 3 and 16, which were located about 1 km north of Tell el-ᶜUmeiri, belong to a cemetery with numerous tombs, many of them recently plundered. At least five distinct tomb types were represented, including the rolling stone type as indicated by the discovery of a large, completely quarried rolling stone that needed only to be undercut.

Site 11, about 1 km south of Tell el-ᶜUmeiri, contained the remains of another cemetery. Here scores of open tombs were found along a line that ran for nearly 0.5 km east–west. Most consisted of round chambers with as many as 15 loculi. Some had stepped entrances cut into bedrock and many appeared to have been recently excavated illicitly. About 4 km north of Tell el-ᶜUmeiri another cemetery, Site 25, contained at least 35 opened tombs representing a variety of types, some with as many as 12 loculi. Whereas the pottery from Sites 3, 16, and 25 consisted mostly of Byzantine and Roman pieces, the dominant pottery at Site 11 was Mamluk.

An artificial hillside cave was found at Site 39 facing southeast; it appeared to contain the remains of a columbarium (fig. 5). Inside were two vaults, each lined with recesses for cinerary urns. Many of the recesses were blackened from soot. No pottery was found.

Survey Pottery

An opportunity for comparison of the pottery finds of several surface surveys has become possible thanks to collections made in the southern portion of the project area and the neighboring

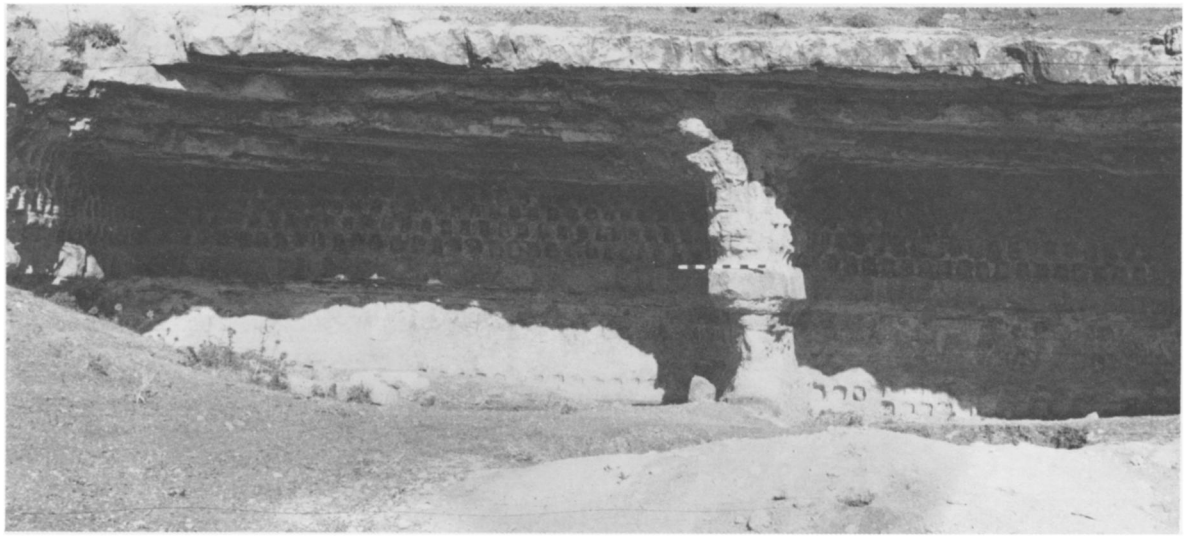

Fig. 5. Columbarium. Site 39, carved out of a hillside near ᶜUmeiri.

territory to the south and west by the Tell Ḥesbân Survey (Ibach 1978) in 1973, 1974, and 1976, and to collections of the random and judgment sampling surveys of our team. Table 1 shows the distribution of this ceramic evidence, period by period, from our 38 random squares (first column), our 55 sites (second column), and the Tell Ḥesbân Survey (third column).

While no Chalcolithic pottery was recognized from our first season, the Tell Ḥesbân Survey (HS) reported Chalcolithic at 11 of their 148 sites (7.4%). Three of these 11 sites, including Tell el-ᶜUmeiri, lay within our survey area (HS 128, 129, 149).

Early Bronze pottery was more widespread: 11 random squares (29%) and 10 sites (18.2%), compared to 46 sites (31%) in the Tell Ḥesbân Survey. But three of the latter lay within our area and include Tell el-ᶜUmeiri (HS 139, 140, 149).

Middle Bronze remains so far are meager, in 2 random squares (5.3%) and 2 sites (3.6%), compared to 14 Tell Ḥesbân Survey sites (9.5%) from EB IVC and MB. But 3 of the Ḥesbân Survey sites lay within our perimeter and include Tell el-ᶜUmeiri (HS 139, 140, 149).

The distribution of Late Bronze readings was similar: none in random squares, "possible" at 3 sites (5.5%), compared to 6 sites in the Ḥesbân Survey (4.1%). Again, three of the Ḥesbân Survey sites also fell within our perimeter and include Tell el-ᶜUmeiri (HS 128, 129, 149).

Distribution of Iron I remains, where the number of sites increased sharply, was remarkably consistent (23%, 21%, 20%), making the pattern for late Iron II especially interesting (60.5% of random squares, 61.8% of sites), as compared with the findings of the Tell Ḥesbân Survey (43%).

The Hellenistic period was possibly represented in one random square, plus a Nabataean sherd in another square, in surprising contrast to the 21 Tell Ḥesbân Survey sites where this period made up 14 percent of the finds.

Similarly, the distribution of Early Roman pottery appears to have been broader in the Ḥesbân Survey zone (29%, 27.2%, 39%), but more nearly uniform in the Late Roman period (36.8%, 29%, 30%).

The heaviest return came from the Byzantine era, as was to be expected (81.6%, 67.8%, 85%). From this general period, a basalt stele found at a hillside cemetery (Site 26) was carved in low relief and appears to depict a Stylite monk standing before his "pillar."

While the figures drop off rather sharply in the Umayyad period (42.1%, 40%, 22%), there was evidence of continuity at the transition. Of the 16 random squares showing Umayyad pottery, 14 also produced Byzantine readings. Similarly, of the 22 sites with Umayyad sherds, 17 also yielded Byzantine.

The strong contrast between our returns and the overlapping Tell Ḥesbân Survey for the Ayyubid/

TABLE 1. Pottery Correlations between Madaba Plains Project and Ḥesbān Survey*

	Madaba Plains Project Regional Survey, 1984		*Hesban Survey 1973, 1974, 1976*
Period	*38 Random Squares*	*55 Sites*	*148 Sites*
Chalcolithic	-	-	11 (7.4%)
Early Bronze	11 (29%)	10 (18.2%)	46 (31%)
Middle Bronze 1	-	-	
Middle Bronze 2	2 (5.3%)	2 (3.6%)	14 (9.5%)
Late Bronze	-	3 (5.5%)	6 (4.1%)
Iron Age†			
Iron 1	9 (23.7%)	12 (21.8%)	30 (20%)
Iron 2/Persian	23 (60.5%)	34 (61.8%)	63 (43%)
(Persian Period)	-	-	1
Hellenistic	1 (2.6%)	-	21 (14%)
Nabataean	1 (2.6%)	-	-
Roman‡			
Early Roman	11 (29%)	15 (27.2%)	57 (39%)
Late Roman	14 (36.8%)	16 (29%)	47 (30%)
Roman/Byzantine	3 (7.9%)	3 (5.5%)	3 (2%)
Byzantine	31 (81.6%)	37 (67.8)	126 (85%)
Umayyad	16 (42.1%)	22 (40%)	33 (22%)
Abbasid	-	1 (1.8%)	7 (8%)
Fatamid	1 (2.6%)	-	-
Ayyubid/Mamluk	6 (15.8%)	4 (7.3%)	52 (35%)
Ottoman	1 (2.6%)	1 (1.8%)	10 (7%)

*Prepared by Robert Boling using Ḥesbān statistics from Robert Ibach.
†Another 6 squares (15.5%) and 9 sites (16.4%) produced undifferentiated "Iron Age" sherds.
‡Another 13 squares (34.2%) and 15 sites (27.2%) produced undifferentiated "Roman Period" sherds.

Mamluk period (15.8% and 7.3% against 35%) is considerably less striking when we observe that seven of the latter sites lay within the southern half of our project area (HS 130, 134, 140, 142, 143, 145, 154).

In general we observed that where the data are most abundant (Iron Age, Late Roman, Byzantine, Umayyad) the percentages are closely comparable with those of the Tell Ḥesbân Survey. The greatest differences appear in the quantities of pottery found by our judgment survey, possibly because of our concentration in the northeast quadrant of our project area. Even here the coverage is far from complete.

Prehistoric Site

In a cultivated field along the Naᶜūr highway, east of the intersection with the new airport highway, was Site 53, an extensive prehistoric site in a corner of Random Square 37. From among the hundreds of lithic artifacts recovered in one day's survey, Acheulian handaxes (LPL), Levalloiso-Mousterian tools (MPL) and a variety of Neolithic and Chalcolithic remains were identified. A seasonal lake might have existed southeast of the site; this possibility, along with the site itself, will require further investigation.

