

MADABA PLAINS PROJECT THE 1992 EXCAVATIONS AT TELL EL-'UMEIRI, TELL JALUL, AND VICINITY

by
Larry G. Herr, Lawrence T. Geraty
Oystein S. LaBianca and Randall W. Younker

Introduction

A fourth season of excavation and survey by the Madaba Plains Project occurred between June 21 and July 31, 1992. It was again sponsored by Andrews University in consortium with Atlantic Union College, Canadian Union College, and Walla Walla College. Full reports have already been published for the first season (1984—Geraty, *et al.* 1989) and the second season (1987—Herr *et al.* a 1991a). Preliminary reports have also been published in the Supplement to the *Bulletin of the American Schools of Oriental Research* (numbers 24

and 26), *the Annual of the Department of Antiquities of Jordan* (volumes 31, 33, and 35), and *Andrews University Seminary Studies* (volumes 23.1, 26.3, and 28.1).

This season, a team of about 100 persons took part in the interdisciplinary project, which included excavations at Tell el-'Umeiri, surveys and soundings within a 5 km radius of the site, excavations at Tell Jalul, processing finds in camp laboratories, and camp logistical activities (Fig. 1).¹

Once again the theoretical objectives of the project focused on cycles of intensification and abatement in settlement and land

¹ The authors of this report are especially indebted to Dr. Safwan Tell, Director General of the Department of Antiquities; Adib Abu Shmeis, Rula Qusous, and Hanan Azar, Department of Antiquities representatives; other members of the Department of Antiquities facilitated our project at several junctures. We should especially mention Fawzi Zayadine who helped with the cave excavation and inscription at Khirbet Rufeiseh.

The land owner of Tell el-'Umeiri, Dr. Raouf Abujaber, was again generous in facilitating and encouraging our research. At Jalul, the enthusiastic cooperation of General Akash ez-Zaben was much appreciated, as was the help of his daughter, Sabal Zaben, who excavated with us at times. Also appreciated was the help of Sheikh Zaben. The officers and staff of the American Schools of Oriental Research and its local affiliate, the American Center of oriental Research in Amman directed by Pierre Bikai and assisted by Patricia Bikai, provided invaluable assistance. The staff was housed in Muqabelein at the Amman Training College, an UNWRA junior college for Palestinians. We give special thanks to its Principal, Dr. Kamal Fahmawi, for making our stay a genuine pleasure. The scientific goals and procedures of the project were approved by the Committee on Archaeological Policy of the American Schools of Oriental Research.

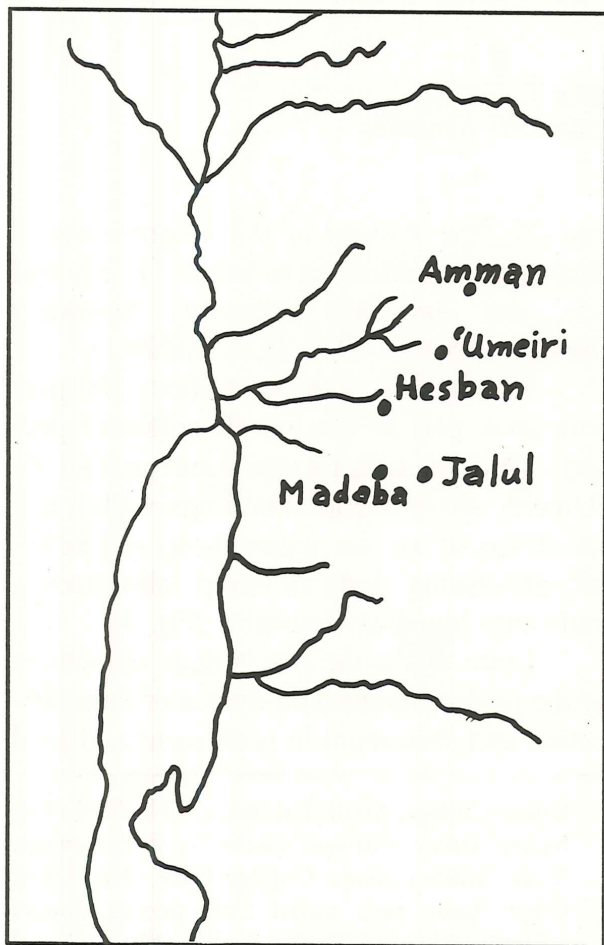
The expedition took place only because of the financial assistance of its principal sponsor, Andrews University, in consortium with Atlantic

Union College, South Lancaster, MA, USA; Canadian Union College, Lacombe, AB, Canada; Walla Walla College, College Place, WA, USA. Other funds were raised from private donors (notably Ron and Sheila Geraty, Mitchell and Patsy Tyner, and Wifred Geschke) and volunteer participants,

Thanks are also due each member of the staff, which was divided into five sections: 'Umeiri excavation, Jalul excavation, regional survey, laboratories, and camp logistics. In charge of planning and overall execution of the project were Lawrence T. Geraty, Larry G. Herry, Oystein S. LaBianca, and Randal W. Younker, co-directors of the project.

'Umeiri Field Supervisors included John Lawlor (Field A), Douglas Clark (Field B), Timothy Harrison (Field D), and Russanne Low (Field F); for Jalul they included David Merling, Zeljko Gregor (Field A), James Fisher and Penny Clifford (Field B). Survey personnel are listed in the next endnote. Roughly 80 square supervisors, volunteers, specialists, and camp staff made up the remainder of the personnel.

In-kind contributions to the project were provided by the Environmental Systems Research Institute of Redlands, California, which provided GIS software support; Magellan Systems Corporation of San Dimas, California, which provided a Global Positioning System receiver unit; and Worthington Foods of Worthington, Ohio, which provided vegetarian canned foods.



1. Map of the Madaba Plains region.

use in this frontier region between the desert and the sown, especially the involvement of the ancient Ammonites. Central to this focus was the study of the food systems employed by the inhabitants through time (for a full discussion of this theoretical framework, its history, and previous work done in the region see Geraty *et al.* 1986: 117-119).

The implementation of these objectives were refined during the 1992 season by enlarging the regional survey to six teams, each with its own primary objective; by probing deeper in the Fields of excavations at Tell el-'Umeiri; and by beginning excavations at Tell Jalul, the largest tell site in Jordan south of Amman and the central tell site of the Madaba Plain during the Bronze and Iron Ages.

The following report will cover the 'Umeiri excavations, followed by those of

Jalul and then the regional survey.