STRATIGRAPHIC EXCAVATIONS AT TELL EL-ᶜUMEIRI[7]

Random Surface Survey

To derive hypotheses concerning the spatial and chronological extent of the tell settlements, 64 squares, each 6 × 6 m, were randomly located over the site. Definite terraces or shelves were

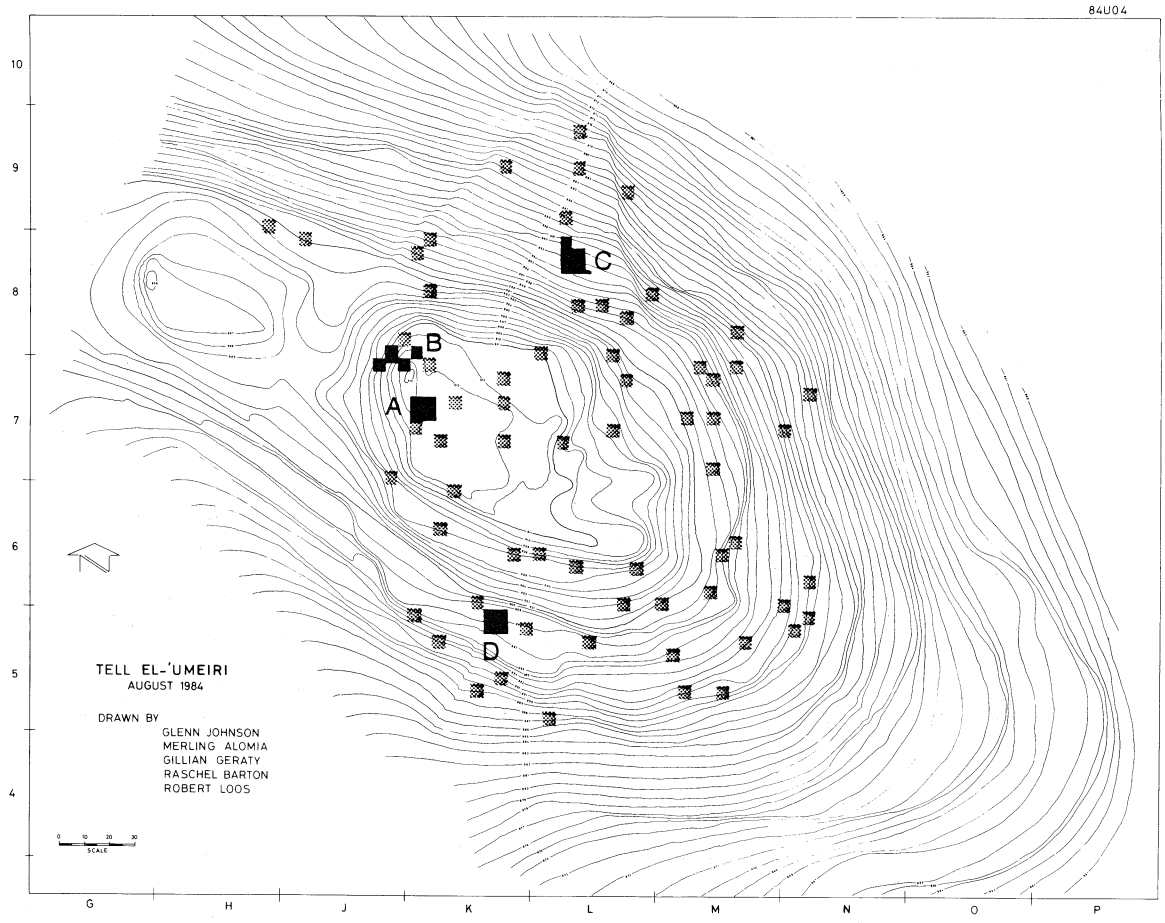

Fig. 6. Topographic map. Permanent excavation fields begun in 1984 are in black; random surface survey squares are light.

present in the topography (fig. 6), so it was decided to follow the method used by Portugali (1982) in the Esdraelon Valley, including the excavation of the top 10 cm of topsoil.

The steepness of the slopes above the shelves made the results ambiguous, especially for the latest periods, whose remains had been exposed to erosion for about 2500 years after abandonment. According to Portugali's method, for example, the data should have indicated that almost the complete site was inhabited during the late Iron II period. Excavations showed, however, that occupation during this period was probably limited to the acropolis and the eastern shelf. Erosion and possible extraurban activities such as quarrying and light industry (below) had transported massive amounts of debris and pottery down the slopes of the site, covering all but the western shelf with a thick layer of topsoil in which pottery from the late Iron II period was dominant. Thus, Portugali's method needs to be qualified: on steeply sloping sites with shelves or terraces the ceramic remains on the surface and in the topsoil, dating to a period of occupation followed by abandonment of the site, may reflect the deposition of erosional debris during the abandonment rather than occupation.

The pottery lying on the surface was carefully separated from that found in the topsoil to test the validity of surface pottery alone as an indicator of spatial settlement patterns. Generally, the samples from a single square were similar, not only in periods represented, but in the percentage of sherds from each period, when both samples contained more than 15 or 20 sherds. Smaller samples tended to produce distorted results.

The history of the spatial extent of occupation at the site may now be outlined. The complete

Fig. 7. Field A, the "Ammonite Citadel," end-of-season photograph with balks partially removed, looking south. The walls most visible belong to Field Phase 1b; the emerging walls of Field Phase 2b can be seen in the upper half.

site, including all the shelves, was settled early in the Early Bronze Age. The Middle Bronze settlement was not found on the lower southern shelf in excavation, but was strongly represented in the survey data elsewhere. Signs of massive fortifications may also date from late in this period. The Late Bronze and Iron I settlements seem to have been restricted to the acropolis, eastern shelf, and northern slope. The late Iron II occupation probably continued the general trend toward a reduced settlement size through time by abandonment of the northern slope, except for extraurban activities. Although the settlement in this period was therefore the smallest at the site, it would appear that the greatest material prosperity took place at this time (squares that were strongly dominant in late Iron II pottery contained four times as many small objects as other squares; they also revealed much more diversity).

Excavation Areas

Ammonite Citadel: Field A

Four squares were opened at the western end of the flat acropolis (fig. 6). Two major phases of occupation, each with an ephemeral subphase, were discernible (fig. 7).

Field Phase 2b. The features of Field Phase 2b may be divided into two complexes, one in the south, the other in the north. A two-room complex was located in the south, while adjoining walls and rooms occupied the northern two squares. Of the southern complex, Room 5 was the best defined. Four clear walls enclosed a beaten earth surface into which two doorways opened, one from the south, the other from the west. Excavation has proceeded only to the surface and no sign of the founding levels of the walls—which stand to seven courses of boulders—has yet been found. Set against the stones of one of the walls was a virtually complete storejar. Room 6 has not been as clearly defined because of the presence of Field Phase 1a walls above.

Two rooms were also cleared in the northern complex. Room 4 was long and narrow, but the surface has not yet been reached. Room 2/3 seems to have been a large room to the west with a "panhandle" extending to the east. The southern wall has been exposed only two courses deep but is remarkable for its width, 1.65 m. Many objects were found within the 0.20 m-deep fill, including three ballistic missiles and an amorphous pile of seven reconstructable ceramic vessels (fig. 12) apparently dumped into the room secondarily as

part of the fill, since the vessels were not on the surface.

The pottery from every soil layer attributed to this phase consistently contained a high dominance of late Iron II sherds as the latest pottery. The surfaces, however, have not yet been excavated.

Field Phase 2a. This was an ephemeral phase apparent only in Square 7K50 where a surface was laid on top of the fill above Field Phase 2b. On this surface was a one-row, one-course, L-shaped "wall," which formed a small "room" with two of the walls from Field Phase 2b. The wall was probably never more than a "divider wall" of some type.

Field Phase 1b. Many of the walls of Field Phase 2b were reused in some capacity during Field Phase 1b, but with several significant changes that altered the basic architectural plan of the structure(s). In the south the resulting room seems to have been the only one in the southern part of the field (Room 1). The area to the west seems to have been external. The northern part of the field saw the extension of the north–south wall, cutting off Room 3 from Room 2. To provide access to Room 3, 1.70 m of the north wall was dismantled. The areas north of Room 4 and east of Room 1 have not yet been excavated. The changes described here between Field Phases 2b and 1b probably do not represent a completely different function for the structure(s); they do suggest a significant restructuring, providing a larger room in the south and a different route of access for some of the rooms in the north. No object finds were made on the surfaces.

Field Phase 1a. This is a stratigraphic designation used to define two small or fragmentary walls that seem to postdate the construction of the walls of Field Phase 1b. One was a possible buttress wall 1.5 m long and one course wide running up to the west face of the western wall. The other was a fragment in the northeast corner of Square 7K41 that seemed to run over a Field Phase 1b wall. No surfaces were found to go with these walls.

In summary, the thickness of the walls in both major field phases does not lend itself to the interpretation of a domestic complex, but rather to a public or defensive structure, along the lines of a citadel like the "Western Tower" at Tell Beit Mirsim (Albright 1943: 47) or the citadel at Hazor (Yadin 1975: 161–63). It is not possible at present, however, to suggest a coherent plan for our structure(s).

The Western Defensive System: Field B

Tell el-ᶜUmeiri is joined by a saddle on the west to a ridge of hills running north–south. The ridge makes the tell's western slope the most vulnerable. Our assumption therefore was that this critical and strategic slope would provide the best location to examine the fortification activities of the ancient inhabitants. The five squares opened on this slope (fig. 6) did indeed uncover some five phases of the Iron II and Iron I defenses and perhaps even an earlier one (fig. 8).

Field Phase 7. In Squares 7K90 and 7J89 a solid mass of mudbricks, many of which were lying in orderly rows on a 45–50° angle (but not tumbled in all directions), measured more than 4.5 m wide east–west, at least 10 m long north–south, and deeper than 1.4 m. The northern, eastern, and southern limits of the bricks have not yet been located and the western limit is not certain. The colors of the bricks and their friability suggest that a severe fire burned the wall at some time.

The function of this feature is difficult to determine. It was solidly mudbrick with no signs of significant brick displacement or secondary debris, and the bricks appear in regular rows. This indicates a solid wall structure, perhaps a defensive wall, judging by the thickness. Alternatively, it could have been a tower or platform. Some have observed that the slanting bricks, which go down at least as deep as 1.4 m, would not be expected in purposely built structures and that they therefore reflect one that was destroyed. It is possible to put both ideas together and suggest that the slanting bricks may be the top courses of a massive mudbrick defensive wall or tower tumbled somewhat in a violent destruction. One might speculate that wooden ties deep within the structure burned, causing the bricks above to collapse. The date could range anywhere from Early Bronze to Iron Age I.

Field Phase 6. The mudbricks of Field Phase 7 were cut by an east–west wall on the north. Its relationship with other walls in the field was not clear, but it may have joined a north–south wall which seems to have been battered against the western extent of the mudbricks of Field Phase 7.

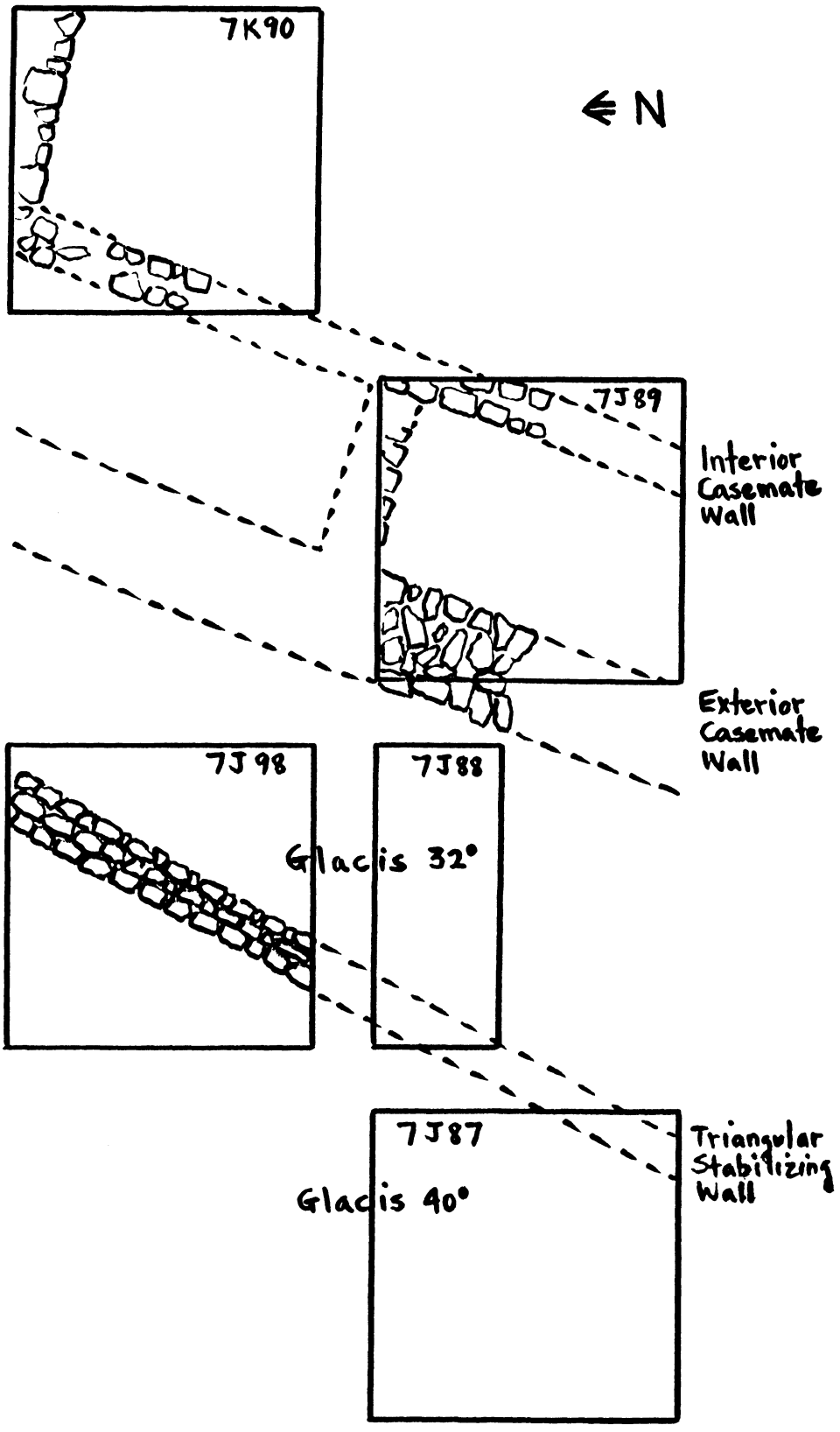

Fig. 8. Field B, the western defense system. Schematic plan of the Field Phase 6 casement wall and glaçis.

This wall ran south for approximately 7 m before it broke off; however, the founding levels have not yet been reached and it may continue farther at lower levels. In Square 7J89 an east–west wall bonded with it and ran to the west where it most likely joined, inside our balks, a second north–south wall parallel to the first. This latter wall averaged 1.5 m wide and could be traced on the surface of the mound 15 or 20 m to the north. It has been exposed to five courses, although the foundations have not yet been uncovered. It appears that these walls make up a casemate construction.

Running up to the outer face of the exterior casemate wall was the top layer of a glaçis uncovered in Squares 7J88, 7J98, and 7J87. It was 2 m thick in Square 7J98, suggesting that the outer casemate wall descends at least that much deeper. The surface of the glaçis descended at the slope of 30–32° for about 5 m until it was interrupted by a stone line of boulders in a three-tiered triangular section whose function was apparently to stabilize the slope. Below this the slope of the glaçis increased to 40°.

The construction of the glaçis is of interest. Resting upon the smooth face of a lower rampart (perhaps to be connected with the mudbrick of Field Phase 7?) and apparently providing purchase on that surface was a loosely-packed layer of rough limestone cobbles and boulders. Overlying this was a layer consisting of a random mixture of *nari* cobbles and pockets of brownish-yellow clay, another layer composed of *nari* cobbles lacking the clay, and a top layer of a dark yellowish-brown clay that surrounded and apparently held together pebble- and cobble-sized soft *nari*.

Excavations in Field B have thus partially uncovered what appears to have been a coherent defensive system consisting of a casemate wall and glaçis in Field Phase 6. The date of the system may preliminarily be attributed to the late Iron I or early Iron II period, probably the former. Excavation of the casemate wall should provide a firmer date.

Field Phase 5. Field Phase 5 consisted primarily of two surfaces in Square 7J89. A cobblestone surface was laid above one of the Field Phase 6 walls. A hard-packed surface of dark brown soil immediately on top of the cobbles probably represented the accumulation of occupational debris during the period the cobbles were in use. The remains produced very little dating evidence, but the phase should date to the end of Iron I or very early Iron II.

Field Phase 4. On top of the Field Phase 5 remains was a small room of which only the western 2 × 2 m portion was in our excavated area (Square 7J89). The room was made up of three walls constructed of medium boulders preserved three to four courses high with two surfaces separated by 18 cm of debris. The room may have been a storeroom, since there were three large early Iron II collared-rim storejars (fig. 12) on the upper surface. Leaning near the westernmost jar was a small jug (fig. 9), which contained a few barley and flax seeds whose large size suggested extensive irrigation (David McCreery, personal communication). Overlying the surfaces was an irregular layer of ash containing charcoal chunks 4–5 cm in diameter, indicating destruction of the storeroom. This destruction seems to have been the result of enemy attack, as suggested by the presence of slingstones also found in the room. The latest pottery within the ash was early Iron II.

Although it is impossible to establish stratigraphic connections between the storeroom and any other preserved materials in Field B, one may suggest that a hard, compact layer of soil, which contained pottery datable to early Iron II, and which was laid on top of the clay-and-chalk glaçis in Squares 7J88 and 7J87—possibly as a repair—belonged to this field phase.

Field Phase 3. Five pits dating to late Iron II were excavated in Square 7K90 below a surface of Field Phase 2. Lensing ash layers in all the pits indicated burning activities, perhaps of garbage or other refuse.

Again, although no stratigraphic connections could be made, we suggest that the earliest late Iron II beaten earth layer above the glaçis in Squares 7J88 and 7J87 may have belonged to a repair of the glaçis during this field phase. The color of the soil was lighter than that of Field Phase 4 and contained small *nari* and charcoal flecks. It sloped at a steady 32°. One would expect the defensive system to have been repaired after the destruction that ended Field Phase 4.

It seems that at least the outer wall of the earlier casemate wall remained in use, for the glaçis repair ran up to it. Underscoring this suggestion is the observation that the wall apparently had two construction phases.

Fig. 9. Broken remains of two early Iron Age II storejars with an associated small jug.

Field Phase 2. An irregular surface overlay the pits of Field Phase 3 in Square 7K90. It ran up to the top course of a stonelined silo 1.1 m in diameter and 0.54 m deep. The surface could not be traced to any walls, although a silo this size suggests domestic use and the presence of walls nearby. At some point the silo was filled with debris and the ring of stones forming its top course served as a perimeter for a briefly-used hearth, containing an ash accumulation of about 5 cm. Numerous bones with butcher marks were found on the surface, indicating activities related to food preparation, perhaps associated with both the silo and the later hearth.

Field Phase 1. Three walls, preserved only in fragments, seem to have been constructed after the Field Phase 2 surface in Square 7K90; one of these ran over the hearth of Field Phase 2.