STRATIGRAPHIC EXCAVATIONS AT TELL EL-'UMEIRI

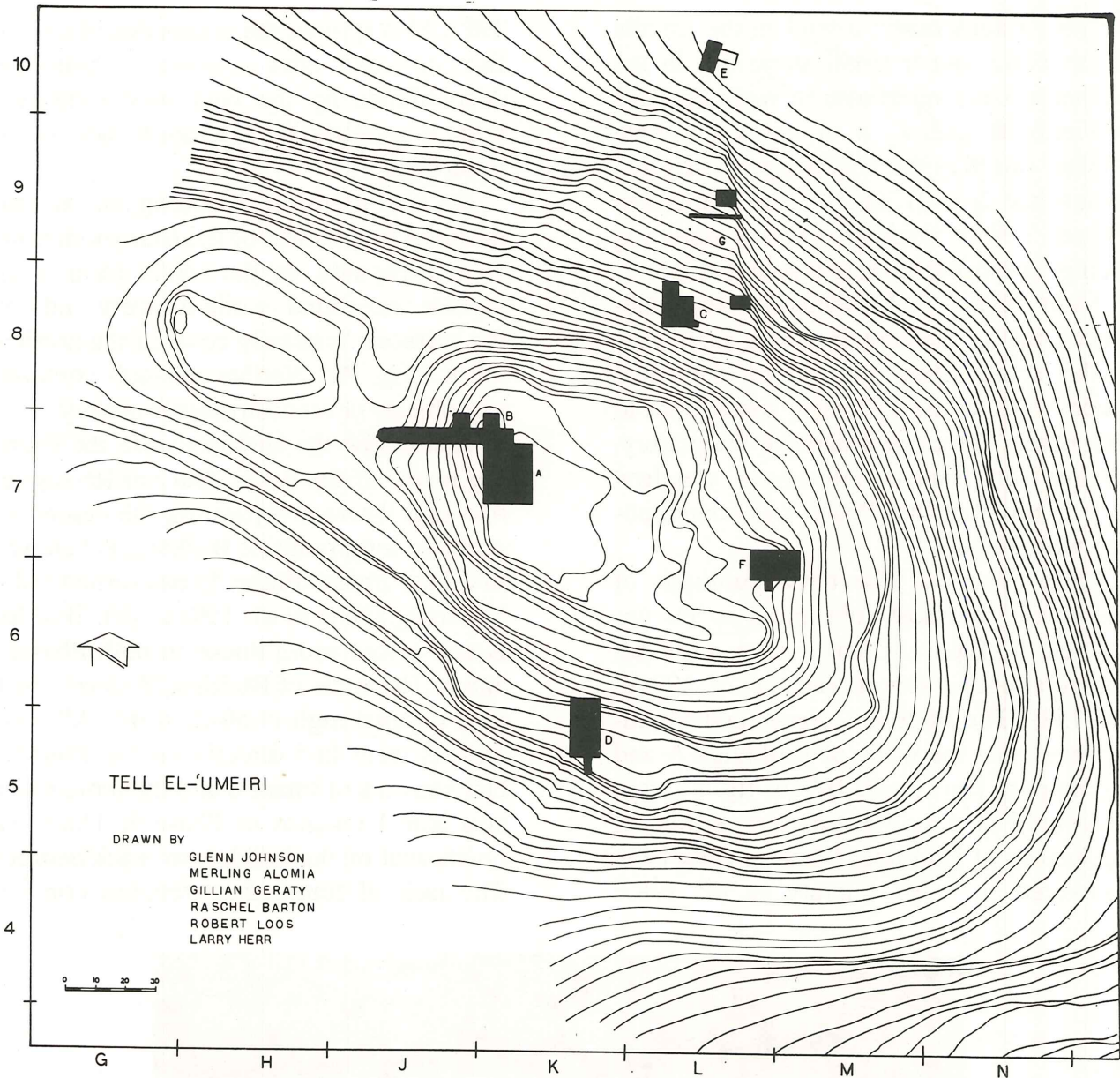
In 1984 four Fields of excavation were opened (Fields A, B, C, and D). In 1987 three of the four were expanded (Fields A, B, and D), one was completed (Field C), and two new Fields were opened (Fields E and F). In 1989 one was expanded (Field A), three reopened old squares and expanded slightly (Fields B, D, and F), another reduced excavation from two squares to one (Field E), and another Field was opened on the north slope (Field G) (Fig. 2). This season, four Fields deepened previously opened squares (Fields A, D, and F), one deepened existing squares while expanding by one square (Field B), and two Fields were discontinued (Fields E and G).

Field A: The Ammonite Citadel (John I. Lawlor)

Excavation on the western rim of the site encountered primarily late Iron II and Persian remains during the first three seasons. Small hints of Iron I material were found in one square. This season, three of the squares (out of 12 so far opened) that were least hindered by standing architecture were sounded to examine earlier remains. These included 7K42 at the southeast corner of the Field, 7K41 on the southern side, and 7K51 roughly in the center. There is now evidence for eleven phases stretching from the Late Bronze Age to Ottoman times.

Field Phase 11. The top of a phase dating to the Late Bronze Age was discovered in the very southeastern corner of the Field (Square 7K42). The top three courses of a wall and its tumble ran NE-SW. The small boulders and cobbles making up the wall clearly differentiated it from the construction techniques of the Iron I and Iron II walls in Field A.

Field Phase 10. A sounding in 7K41 en-



2. Tell el-'Umeiri: Topographic map with Fields of excavation.

countered two phases of Iron I material. The earliest one comprised stone and earth tumble upon which the later one (FP 9) was founded.

Field Phase 9 (FP 7 in 1989). The second of the two Iron I phases in Field A had already been found in 1987 (FP 5 at the time) in the northwestern corner of the Field, consisting of portions of two walls forming a door. This season, the phase was found as wall fragments in all three soundings. Unfortunately, the soundings were separated by several meters of thick Iron II walls and the wall fragments could not be

connected in a coherent pattern. The wall fragment in the southeastern corner of the Field was made of very large boulders (two courses high and one row wide), very different from any other Iron I architecture so far found at the site. A cobble floor was found along the southern edge of the Field and short fragments of parallel walls were found in the middle. The pottery was similar to that found in previous seasons and dates to the early Iron I (12th century B.C.).

Field Phase 8. After a hiatus of about 300 years, occupation again occurred in the ninth and/or eighth centuries. The remains

are very fragmentary: a wall in the middle of the Field and a small stone bin in the southeast. Uncovered also in weak deposits in Fields B and F, it is not yet known whether this was the beginning of the prosperous late Iron II and Persian settlement (Phases 7-3) or whether it was a stuttering attempt at reoccupation that soon fizzled.

Field Phase 7. Divided into two sub-phases, this phase contained two small bins in the southeastern portion of the Field which were stratigraphically subsequent to each other. The closest date for the pottery, coming from limited earth layers, was Iron II. It is possible that Phase 7 is contemporary with Phase 8.

Field Phase 6. The three buildings of this phase, the most substantial so far uncovered in Field A, have been well described in earlier reports (Herr *et al.* 1991b: 156-158). The bottom surfaces and founding levels for the walls of Buildings A and B (compare Herr *et al.* 1991b: fig. 3) were discovered in three locations. A portion of the surface of Building A had already been uncovered in 1984 (Geraty *et al.* 1987:

189). This season, the remainder of the surface emerged after removed a balk was. Also hidden by the balk was a doorway with a pedestal on the north side of the jamb (Fig. 3).

To the north, in Building B, the two northern long rooms of the four-room house were excavated. In the center room a dirt surface was found, while a nicely laid cobble surface completely covered the northern room (Fig. 4). Neither surface contained any objects or reconstructable pottery.

Just below the surfaces were the founding levels of the walls. Our earlier suggestion that the wall separating the center and northern longrooms of Building B belonged to a later phase (Phase 5) has turned out to be wrong (Herr *et al.* 1991a: 23): Building B was a four-room house in both Phases 5 and 6. The walls of Building B stood five to nine courses high (1.50-2.70 m). All foundations were laid directly on the fragmentary remains of Phase 8 and the more extensive Iron I remains of Phase 9. There was no attempt by the builders to reach bedrock. The lack of foundation trenches confirms



3. Tell el-'Umeiri: Room with door and pedestal in Field A, Building A (Phase 6: late Iron II to early Persian).



4. Tell el-'Umeiri: Room with cobbled floor in Field A, Building B (Phase 6: late Iron II to early Persian).

our earlier suggestions that these large walls were basement structures.

The potsherds from the surfaces of Phase 6 belonged to the late Iron II period.

Field Phase 5. The major restructuring of Building A has been described in earlier reports (Geraty et al. 1989: 238-242). The other two buildings were reused with only minor changes and higher basement floors. The best preserved floors, in Building C, were described earlier (Herr et al. 1991b: 157-158). Although surfaces for the phase had been uncovered in earlier seasons for Buildings A and B, they were of poor quality and difficult to discern. This season, no new surfaces were found, but the fill separating them from the surfaces of Phase 6 contained late Iron II and Persian pottery. No artifacts of any kind have been found on the Phase 5 surfaces, suggesting a nonviolent conclusion to Phase 5.

Later Phases. No new remains for Phases 4 to 1 were discovered this season.

Ground Penetrating Radar. In 1989 and again this season, ground penetrating radar examined the unexcavated area to the south of Field A. The results suggest more walls of similar size and orientation to those already discovered in Field A. Future seasons may test these results.

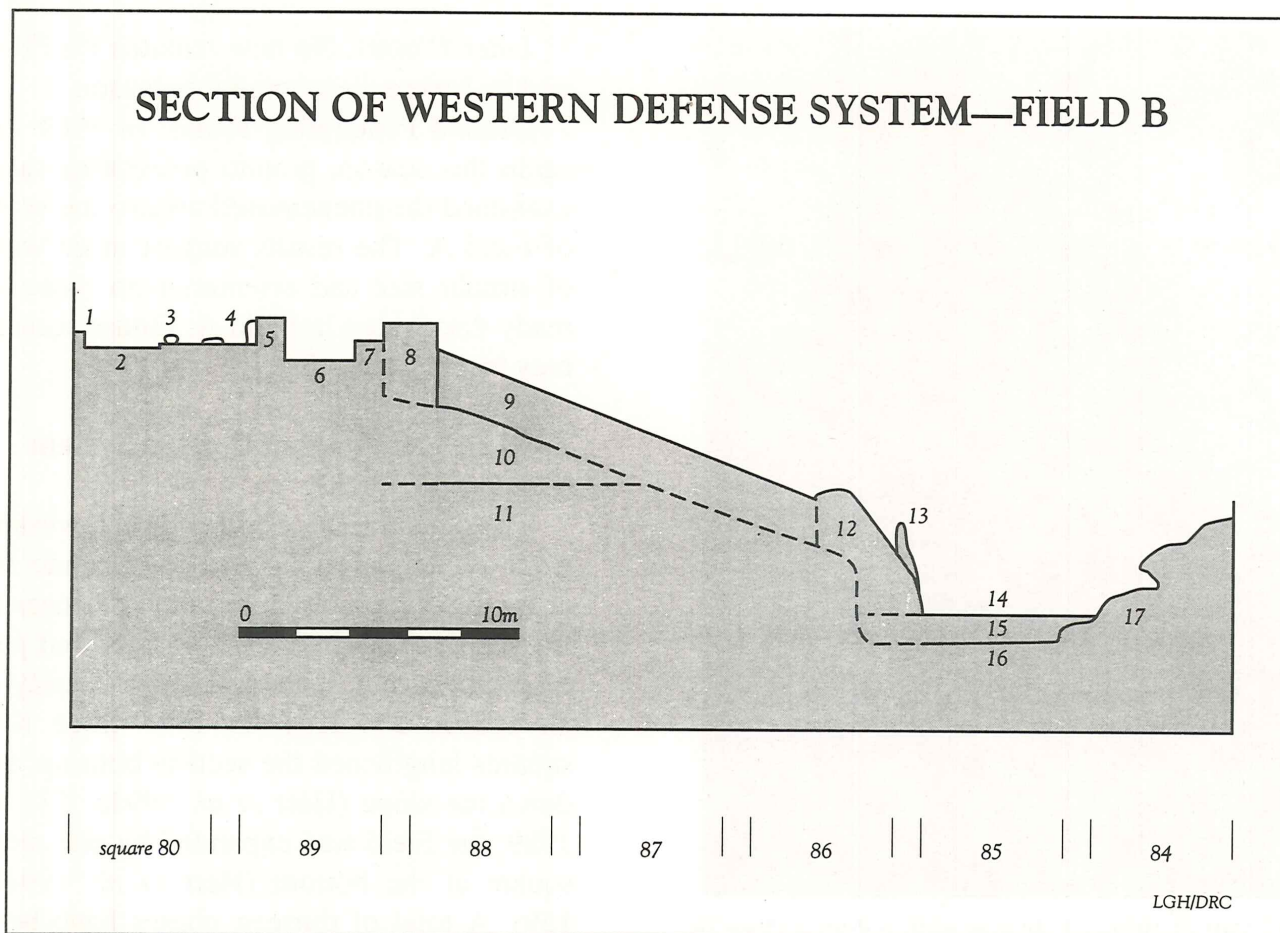
Field B: The Western Defense System

(Douglas R. Clark)