The Northern Suburb: Field C

The northern slope was made up of two broad, sloping shelves or terraces, one above the other (fig. 6). One of the most striking features of the northern slope was a pair of defensive wall lines, which originated at both the eastern and western ends of the summit but gradually converged at the bottom near the spring (fig. 10). This walled suburb may have been an attempt at some period (the random survey would suggest the Early Bronze Age) to protect the spring. Crossing this isosceles triangle-shaped area was a prominent bedrock shelf which could be traced for 20–25 m. The face of the bedrock shelf was thought to be several meters deep—as was its continuation east of the suburb—and to contain cave dwellings, if not tombs.

Field Phase 7. Bedrock cupmarks and, in Square 8L73, a large oval-shaped depression in which three basalt upper millstones were found suggest grain grinding in the earliest occupation in the field. A surface overlying the millstone installation was Early Bronze.

Field Phase 6. Two fragmentary walls and two surfaces in Square 8L63, as well as surfaces in Squares 8L72 and 8L73, were stratigraphically above the bedrock remains of Field Phase 7. Those in Square 8L63 seem to have formed a small room with a bench and a curbing bordering a street. Pottery in the soil layers dated them securely to the Early Bronze Age.

Middle Bronze remains were discovered only in Square 8L72 where frequent sherds were found in later soil layers. Some walls and surfaces contained a dominance of Middle Bronze pottery but later material was too consistently present to allow a Middle Bronze date.

Fig. 10. North slope before excavation began in Field C (arrow). Note perimeter walls of the northern suburb converging at bottom left in the vicinity of the spring.

Field Phase 5. Found only in Square 8L82, probable Late Bronze layers were uncovered under Iron I material. They may have been associated with a terrace revetment wall provisionally dated to Field Phase 4, but excavation ceased before connections could be established.

Field Phase 4. In Square 8L82, Iron I remains were uncovered in the form of the terrace revetment wall and two surfaces used with it. On the downhill side of the revetment wall, deep layers of ash were excavated, possibly from garbage disposal and burning. But the loose nature of the ash may suggest a pit.

Field Phase 3. During the late Iron II period when the northern suburb seems to have been extraurban, the inhabitants cleared the area next to the bedrock terrace down to the lowest Early Bronze layers and utilized the area for small, ephemeral constructions possibly related to animal husbandry, storage, or small industries. The remains included three walls forming a U-shaped room with associated surfaces and a fragmentary plaster installation, all in Square 8L72. Although the dominant pottery was Middle and Early Bronze, late Iron II pottery was present in small amounts in virtually every bucket of pottery. This would seem to date the field phase securely, while also underlining the ephemeral nature of the finds. Stones and soil from the clearing process were reused in the construction and not brought in from elsewhere, suggesting an economy of work and expense. The straight cut of the bedrock, which had been observed prior to excavation, seems to have resulted from small-scale quarrying associated with clearance of the area.

In Square 8L73 an irregular semicircular wall or fence may have served as an animal pen, while a small stone lined cyst (silo or bin?) a meter north of the wall may have been used for storage or feed.

Field Phase 2. Two very fragmentary wall remnants south of the Field Phase 4 walls in Square 8L72 date also the late Iron II period but were above the surfaces associated with Field Phase 4. The walls were too fragmentary to permit speculation regarding their function, though some have suggested a stairway leading from the spring to the summit.

Field Phase 1. A surface and other soil layers containing Roman and later pottery from the abandonment of the area may indicate the existence of a small farm near the spring. No wall remains were found.

Fig. 11. End-of-season photograph of Field Phases 4 and 3 in Field D, the lower southern shelf. The arrow points to the doors in the Field Phase 4 houses. Field Phase 5 walls are visible in the lower right corner.

The Lower Southern Shelf: Field D

The broad southern slope of the tell is composed of two shelves with a third that apparently connects the two like a ramp (fig. 6). The four squares of Field D were opened on the southern edge of the flattest, broadest (20–30 m), and lowest shelf occupied on the southern slope. It proved to be a domestic area from the Early Bronze Age.

Field Phase 5. Under the erosion channel of Field Phase 1 (below), the upper courses of three walls were found in the cut. Two of the walls may have formed a door jamb. Unexcavated soil layers running up to these walls should help date them in future seasons, perhaps to EB III.

Field Phase 4. Also needing further excavation, but more fully exposed, were the wall fragments of Field Phase 4. However, little coherence can yet be suggested from the remains, except to speculate on the possible presence of narrow alleyways and broadroom houses (fig. 11). The longest wall stretched along the northern edge of the field for nearly 7 m and to the north a perpendicular wall came out of the excavated area. Also to the north and possibly inside an occupational complex was a series of thin, lensing surfaces with ash pockets between. A pebbly surface similar to the wind-blown, water-eroded surface of the tell today may have been an outside surface such as a courtyard or a roadway separating this building from a complex to the south.

The southern complex was perhaps a north–south trending broadroom house with a possible door on the west side, though the presence of the mortar in the corresponding surface where one would expect a wall to continue makes this suggestion problematic. Ashy debris was scattered widely over this surface. Within this building was a deposit of plaster material clearly showing the cemented impressions of reeds (probably *phragmites australis*) placed tightly next to each other. It has been suggested that the roofs of the houses were covered with plaster on top of the reeds. Another complex may have been located to the west, across a possible alley where two walls seem to have cornered. None of the walls have been completely exposed, but a more coherent plan should emerge in future excavations.

Although the ash on the surface could indicate violent destruction, there was no sign of structural destruction. In any case, the presence of loess

deposits mixed with apparent sheet wash (from the steep slopes above the shelf) nearly covering the architecture suggests abandonment for a period of time.

Field Phase 3. The remains of Field Phase 3, though fragmentary, were clear. The northern parts of two houses were discovered in Squares 5K86 and 5K87. Into the earlier soil layers the builders dug broad, shallow pits about 4 × 4 m and ca. 0.50–0.75 m deep. The foundations for the houses were laid at the edges of these pits (fig. 11). The western house contained gently rounded corners, whereas the one exposed corner of the eastern house was acutely angled.

Both houses were located in the northern walls opposite the wadi at a protective angle from the wind. From wear patterns on the stones, door sills and steps were apparent in both houses. In the western house at least two beaten-earth surfaces were preserved. The earlier floor included a mortar and, in the northwest corner, what appeared to be a stone-lined pit filled with ash. The later surface may have been laid when the mortar cracked. Both houses contained central pillar bases 1.60–1.80 m from the walls.

The open space between and around the houses contained no other walls or occupational surfaces. If such structures existed originally above ground, they may have been removed by later activities. No signs of destruction were apparent; rather, the houses seem to have been abandoned. The pottery form the soil layers of Field Phase 3 is tentatively placed in the EB IV period.

Field Phase 2. Field Phase 2 walls were best preserved in Square 5K86 (fig. 11) with fragments in the other squares. Only the foundations of the walls remained with no surfaces. Plow marks show that later farming had disrupted the soil apparently below the occupational levels of the structures. All walls of Field Phase 2 were uniformly built of medium to large cobbles and measured 0.40–0.50 m wide. Coursing was irregular. Because of the lack of stratified soil layers connecting the walls, the ascription of the wall fragments to one field phase was suggested by this distinctive construction technique, not by stratigraphy. For the same reason it is not possible to ascribe a secure date to the walls, but a few probable EB IVC sherds were found as the latest pottery in some of the soil layers.

Field Phase 1. Activity on the lower southern shelf more recent than the Early Bronze Age has had significant archaeological impact. Roman, Byzantine, and Umayyad pottery deep within Square 5K76 led to the realization that during a period between the Early Bronze Age and Umayyad times the original face of the southern shelf had receded and erosional gullies had formed. At some point the erosional channel in Square 5K76 was filled with debris containing the later pottery, perhaps to level the shelf for more agriculture.

Pottery, Lithics, and Objects

The chronological range of pottery sherds discovered on the tell has already been mentioned. Several whole vessels were found as well (figs. 12, 13).

Though much less frequent than the sherds, the lithic tool finds covered the same periods. Of some 500 other objects found, approximately 25 percent may be considered household objects reflecting several different activity patterns: tools for food preparation, consumption, and storage included—besides the ceramic vessels—millstones, grinders, mortars, pestles, knives, a stone hoe, whetstones, spoons, flint tools, stoppers, and stone bowls. Several rope stone weights, probably used as counter-weights for doors, reflected architectural use patterns. Another 25 percent of the finds suggested industrial activities, including spindle whorls, spindles, loom weights, weaving spatulas, burnishers, chains, etc. Yet another 25 percent suggested military activities: these finds were slingstones, maceheads, possibly the chains mentioned above (Yadin 1984), and arrowheads. Significant numbers of such luxury items as beads, pendants, bangles, earrings, cosmetic palettes, and a mirror were found. Animal and human figurines could have been used either for cultic purposes or for toys. Small ceramic cart wheels may also have been toys. Items connected with clothing included buttons, fibulae, and pins; shells and glass were also found. Objects suggesting trade and other economic activities included coins, scarabs, and two cylinder seals.