The objective for Field B on the western slope of the acropolis was to examine the changes which took place in the defenses of the site through time. Four squares and part of another were opened in 1984 (Geraty et al. 1989b: 244-257). In 1987 three new squares lengthened the section both up and down the slope (Herr et al. 1991a: 53). In 1989, the Field was expanded by one more square at the bottom (Herr et al. 1991b: 159). A total of thirteen phases have been encountered during the three seasons. Fortunately, no revisions in our previously established stratigraphy were necessary following this season. There was only one new phase, Phase 13.

Field Phase 13. Two shallow depressions in bedrock on the slope of the site beneath the MB II rampart contained debris with nothing later than Early Bronze Age pottery. They probably represent remnant deposits after the slope had been scraped to construct the Middle Bronze Age rampart.

Field Phase 12. The late MB II fortification system was made clearer this season by establishing a chronological connection between the beaten-earth rampart (fig. 5, no. 10) and a dry moat (fig. 5, nos. 16 and 17). The sloping rampart was completely excavated in a probe measuring 2 X 5 m and located immediately west of the Iron I outer casemate wall (Fig. 5, no. 8). The rampart was constructed with a series of dark brown, beaten earth layers (Fig. 5, no. 10).



5. Tell el-'Umeiri: Schematic section of the western defenses and domestic dwelling in Field B, looking south (Phases 12 and 11: MB IIC and early Iron I).

Beginning with the first layer, laid upon bedrock which was relatively level at this point (Fig. 5, no. 11), each subsequent layer gradually steepened the slope until, after about 3.1 meters of accumulation in the east and 1.5 meters in the west, the slope reached 20 degrees. The primary defensive wall for these fortifications, if any existed, must still be farther up the slope, buried beneath the Iron I domestic remains (Fig. 5, nos. 1-7) (for a suggestion that none should exist, see Finkelstein 1992). The latest pottery in the rampart layers belonged to the late MB II horizon.

The bottom of the dry moat (Fig. 5, no. 16), 4.2 m below the highest bedrock on its western side (Fig. 5, no. 17), could not be stratigraphically connected with the rampart this season due to the presence of an intervening Iron I retaining wall (Fig. 5, no. 12).

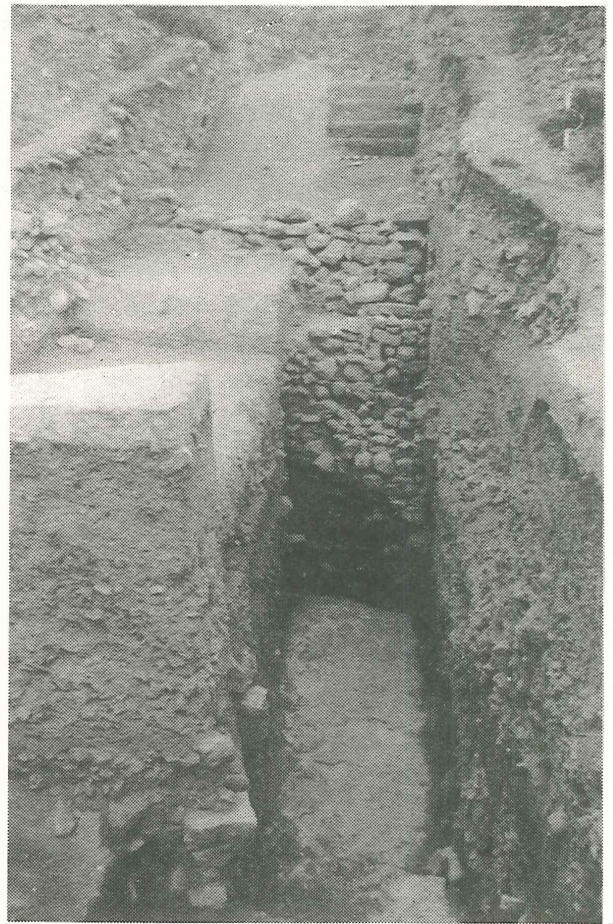
However, the carved, flat bottom of the moat (already encountered in 1989, Herr *et al.* 1991b: 159-160) was covered with a thick layer of debris (Fig. 5, no. 15) which went beneath the lowest stones of the Iron I retaining wall. The debris was identical in description to that of the rampart and was also datable to late MB II. It is thus certain that the moat, including its irregular western side (Fig. 5, no. 17), was dug out at least as early as Phase 12. The MB II debris within the moat probably washed down from the surface of the rampart, inferring only a limited retaining wall at best. Because no Early Bronze Age deposits were found in the moat, we may hazard the suggestion that it did not exist at that time. But more excavation beneath and east of the Iron I retaining wall is needed for confirmation.

Field Phase 11. The Iron I casemate-and-rampart fortification system of Phase 11 is the most coherent phase yet uncovered in Field B (Fig. 5, nos. 1-9, 12, 14, 17), and may be the most complete system, whose construction is datable to the 12th century, so far discovered in all of Palestine and Jordan. Although most of the system was already discovered in earlier seasons, not until this year could we make clear connections from domestic remains inside the casemate wall to the moat at the bottom of the slope.

We will describe the phase from west to east (Figs. 5 and 6). At the bottom of the fortification system was the dry moat, reused from Phase 12. However, the Iron I builders did not remove ca. 0.70 m of the debris at the bottom of the moat (Fig. 5, no. 15), reducing its depth for their use. To make up for this loss, an imposing retaining wall (Fig. 5, no. 12) was constructed of large boulders on top of this debris. The retaining wall was not vertical, but sloped inwards. Because it would have been easy for an invader to climb, it probably functioned more to support the rampart above it than to thwart invasion.

Nothing new emerged this season regarding the rampart (Fig. 5, no. 9) and casemate wall system (Fig. 5, nos. 5-8), which were described in an earlier report (Herr *et al.* 1991b: 159-160). However, portions of two houses were uncovered east of the fortification system.

The casemate room was part of the southern house (Fig. 5, nos. 1-8; and Fig. 7) with a probable door connecting them. In the casemate room, in 1989, a stone platform and over ten smashed collared-rim storejars were found (Herr *et al.* 1991b: 161-162). East of the inner casemate wall were two rooms separated by a north-south line of stone pillar bases (Fig. 5, no. 3; and Fig. 7). The floor of the western room was paved with large cobbles while that of the eastern room was beaten earth. That the



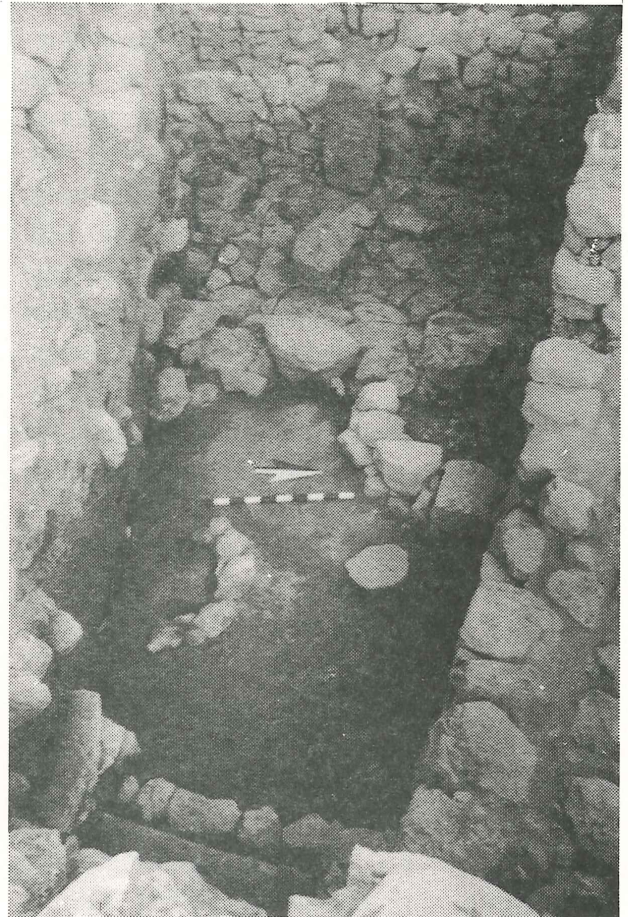
6. Tell el-'Umeiri: Western fortification system in Field B, looking east (Phase 11: early Iron I). The vertical retaining wall made of small stones in front of the larger stone structure is a late Iron II addition.

western room may have been a small shrine is suggested by the presence of an un-inscribed standing stone with a naturally round top leaning against the inner casemate wall (Fig. 5, no. 5; and Fig. 7). In front of the standing stone was a large, oval, flat-topped boulder, perhaps used for offerings or a cultic dedicatory display. Both the standing stone and the "offering stone" were made of the same hard, gray limestone, different in quality from most building stones at the site during this phase. No artifacts were discovered. In the room with the beaten-earth floor (Fig. 5, no. 2; and Fig. 7) were a stone bin and a hearth (probably for cooking), while near the hearth were a mortar and a grinding stone (Fig. 7). A bench may have bordered the room on the east. It would appear that this

room functioned domestically as a courtyard for, among other things, food preparation.

Only small portions of two rooms in the northern house were uncovered. Both rooms were paved with flat cobbles and boulders, but nothing was found on the floor.

Both buildings were covered by a very deep destruction layer (over two meters deep) of burned bricks, stones, and wood, graphically illustrating the process of destruction. The casemate wall and attached houses were probably at least two stories high to account for the tremendous quantity of debris. The way the debris covered the southern house in three parts told the story of the destruction: First to fall, and lying directly on the floors, was the roofing material made up of mud and burned beams. Within this debris, huge quantities of broken collared-rim storejars, large pockets of carbonized grain, and portions of articulated horse and cattle bones with butchering marks suggest strongly that the roof was used for food storage. One pocket of barley consisted of thousands of grains so firmly carbonized by a long, hot fire that they were virtually indestructable. In the base of one collared-rim storejar were hundreds of barley grains, suggesting that the vessels were used to store dry goods. These food remains indicate that the destruction did not take place after a long siege, but was sudden, before the food could be consumed. Second, above the roof debris came jumbled mudbricks, burned by the destruction fire. They clearly came from the second story, with whole sections of the wall collapsing at a time (rows of stacked bricks lying on their sides were easily visible). Finally, above the bricks were stones from the upper portions of the first story walls. The destruction debris in the small portion of the northern house produced over 20 crates of broken collared-rim jars (each crate contained about three pails).



7. Tell el-'Umeiri: Domestic dwelling inside casemate fortifications in Field B, looking west (Phase 11: early Iron I).

All the pottery in the destruction was identical to that excavated in the casemate room in 1989 (Herr *et al.* 1991b: 161-162). The great variety of collars on the collared-rim jars, their everted rims, cooking pots with slightly everted flanged rims, and the presence of vessels in the Late Bronze tradition (such as large jugs with handles on the shoulder) all suggest a date very early in Iron I, the 12th century. This was a sudden, catastrophic, and, for the occupants, a permanent destruction. The site lay in ruins for centuries. Where did the people go? Possibly this is when the more fortifiable hill of Tell Jawa, just three kilometers to the east, was settled. Who destroyed the city is even more ambiguous.

Field Phase 8. Nothing more was discovered this season from Phases 10 and 9. However, during Phase 8, the retaining wall

at the bottom of the rampart was made more steep by the addition of a nearly vertical wall (Fig. 5, no. 13) built of small boulders on top of the lowest course of stones in the Iron I retaining wall (Fig. 6). Because the pottery from the wall and the fill behind it was late Iron II, it probably comprised part of the repairs made to the defensive system at that time (Herr *et al.* 1991b: 160). Apparently, the occupants were not concerned to thwart attackers who might climb the retaining wall.

Field Phase 4. Only minor earth layers were uncovered within the moat from Phases 7 to 5. But, probably within Phase 4, a small extra-urban structure was built on the western bedrock shelves of the moat. Partially protected by a bedrock overhang were two flimsy walls and a shallow surface which appeared to run over the wall stones, suggesting that it was a platform rather than a building. On the platform and beneath the bedrock overhang were three nearly complete vessels: a juglet, a bowl, and a basin. The finds suggest a domestic function (possibly a tent or shack platform) and a date at the transition between late Iron II and early Persian.