Seal Impression of the "Servant of Baʿalis." The object that caused the greatest stir was a small, fired ceramic cone, with a seal impression containing the name of a royal official and the king he served, written in the Ammonite script of ca. 600 B.C.: *lmlkm-ʾwr ʿbd bʿl-yšʿ* (belonging to

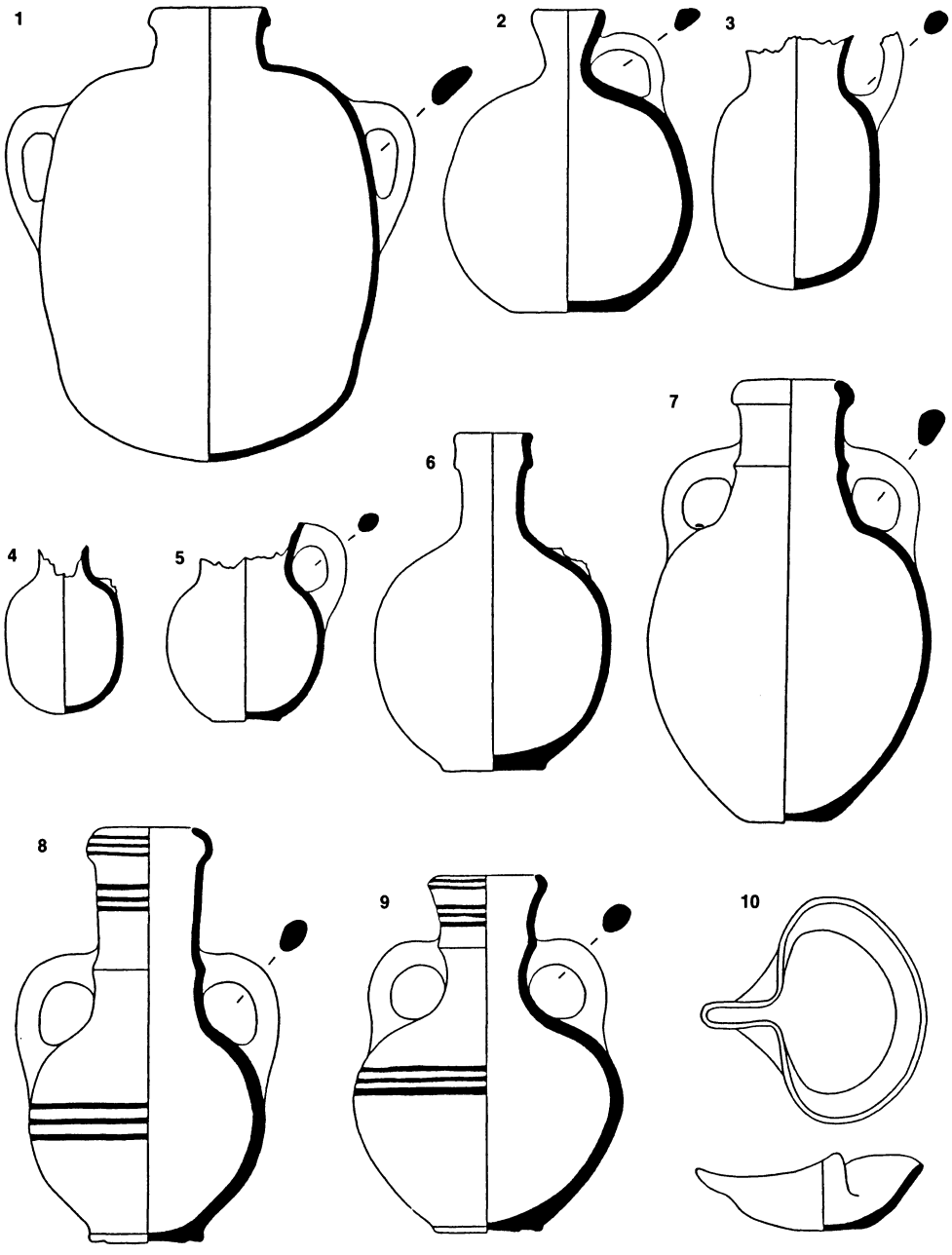

Fig. 12. Complete vessels (scale 1:5). Nos. 1–2: Field A:7K41 (Iron II); no. 3: Field A:7K51 (Iron II); nos. 4–10: Field A:7K50 (cache of vessels in secondary Iron II fill).

Milkom-ʾur, minister of Baʿal-yashaʿ (figs. 14, 15). The owner's name contains the name of the primary Ammonite deity, Milkom, as the theophoric element; the king's name *bʿlyšʿ* may be identified with Baʿalis of Jer 40:14, the first occurrence of this name outside the Bible (Herr 1985).

The difference between Jeremiah and our seal impression in the spelling of the royal name may be explained in at least three ways. It may represent an intentional pious change in the Bible to avoid heathen theology (Shea 1985), an unintentional change reflecting the way the Judeans heard the name pronounced in Ammonite—partially preserved, perhaps, in Jer 40:14 (LXX) as Βελισα (Geraty 1985: 100; Puech 1985: 10, 24), or simply a hypocoristicon (Cross 1973: 15).

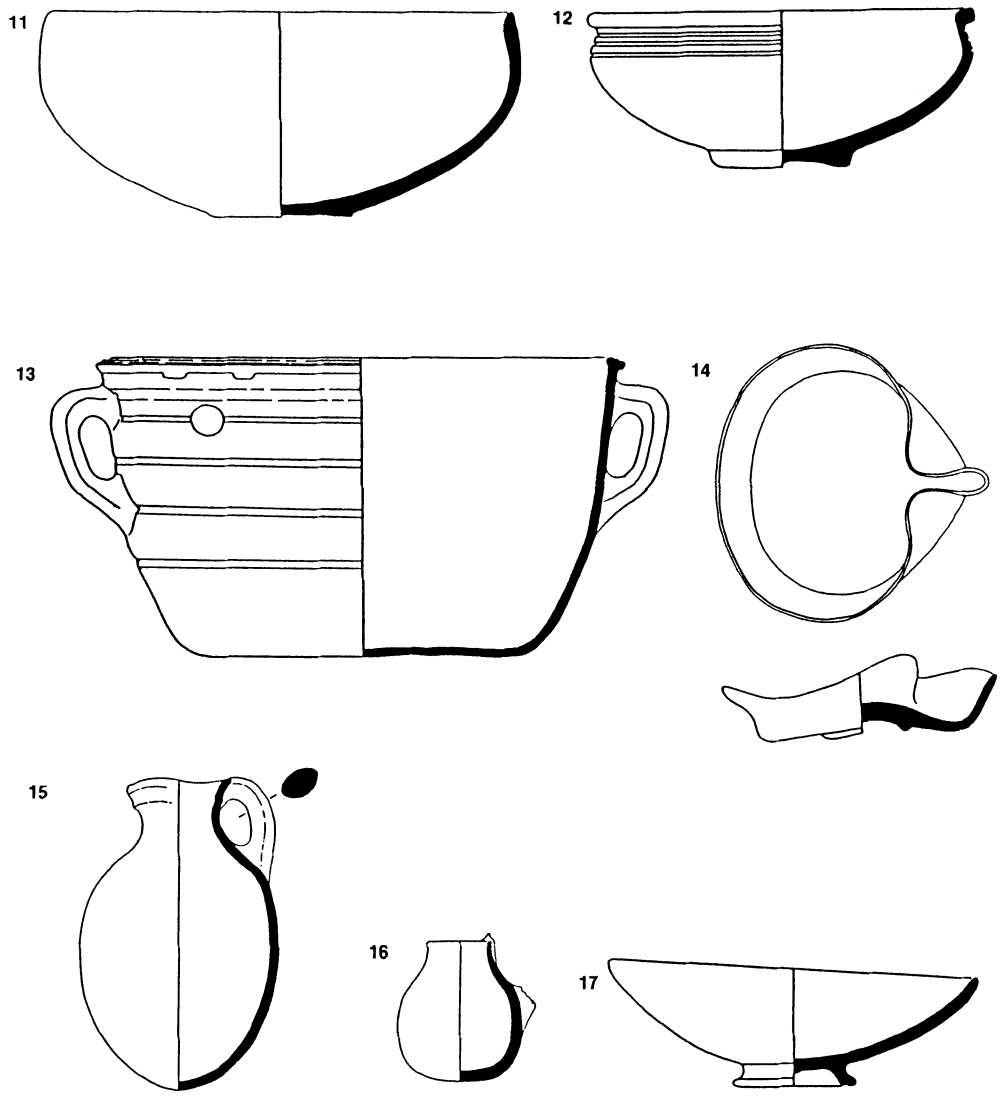

Fig. 13. Complete vessels (scale 1:5). No. 11: Field A:7K50 (from the cache of vessels in secondary Iron II fill); no. 12: Field A:7K50 (Iron II); no. 13: Field A:7K51 (Iron II); nos. 14–15: Field B (late Iron II/early Persian and Iron II); no. 16: Field C:8L72 (EB); no. 17: Field C:8L72 (MB).

Animal and Plant Remains

A total of 15,464 bone fragments were processed by the project's ecology laboratory during the 8-week season at Tell el-ᶜUmeiri. The animals represented included sheep, goat, cattle, horse, donkey, pig, camel, chicken, fish, weasel, rodent, dog, gazelle, deer, wild bird, and turtle. Although final identification and measurements are still to be completed, a few patterns have emerged.

As noted, the three archaeological periods exposed during the excavations were Early Bronze, Iron I and Iron II; there was also plentiful Middle Bronze pottery. Because the 1984 excavation concentrated in fields with Iron Age remains, the greatest number of animal bones and the greatest variety of species comes from the Iron Age, particularly Iron II. Donkey, horse, and cattle were especially plentiful in Iron II contexts, reflecting periods of urbanization and intensification of the food system. Pigs became more numerous in the Iron Age at Tell el-ᶜUmeiri, although not in large enough quantity to indicate any specialized role in the diet.

The significance of our preliminary findings, particularly concerning the material from the Iron Age contexts, is that they seem to correspond closely with the findings at nearby Tell Ḥesbân.

Fig. 14. Royal Ammonite seal impression. Enlarged from 19 mm diameter.