Field D: The Lower Southern Shelf (Timothy P. Harrison)

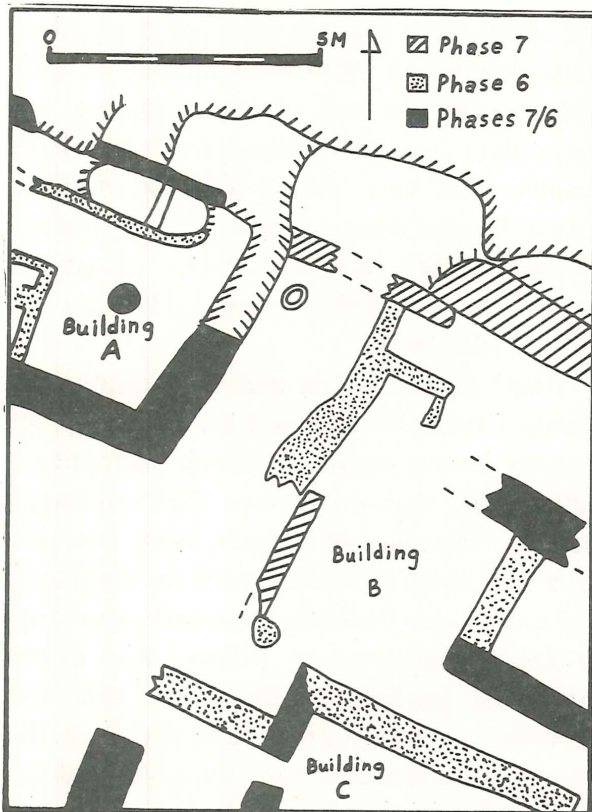
The 1984 excavations on the lower southern shelf (Geraty *et al.* 1989b: 282-295) uncovered two fragmentary phases which were originally ascribed to the early EB IV period (but now are attributed to the transitional EB III/EB IV period) and another which was given an EB III date. In 1987 the Field was expanded to the north, where five EB III phases (now called sub-phases of a single phase) of a domestic complex were found (Herr *et al.* 1991a: 87-155). In 1989, excavation returned to the initial area laid out in 1984 and took all four squares deeper (Herr *et al.* 1991b: 163-165). Additionally, a narrow probe investigated the remains on the southern slope of

the shelf. This season, the four excavation units opened in 1984 were carried to bedrock, yielding a total of seven phases, one more than was determined from the 1989 results. The new phase was the earliest, Phase 7; otherwise, no new phasing changes have taken place from those which appeared in the 1989 report (Herr *et al.* 1991a: 163-165).

Field Phase 7. The earliest architectural features were all founded on bedrock, frequently incorporating bedrock formations, natural and man-made, into their buildings (fig. 8). There seem to have been two distinct structures situated around an open central courtyard. Building A, whose roof was probably supported by pillars, was in the northwest portion of the Field and was probably a broadroom house. Beneath the house and connected to it by a stepped access shaft was a string of three small interconnected storage caverns (Fig. 9). Possible Building B stood to the southwest of Building A. Its walls were reused in Phase 6. The pottery suggests a date for Phase 7 in the EB IB period.

Field Phase 6. By the end of the 1989 season a few deposits from this phase had been identified. This season, it was fully excavated in all four squares. However, separating it from the preceding Phase 7 and subsequent Phase 5 was difficult, because there were no clear cultural breaks, but rather a continuous build-up of surfaces and wall alterations, ultimately culminating in the urban configuration of Phase 4 (Herr *et al.* 1991b: 163-165). Phase 6 represents a burst of activity which seems to have seriously altered the Phase 7 buildings. Although Building A continued from Phase 7, two new structures were apparent, Buildings B and C (Fig. 8).

Finds from Building B included eight spindle whorls and a concentration of potter's marks on sherds, suggesting industrial activities. On the other hand, the total lack of finds related to food preparation, like



8. Tell el-'Umeiri: Plan of walls and cave in Field D, (Phases 7 and 6: EB I-II).

mortars, grinders, or pounders indicates the lack of typical Early Bronze Age domestic activities. Also found were a relative variety of faunal remains: sheep/goat, cattle, donkey, gazelle, dog, cat, fowl, and rodent.

Building C, in the form of a longroom, was south of Building B and separated from it by a passageway. The open area between Buildings A and C may have served as a common activity area. The surface in this open area contained all manner of domestic artifacts, comprising such activities as food production and preparation, textile production, and pottery production (burnishing tools and potter's marks).

Although the basic broadroom form of Building A continued in Phase 6, it saw changes as well, both to the building itself (primarily on the interior) and to the subterranean chambers. A narrow, stone-lined shaft leading to the caverns probably was an air-shaft intended to pierce the accumulating occupational debris above.

The pottery seems to suggest an EB II

date for Phase 6.

Field Phase 5. The new evidence from this season did not alter the picture gained after the 1989 season (Herr et al. 1991b: 163-165).

No new material from the later phases was discovered this season. Although we have not excavated all debris to bedrock, every square has attained that goal in substantial parts. There probably is nothing of major stratigraphic significance left.

Field F: The Eastern Shelf (Russanne Low)

During the 1984 random surface survey, the eastern shelf produced the most balanced series of ceramic readings anywhere; that is, pottery quantities from all major periods of settlement were represented in more-or-less equal percentages (Geraty et al. 1989b : 216-232). There were also topographic features suggesting that the southern city wall, running along the edge of the acropolis, may have ended here in a tower (Fig. 2). North of the "tower" was a depression running up the slope from the east and flanked by another possible tower (a stone pile) on the north, suggesting the existence of a gateway to the acropolis. Four squares were laid out in 1987 to intersect the eastern side of the northern "tower" of the proposed gateway and to examine the eastern shelf as it approached the structure (Fig. 2 shows the location of these squares). A portion of a fifth square was later added to the south in the topographic depression. In 1989, two new squares were opened east of the original four. This season, only the western two squares were deepened into Iron I levels.

The results from preceding seasons did not resoundingly confirm the gate hypothesis (Herr et al. 1991a: 179-187). However, remains from all periods represented at the site have been found (Herr et al. 1991b: 166-168). No new phases of occupation were discerned this season, leaving our to-

tal at eleven (Herr *et al.* 1991b: 166-8). Excavation revealed new information about only three of those phases.

Field Phase 9. The lowest materials excavated this season were fill layers beneath the Phase 8 surface. The layers were ca. 1.0 m thick, but do not seem to have comprised destruction debris. Its tip layers suggest, rather, periodic deposition over time. The pottery in the layers dated to early Iron I.

Field Phase 8. Above the Phase 9 fill was an Iron I domestic complex (Fig. 10), including a north-south stone wall, possibly an east-west wall connected to it, an interior surface sealing against both walls, and an exterior surface to the south. On the interior surface was a mortar stabilized by surrounding stones. Like the latest Iron I remains in Field B, a thick destruction layer covered the remains. It was full of burned bricks fallen from surrounding walls and a few burned wooden beams. Within the destruction, and immediately above the surface, was a perfectly preserved bronze axe head. The pottery dated to early Iron I. As in Field B, there was no sign of subsequent occupation until the Iron II period.

Field Phase 7. Unlike Fields A and B, post-Iron I occupation did not include an early Iron II level, but skipped to late Iron II, when the basement of a large building was excavated into the Iron I levels immediately adjacent to the Phase 8 complex (Fig. 10). It may have been a four-room house plan, with the broadroom in the north and the longrooms, of which only one has been so far partially excavated, to the south. Only a narrow portion of the eastern edge of the building was within our excavation area, but exterior foundation trenches for the walls through the Phases 8 and 9 debris were clear. The basement construction of the building reminds one of the large, public structures in Field A, which were similarly constructed. However, while the floors of the Field A structures were made of beaten earth (except for one cobbled example),



9. Tell el-'Umeiri: Building A in Field D with holes leading to cave (Phases 7 and 6: EB I-II).

the interior floors of the two rooms in the Field F building so far uncovered were paved with smooth, round cobbles. The outer walls of the building were well preserved, reaching over two meters high in one location. The pottery from the fill inside the rooms and from above the surfaces was late Iron II.

From the fill debris above the Iron II house came a faience seal (Fig. 11), which reads *lnsr'l bn 'lmsl* "belonging to *Našar'il* son of 'Ilmashal" (Fig. 12). The names are typically Ammonite as is the seventh century script. A disk and crescent at the bottom comprise the modest iconography.

STRATIGRAPHIC EXCAVATIONS AT TELL JALUL

In harmony with our regional approach,



10. Tell el-'Umeiri: Field F: Possible four-room house on right with cobbled floors (Phase 7: late Iron II); room of earlier house on left (Phase 8: early Iron I).

we commenced excavations at a new major site in the Madaba Plains region, Tell Jalul. Located approximately five kilometers east of the modern town of Madaba, Jalul is the largest tell in the Madaba Plains, covering an area of about 18 acres. The ancient identity of the site is at present unknown, although there have been several proposals. For example, some scholars have suggested that Jalul was the Heshbon of Sihon the Amorite king mentioned in numerous biblical passages such as Num 21:21, Deut 29:7, Josh 9:10, etc. (e.g. Horn 1982: 10, 11 and Boling 1988: 47), while Andrew Dearman has recently proposed Biblical Bezer (Dearman 1989).

While a number of well-known scholars have visited Jalul (e.g. Albright 1933: 28; Glueck 1934: 5), the first intensive and

comprehensive survey was undertaken by a team from the Andrews University expedition to Heshban (Ibach 1978; 1987). Systematic random sherding indicated that the site and/or its immediate vicinity have been almost continuously occupied throughout historical antiquity. This preliminary indicator of its occupational history, along with its size and central location, suggest that Jalul must have played an important role in the region's social and political history.

Because our focus on the social, cultural, and political development of the inhabitants is necessarily diachronic, one of our first objectives for the new excavation was to establish a chronological framework for the site. Therefore, it was decided to open a trench at the northeast corner of the tell (Field A) where it was obvious that a considerable amount of occupational debris had accumulated and where the incline of the slope was great enough that an excavation trench could quickly expose a vertical section through the occupational levels (fig. 13). A second field was opened on the eastern side of the tell (Field B) where surface remains pointed to the possible presence of a monumental gateway; if so, this could help us to understand not only the nature of Jalul's ancient fortification system, but also to discern the layout of the city and determine where to locate future excavation fields.

Field A (David Merling and Zeljko Gregor)

Excavations in Field A discerned twelve phases of occupational activity.

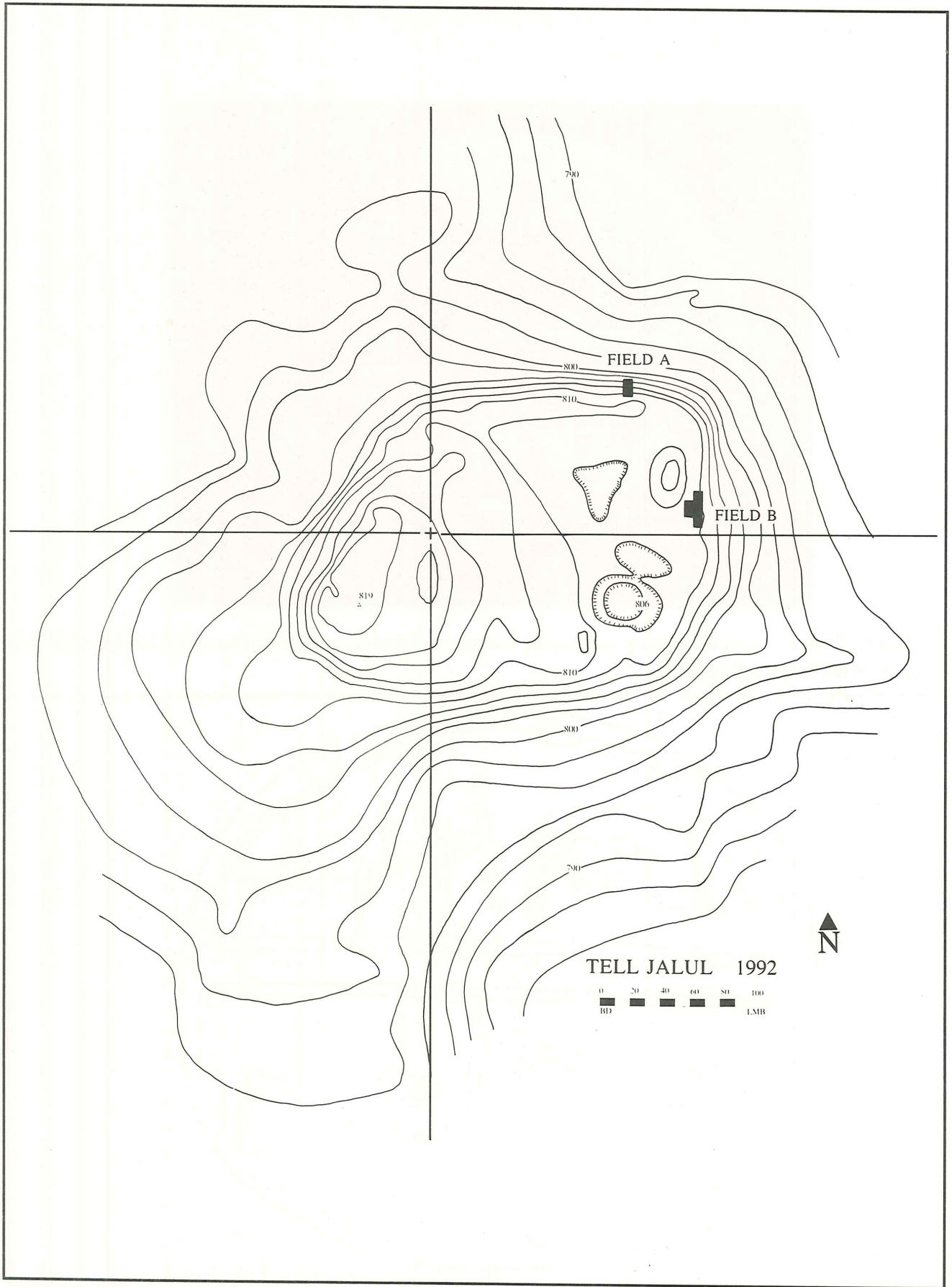
Field Phase 12. There were no architectural remains associated with the earliest phase. However, a series of wind-blown (?) ashy layers (well over one meter thick) containing Iron I sherds, including collared-rim storejars and carinated bowls, were found throughout all of Square A2 where the lowest levels were reached. The presence of