Fig. 15. Drawing of the royal seal impression, by Peter Erhard in consultation with Larry Herr.

Concerning the Iron Age at Tell Ḥesbân, Boessneck (1978) reports that in addition to the sheep and goats, a large number of cattle (as well as horse and donkey) were present. The presence of cattle and other large animals is indicative of more intensive agriculture (LaBianca 1985a). The preliminary findings at Tell el-ᶜUmeiri also seem to indicate a high percentage of cattle, horse, and donkey during the Iron Age.

The zooarchaeological findings correlate nicely with the results obtained by our palaeobotanical laboratory. Through flotation, a number of carbonized seeds were recovered from soil samples taken from the tell. So far, barley, wheat, lentil, pea, bitter vetch, chick pea, grape, wild pistachio, olive, and pomegranate have been identified from among the 280 seeds collected. Again, the number and variety of seeds is greatest for Iron II.

When bone and seed data are considered together with the evidence for numerous farmsteads in the surrounding region, a picture begins to emerge of a sophisticated food system for the late Iron Age in the region of Tell el-ᶜUmeiri.

INTEGRATION OF FINDINGS

Reflecting on the findings of the regional survey, we find it noteworthy that the vast majority of the remains of human handiwork encountered in the rural landscape can be seen as related in one way or another to the quest for food. First, at least 32 of the 55 sites examined appear to have been farmsteads or sites whose primary purpose was related to food production.

Second, another 15 sites, 8 of which overlapped with the farmstead sites, contained the remains of ancient roadways. These represent public works constructed primarily during Roman–Byzantine times to facilitate transporation of farm produce to markets and to permit easy movement of soldiers and merchants throughout the farming community. Significantly, all but one of the eight farmsteads that overlap with the roadway sites contained Roman–Byzantine pottery, thus attesting to the dependence of farmers during this period on paved roadways.

Third, information about the nutritional and health status of the individuals whose bones and teeth have been preserved in the funerary sites becomes significant in the light of our food system perspective. Furthermore, the fact that the three major cemeteries identified in this region were in active use during the populous Roman and Byzantine periods points to a co-occurrence undoubtedly reflecting an association of some sort betwen population densities and the maintenance of large and elaborate tombs and cemeteries. The fact also that many of the tombs and burial places examined served during less prosperous times as shelters for animals, as storage depots for farm equipment or food, or as dwellings for people, suggests that, even in their secondary uses, such sites are not exempt from analysis focused on food systems functioning in antiquity.

The widespread presence of Early Bronze pottery found by the random surface survey at Tell el-ᶜUmeiri itself points to the existence of an Early Bronze Age urban settlement. Indeed, the Early Bronze occupation on the tell appears to have been the most widespread of any period. Early Bronze ruins included broadroom houses and other domestic installations. In the vicinity of Tell el-ᶜUmeiri only three farmsteads had ceramic indicators dating from the Early Bronze period. Taken together the evidence thus far suggests that the intensity of food production during this period was perhaps medium, but not high (cf. LaBianca 1985a). Thus, a mixed economy consisting of cereal cultivation and cattle, sheep, and goat husbandry was probably the order of the day.

The scant remains so far from the Middle and Late Bronze periods on the tell and in the surrounding region point to abatement of the local food system in the direction of transhumant pastoralism. Sedentary occupation, nonetheless, seems to have persisted at Tell el-ᶜUmeiri, though on a slightly smaller scale than during the Early Bronze Age.

The regional survey indicates especially, however, that by the arrival of Iron I the food system had clearly intensified. This buildup reached its peak during Iron II, when Tell el-ᶜUmeiri itself may have been the regional center of gravity for the surrounding farming community, judging from the dating to this period of both the citadel complex and the western defensive system on the tell. Crops such as grapes were being produced not merely for local consumption, but also probably for export. Thus a considerable emphasis on fruit production is suggested by the plant and animal remains and by the occurrence of perimeter walls and agricultural towers. In the outlying fields cereals were produced in large quantities as well, and pasture animals existed in relatively reduced numbers so as not to compete.

Tell el-ᶜUmeiri's rise to prominence in this region is further reflected by the discovery of the Baᶜalis seal impression, which establishes convincingly that political power and prestige had gravitated to the Ammonite ruler by the 6th century B.C. This success can be seen in Jeremiah 49 where the prophet rebuked the Ammonites for taking advantage of Judah's misfortunes by moving into the territory of Gad. In verse 4 Jeremiah asks, "Why do you boast of your valleys, boast of your valleys so fruitful? O unfaithful daughter, you trust in your riches and say, 'Who will attack me?'" Obviously Ammon's agricultural success had provided a firm economic base which in turn led to her political confidence.

It was this confidence that undoubtedly led to the events described in Jeremiah 27 and 40, where the prophet first depicts an Ammonite king as one of those who led the rebellion against Babylon; and then specifically mentions that Baᶜalis was responsible for instigating the assassination of the Babylonian-appointed governor Gedaliah. Again, such brazen acts against the Babylonians reflect Ammon's increasing political self-confidence, which was based upon her successful economic growth.

The almost complete absence thus far of signs of sedentary occupation during the Hellenistic period either on the tell or in the surrounding region suggests another period of abatement in the direction of transhumant pastoralism from the 5th through 2nd centuries B.C. The process of sedentarization that took hold during the Early Roman period continued until it peaked during the Byzantine period. Although this process does not appear to have affected our particular tell significantly (although it is clearly in evidence at the other two Tell el-ᶜUmeiris), it is well documented by our regional survey. Again the project area was filled with farmsteads, many of which were serviced by paved roads. Fruit trees and cereals again took over lands that in the earlier Hellenistic period had been grazing areas. Trade and international commerce in this region probably reached their greatest peak during this time.

The cycle that reached its peak during the Byzantine period began to abate again during Umayyad times, as seen from the reduced number of farmsteads during this period. This abatement phase reached a point of nearly complete return to pastoral nomadism during the subsequent early Islamic centuries. This pattern was only briefly interrupted during Mamluk times, when a reuse of certain of the farmsteads is attested. Throughout the Ottoman period pastoral nomadism continued as the dominant strategy of food production throughout the project area, until the most recent process of sedentarization took hold in the latter part of the last century.

The pattern of the filling up and emptying out of settlements encountered in the ᶜUmeiri region is not identical to the pattern observed in the vicinity of Tell Ḥesbân. For example, the Iron II period reached a higher peak around Tell el-ᶜUmeiri while the Byzantine peak seems to have been a bit

weaker here than in the vicinity of Tell Ḥesbân. Furthermore, the Mamluk period is not as strongly represented in our region. While these impressions may change after additional seasons, they are offered here to initiate discussion of possible reasons for the differences.

Concerning the existence of transhumant pastoralists in our project area, it is our thesis that this mode of livelihood has always played a role in this region. Even during the intensive Iron II and Roman–Byzantine periods, transhumants moved their flocks seasonally into this region and traded their products with the local villagers and farmers. We regard the task of illuminating the role played by transhumants in all periods in this region as a crucial one to continue to investigate in future seasons.

Plans for Future Research

Future fieldwork will continue the lines of inquiry carried out during the 1984 season. Specifically, the following goals will be pursued during the 1986 season: first, more precise reconstruction of the ancient agricultural and natural landscape, particularly regarding the extent and location of ancient forests and the location of farmsteads, cereal fields, and orchards; second, more precise study and documentation of individual farmsteads to enable us to distinguish different types of sites according to layout and component structures such as towers, houses, perimeter walls, cisterns, and presses; third, more precise study and documentation of the infrastructure of food production at different times, including investigations of the extent of investment in the construction and maintenance of roads, water management works, markets, and other communal undertakings; fourth, intensified investigation of the material remains of transhumant and nomadic pastoralists; and fifth, continued investigations of recent changes in the food system of the project area to further refine our understanding of site formation processes.

In addition to continuing and expanding our stratigraphic excavations on Tell el-ᶜUmeiri, our plans for 1986, pending authorization from the Department of Antiquities of Jordan and local landowners, call for soundings at several farmstead sites, at selected funerary sites, and at the newly-discovered prehistoric site. On the tell itself, specific goals include: first, horizontal expansion of Field A to assess the nature and associated activity patterns of the Ammonite citadel; second, deeper probing into the western fortification in Field B to date more precisely the exposed defensive systems and to ascertain their relation to earlier, emerging systems; third, the possible opening of a new field near the perimeter wall of the suburb surrounding Field C as this is a likely location for encountering remains from the Early through the Middle Bronze periods; fourth, further excavation in Field D to uncover wider and better preserved Early Bronze remains; and fifth, the opening of a new field on the untouched eastern slope where Late Bronze and earlier remains are most likely to be uncovered.

NOTES

[1]The authors of this report are indebted to each of the 75-member staff who helped to make possible these results. Furthermore, the expedition took place only because of the financial assistance of Andrews University and of the California Society for Archaeological Research (Ed Distler, president; John Cassell, secretary; Bernard Brandstater, treasurer; and Charles Anderson, Harold Bailey, Barry Crabtree, trustees), along with numerous private donors. Among the latter, the substantial gifts of Vern and Barbara Jean Carner, Gary and Ruth Stanhiser, Thomas and Hazel Geraty, Ron and Sheila Geraty, and Gary and Anita Frykman must be singled out. Worthington Foods, through Allan Buller, its president, provided the staff with complimentary textured protein products for the season. Ali Ghandour, Chairman of Alia-Royal Jordanian Airlines, arranged for substantial staff savings on airfare. And the Baptist School in Amman, through its principal, Wilson Tatum, gave its facilities to the dig for headquarters. The officers and staff of the American Schools of Oriental Research and its local affiliate, the American Center of Oriental Research in Amman, provided invaluable assistance; the latter's director David McCreery and administrator Laura Hess must be particularly mentioned. Others within Jordan without whom the excavation would not have been possible were Prince Raad ibn Zeid; Director-General of Antiquities Adnan Hadidi; Antiquities Inspector Hefzi Haddad; and businessman/scholar Raouf Abujaber, landowner of Tell el-ᶜUmeiri, who went out of his way in time, effort, and financial assistance to assure our success. Richard T. Krajczar, Superintendent of the American Com-

munity School in Amman, provided generous logistical support, and Dawud al-Eisawi of the University of Jordan's department of biological sciences, aided us in plant identification.

[2]The excavations and surveys begun by Siegfried H. Horn in and around Tell Ḥesbân provide a background for our team's efforts in 1984 (Boraas and Horn, 1969, 1973, 1975; Boraas and Geraty 1976, 1978). Nearly all of the members of our core staff were trained at Tell Ḥesbân. The field excavation procedures, introduced by Roger A. Boraas, were refined there each season. The procedures for processing small finds were devised and gradually perfected there. Novel lines of inquiry were experimented with and adopted there, including zooarchaeology, palaeoethnobotany, taphonomy, ethnoarchaeology, statistically controlled survey sampling, and regional environmental surveys. Procedures for recording and documenting findings were refined and perfected on the basis of our experience in publishing the material from Tell Ḥesbân, including the design and development of our computer-oriented documentation system. Even the conceptualization of our research problem evolved from an initial concern with a specific historical event (the biblical exodus/conquest) to our present concern with understanding the underlying historical and cultural processes at work in the region encompassing Tell Ḥesbân and Tell el-ᶜUmeiri. As a result of all these factors, we acquired a baseline understanding of the project area's natural environment and of the historical drama that has been played out there since the Bronze Age. Finally, Tell el-ᶜUmeiri itself was rediscovered during the Tell Ḥesbân regional survey.

[3]Originally we had intended to continue our research in the Madaba Plains by excavating at Tell Jalul and surveying the region surrounding that site. Thus we had hoped to expand the temporal and spatial frame of previous investigations at Tell Ḥesbân and to uncover and analyze a wider range of cultural materials. Using greatly improved methods of instrumentation and information processing, we would be able to test hypotheses derived from initial inquiries at Tell Ḥesbân and vicinity. When political affairs in the Madaba region prevented the work at Jalul in 1982, we decided we could achieve most of our immediate goals at the alternate Madaba Plains site of Tell el-ᶜUmeiri with its similar occupation history.

[4]The ancient name of Tell el-ᶜUmeiri is not known, although Abel-Keramim of Judg 11:33 and Ammonite Heshbon of Num 21:26–30 have been proposed. Lying in the foothills ringing the Madaba Plains on the north, it was probably dominated by the Amorites during the Bronze Age and by the Ammonites during the Iron Age. Several studies have been done of the history of this region (for example, Glueck 1937, 1939; Landes 1961; Vyhmeister 1967; Oded 1979; Geraty and LaBianca 1985).

[5]The 75-member staff of the Madaba Plains Project was divided into three sections, responsible for camp life and laboratories, for the regional survey, and for the stratigraphic excavations. In charge of planning and overall execution of the project were Lawrence T. Geraty, Director of the Madaba Plains Project; Larry Herr, Chief Archaeologist, head of the stratigraphic excavations and pottery processing; and Øystein LaBianca, Chief Anthropologist, head of the regional survey and the ecology laboratory.

Headquarters during the 1984 season were at the Baptist School near Shmeisani, Amman, a 15-minute drive from Tell el-ᶜUmeiri. Most of the school's facilities were generously made available to the expedition and offered adequate space for sleeping, eating, working, meeting, and recreation.

At headquarters the daily needs of the staff were provided for by David Merling, who headed the camp staff. Rachael Hallock presided over the kitchen with the help of Myrtle Miller; Elvira Ferreira; Natalie Bronwyn, and Andrew Hackwell; and many volunteers. Nursing services were provided throughout by Jean Gard. Physicians were Erwin Syphers and Gary Frykman (Annette Frykman and sons Gregory, Philip, and Eric volunteered on the tell). Lloyd Willis acted as chaplain, Jo Ann Davidson as secretary. Camp handyman/engineer was Robert Artman, who also produced a video program about the dig.

To facilitate in-field identification, documentation and conservation of pottery, objects, flints, human skeletal remains, animal and plant remains, ethnobotanical samples, geological samples and other ecofacts, separate processing stations and procedures were set up at the beginning of the season in the large gymnasium at headquarters. These included the pottery processing stations where sherds were washed, identified, counted, registered, described, mended, drawn, photographed, and further analyzed as needed; the object-processing station, where artifacts such as coins, cosmetic implements, jewelry, figurines, ostraca, textile tools, were cleaned, identified, registered, drawn, photographed, and prepared for preservation; the ecology laboratory, which included separate processing stations, each with its own equipment, including scales and microscopes, for processing flotation samples, human remains, ethnobotanical samples, animal remains, soil and rock samples, flint chips and artifacts, and a work station for the members of the regional survey where maps and aerial photographs could be examined in preparation for the next day's fieldwork.

Pottery processing at headquarters was carried out by Mary Ellen Lawlor and Hester Thomsen, who were assisted by numerous volunteers, including Karis, Nancy, and Renée Lawlor. Processing of small finds was the responsibility of the Object Registrars Elisabeth Platt and Siegfried Horn, assisted by Lotta Gaster. Drawings of the objects were made by artist Peter Erhard.

Supervisors for the ecology laboratory this season

were Patsy Tyner and Randy Younker. Yvonne Hackwell conducted the flotation procedure, Larry Rich cleaned the animal bones, and Claire Peachey processed the geological samples. Our physical anthropologist, Michael Alcorn, was also a member of the regional survey. He processed the flints and human remains. Modern plant specimens collected by the survey and animal bone remains from the tell were identified by Randy Younker, also a member of the regional survey team.

Field identifications resulting from each of these processing operations were compiled and integrated into the stratigraphic locus recorded by a computer system assembled and programmed by James Brower. He also entered the field data and provided supervisors with integrated locus printouts. No sherds or bones were discarded; what was not turned over to the Department of Antiquities at the end of the season or shipped to the U.S. for further analysis was stored in stackable crates in Yadudah, Jordan, courtesy of the Abujaber family.

Also located at headquarters were makeshift quarters for processing and developing film, drafting and artifact drawing. The photography team was headed by Don May, assisted by Larry Coyle and Jonathan Hearon. Glenn Johnson supervised the preparation of a topographical map of the tell, the laying out of the grid, and the recording of architectural finds. He was assisted by Merling Alomia, Raschel Barton, and Robert Loos.

[6]Aerial surveying was limited to the use of stereoscopic photographs of the entire survey territory, supplied by the Jordanian government. These photographs were scrutinized in an effort to locate ruins of rural buildings and installations such as terraces, enclosure walls, reservoirs, mills, and cisterns. Present-day tells, agricultural fields, transporation networks, villages, and forests were also studied.

The random sampling survey consisted of intense scrutiny for a period equivalent to two hours (depending on how many participated on a given day) at each of 38 randomly selected squares each measuring 200 × 200 m. These squares were selected by means of a quasi-random number generator from among 1,962 sequentially numbered squares—those contained within a 5-km radius of the site—located on the ground with the aid of maps and aerial photographs. All pottery, animal remains, and loose artifacts were gathered from within each square, a map was drawn showing the location of all ruins and present-day facilities, and current land use and plant communities within each square were noted.

The judgment sampling survey (the statisticians' name for traditional surveying where the territory surveyed is selected on the basis of personal decisions made by the surveyor) was influenced largely by leads provided by the aerial photographs or the random survey. Ruins located on the aerial photographs or encountered in the process of locating a particular random square were inspected, sherded, and recorded. As a result of these leads, territories were inspected and many unrecorded sites found that would otherwise probably have gone unnoticed.

The environmental survey involved visits to biological communities within the survey territory to study present plant and animal life and to establish a baseline for reconstruction of the ancient environment. Of particular concern to this aspect of the survey operation (following the discovery of numerous farmsteads within the survey territory) was on-site analysis of the relationship between the location of ancient agricultural lands, farmsteads and forests and those of today.

Whereas ethnographic information pertinent to understanding the present-day food system within the project area was collected in connection with all the surveys, focused ethnographic inquiries centered on three topics: shelters utilized by the local population and their animals during the Late Ottoman period; conflicts between animal husbandry and agriculture; and the impact of sedentarization and urbanization on the health status of children. Information on these topics was gathered through on-site observations and interviews with local informants.

These surveys were not carried out independent of each other or by separate teams, but by the same staff of eight working both individually and in different teams on various occasions throughout the eight-week season.

Organized during the first two weeks of the season by Øystein LaBianca, the staff consisted of Robert Boling (McCormick Theological Seminary, Chicago), Field Supervisor for the Survey; Jon Cole, Survey Engineer in charge of aerial photography orientation and hydrological studies; Michael Alcorn, Biological Anthropologist and Lithicist; Randy Younker, Botanist and Ecologist; Allison McQuitty, Ethnoarchaeologist; Bruce Cole, Photographer; and Mohammad Mihyar and Hanan Azar, Translators. This arrangement of using variously constituted teams and permitting periods of independent research by individual survey members was encouraged as the best strategy for reaching the wide-ranging goals that the team had set for itself.

[7]Stratigraphic excavations were carried out using the now familiar "Wheeler-Kenyon" method as refined at Tell Ḥesbân. Improved procedures used for describing and recording the findings encountered in the excavations were according to Herr (1984). In addition to detailing the basic day-to-day activities of work at the camp and in the field, Herr's manual also provides definitions and explanations of terms encountered on the computerized recording forms, thus greatly enhancing standardization of descriptions and consistency in our team's execution of the many different procedures involved in archaeological fieldwork.

A major feature of this system includes specially designed forms for recording soil loci, architectural loci, installation loci, burials, and top plans. Coordinated forms were also available for recording field phase sum-

maries, weekly square summaries, small finds, pottery readings, photographs, and plant and animal remains. Sifting of all debris unearthed and on-site separate bagging of all samples and loose finds such as pottery, bones, fruit pits, and other objects was standard procedure in every square.

Excavation personnel consisted of four field supervisors, each assisted by at least four square supervisors. The square supervisors were assisted by one or more associates. Participants were:

Field supervisor for Field A, the Ammonite Citadel, was John Lawlor (Baptist Bible College, Pennsylvania) assisted by square supervisors and associates Anabel Lázaro and Caryn Broitman, Square 7K40; John Hackwell and Anne Crawford, Square 7K41; James Fisher and Elsie Peterson, Square 7K50; Mary Steratore and Glenn Montgomery, Square 7K51.

Field supervisor for Field B, the Western Defensive System, was Doug Clark (Southwestern Adventist College, Texas) assisted by Lloyd Willis and Vilmar Gonzalez, Square 7J87; Kenneth Carlson and My Louc Erhard, Square 7J88; Richard LaCom and Gillian Geraty, Square 7J89; David Merling and Steven Hawkins, Square 7J98; Helen Dates and Jean Gard, Square 7K90.

Field supervisor for Field C, the Northern Suburb, was James Battenfield (Grace Graduate School, California) assisted by Richard Davidson and Ross Miller, Squares 8L62 and 8L82; Robert Merrill and Bryce Cole, Squares 8L63 and 8L64; Claire Peachey, Hanan Azar, and Stephanie Merling, Square 8L72; Zdravko Stefanovic and René Stables, Square 8L63.

Field supervisor for Field D, the Lower Southern Shelf, was Larry Mitchel (Pacific Union College, California) assisted by Marilyn Murray and Robert Collins, Square 5K76; Steven Boozer and Howard Krug, Square 5K77; Colin House and Jason Mitchel, Square 5K86; Hans Curvers and Cheryl Jacob, Square 5K87.

[8]Post-season identifications were kindly carried out by Jim Black, palaeobotanist, Institute of Archaeology, London.

BIBLIOGRAPHY

Abu Howayej, B.
1973 *Agricultural Atlas of Jordan*. Ministry of Agriculture, The Hashemite Kingdom of Jordan.

Abujaber, R. S.
1984 *The Development of Agriculture in Transjordan During the Nineteenth Century*. Master's Thesis, University of Jordan.

Adams, R. McC.
1978 Strategies of Maximization, Stability, and Resilience in Mesopotamian Society, Settlement, and Agriculture. *Proceedings of the American Philosophical Society* 122: 329–35.

Albright, W. F.
1943 *The Excavations of Tell Beit Mirsim*. Annual of the American Schools of Oriental Research 21–22. New Haven, CT: American Schools of Oriental Research.

Aresvik, O.
1976 *The Agricultural Development of Jordan*. New York: Praeger.

Boessneck, J., and von den Driesch, A.
1978 Preliminary Analysis of the Animal Bones from Tell Ḥesbân. *Andrews University Seminary Studies* 16: 259–87.

Boraas, R. S., and Geraty, L. T.
1976 The Fourth Campaign at Tell Ḥesbân (1974). *Andrews University Seminary Studies* 14: 1–16.
1978 The Fifth Campaign at Tell Ḥesbân (1976). *Andrews University Seminary Studies* 16: 1–18.

Boraas, R. S., and Horn, S. H.
1969 The First Campaign at Tell Ḥesbân (1968). *Andrews University Seminary Studies* 7: 97–117.
1973 The Second Campaign at Tell Ḥesbân (1971). *Andrews University Seminary Studies* 11: 1–16.
1975 The Third Campaign at Tell Ḥesbân (1973). *Andrews University Seminary Studies* 13: 101–16.

Conder, C. R.
1889 *The Survey of Eastern Palestine*. London: Committee of the Palestine Exploration Fund.

Cross, F. M.
1973 Notes on the Ammonite Inscription from Tell Sīrān. *Bulletin of the American Schools of Oriental Research* 212: 12–15.

Dyson-Hudson, R., and Dyson-Hudson, N.
1970 The Food Production System of a Semi-Nomadic Society: The Karimojong, Uganda. Pp. 93–123 in *African Food Production Systems: Cases and Theory*, ed. P. F. M. McLoughlin. Baltimore: Johns Hopkins.

Fohrer, G.
1961 Eisenzeitliche Anlagen im Raume südlich von Naᶜur und die Südwestgrenze von Ammon. *Zeitschrift des Deutschen Palästina-Vereins* 77: 56–71.

Franken, H. J., and Abujaber, R. S.
1979 *Yadoudeh*. University of Leiden, Departmental manuscript.

Geraty, L. T.
1985 Preliminary Report on the First Season at Tell el-ᶜUmeiri (June 18 to August 8, 1984). *Andrews University Seminary Studies* 23: 85–110.

Geraty, L. T., and LaBianca, Ø. S.
1985 The Local Environment and Human Food-Procuring Strategies in Jordan: The Case of Tell Hesban and its Surrounding Region. In *Studies in the History and Archaeology of Jordan*, vol. 2, ed. A. Hadidi. Amman, Jordan: Department of Antiquities of the Hashemite Kingdom of Jordan.

Gese, H.
1958 Ammonitische Grenzfestungen zwischen wadi eṣṣir und naᶜur. *Zeitschrift des Deutschen Palästina-Vereins* 74: 55–64.

Glueck, N.
1937 Explorations in Eastern Palestine. *Annual of the American Schools of Oriental Research* 14: 3–4.
1939 Explorations in Eastern Palestine. *Annual of the American Schools of Oriental Research* 18–19: 113.

Hentschke, R.
1960 Ammonitische Grenzfestungen südwestlich von ᶜamman. *Zeitschrift des Deutschen Palästina-Vereins* 76: 103–23.

Herr, L. G.
1984 Excavation Manual for the Madaba Plains Project. Departmental manuscript.
1985 The Servant of Baalis. *Biblical Archaeologist* 48/3: 169–72.

Ibach, R.
1978 Expanded Archaeological Survey of the Ḥesbân Region. *Andrews University Seminary Studies* 16: 201–13.
1979 *The Ḥesbân Regional Survey*. Manuscript. Ḥesbân Expedition Final Publication Project. Berrien Springs, MI: Andrews University Institute of Archaeology.

Johnson, D. L.
1973 *Jabal al-Akhdar, Cyrenaica: An Historical Geography of Settlement and Livelihood*. University of Chicago Department of Geography, Research Paper No. 148.

LaBianca, Ø. S.
1985a Objectives, Procedures, and Findings of Ethnoarchaeological Research in the Vicinity of Ḥesbân in Jordan. In *Annual of the Department of Antiquities*. Amman: Hashemite Kingdom of Jordan.
1985b Sociocultural Anthropology and Syro-Palestinian Archaeology, in J. M. Miller and G. L. Mattingly, eds., *Festschrift for J. A. Callaway*.

Landes, G. M.
1961 The Ammonites. *Biblical Archaeology* 24/3: 66–86.

Oded, B.
1979 Neighbors on the East. Pp. 247–74 in *The Age of the Monarchies: Political History*, Vol. 4, ed. A. Malamat. Jerusalem: Massada.

Plog, S., Plog, F., and Wait, W.
1978 Decision Making in Modern Surveys. In *Advances in Archaeological Method and Theory*, vol. 1, ed. M. B. Schiffer. New York: Academic.

Portugali, Y.
1982 A Field Methodology for Regional Archaeology (The Jezreel Valley Survey, 1981). *Tel Aviv* 9: 170–87.

Puech, E.
1985 L'inscription de la statue d'Amman et la paléographique ammonite. *Revue biblique* 92.1: 5–24.

von Rabeneau, K.
1978 Ammonitische Verteidigungsanlagen zwischen Ḫirbet el Bisara und el-Yadude. *Zeitschrift des Deutschen Palästina-Vereins* 94: 46–55.

Redford, D. B.
1982 A Bronze Age Itinerary in Transjordan. *Journal for the Society for the Study of Egyptian Archaeology* 12.2: 55–74.

Reventlow, H. G.
1963 Das Ende der ammonitischen Grenzbefestigungskette? *Zeitschrift des Deutschen Palästina-Vereins* 79: 127–37.

Sauer, J. A.
1980 *Archaeology of Jordan*. Amman: Ministry of Information.

Shea, W. H.
1985 Mutilation of Foreign Names by Bible Writers: A Possible Example from Tell el-ᶜUmeiri. *Andrews University Seminary Studies* 23: 111–15.

Vyhmeister, W.
1967 *History of Heshbon*. B.D. Thesis, Andrews University.

Warren, R. E.
1869 Expedition to East of Jordan, July and August, 1867. *Palestine Exploration Fund* 1: 284–311, 381–88.

Weier, T. E.
1970 *Botany—An Introduction to Plant Biology*, 4th ed. New York: Wiley.

Yadin, Y.
1975 *Hazor*. New York: Random House.
1984 The Mystery of the Unexplained Chain. *Biblical Archaeology Review* 10.

Zohary, M.
1962 *Plant Life of Palestine*. New York: Ronald.