11. Tell el-'Umeiri: Seventh century Ammonite faience seal found in Field F (Phase 7?: late Iron II); photo by West Semitic Research.



12. Tell el-'Umeiri: Reversed Drawing of the seal in Fig. 11 as it would appear in an impression.

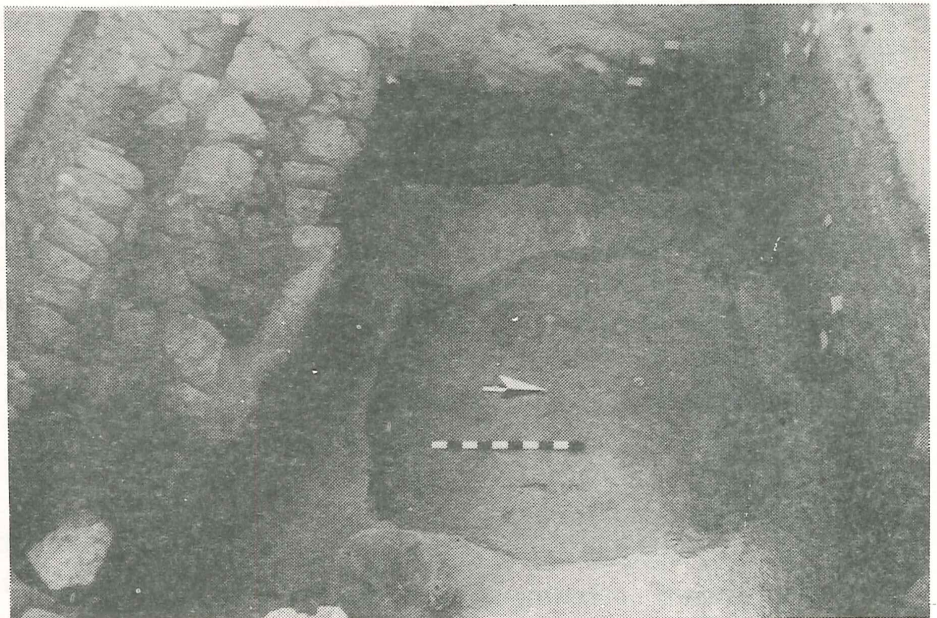


13. Tell Jalul: Topographic map with Fields of excavations.

14. Tell Jalul: East-west wall in Square A2; note two phases of the wall (Phases 11 and 9: both early Iron II), the foundation trenches (in balk), and the ashy layers under the wall (Phase 12: Iron I)



15. Tell Jalul: Large pit in Square A2, just north of the east-west wall in fig. 12 (Phase 8: late Iron II).



identical layers in all of the deepest probes in Field B (below) suggest both a significant occupation of the site during this period and a subsequent wide spread destruction. A few Late Bronze Age sherds were also found in these ashy layers.

Field Phase 11. Phase 11 was represented by the earliest phase of an east-west stretch of wall in Square A2, just inside the crest of the mound (Fig. 14). A distinctive foundation trench could be traced in both the east and west balks to the base of the wall. Although none of the pottery in this

foundation trench dated later than the Iron I period we suspect the wall may ultimately date to the early Iron II—ninth century B.C. (see discussion below, Field B, Phases 10 and 9). The nature and purpose of this wall is not yet known. Its position along the crest of the tell suggests it was a city wall, although the rather small field stones with which it was constructed are more typical of smaller buildings. It may be a wall from a building just inside the true city wall.

Field Phase 10. There appears to have been a brief period of abandonment after

the wall of Phase 11 went out of use. The evidence for this is a pit on the western side of Square A2 that is above the foundation trench for the wall of Phase 11, but is cut by the foundation trench for a later wall in Phase 9. Two other pits on the north side of Square A2 appear to belong to this same phase. All three pits date to the ninth / eighth centuries B.C.

Field Phase 9. An east-west wall was built during the Iron II period along the identical line of the earlier wall of Phase 11. Again, the precise nature and function of this wall is unknown, but presumably it served a function similar to that of its predecessor. Also, the foundation trench for this wall could be easily traced in the balk right to the point where the lowest course was laid (Fig. 14). There was a distinct difference in size and color of the stones in this later wall from the earlier one. The pottery in the foundation trench dated to the ninth/eighth centuries B.C.

Field Phase 8. A large, shallow pit in the center of Square A2 was dug into the ashy layers of Phase 12 (Fig. 15) which contained mostly Iron I pottery; however, the pottery and objects found in the pit date to the late Iron II, ca. seventh century B.C. The sherds included typical Iron II burnished wares. Several interesting objects were also found, including several bone spatulae, a bone pendant shaped like a hammer, and a ceramic figurine head of a horse. Faunal remains included sheep/goat and eight cattle bones. The pit, itself, appears to be lined with chaff and was probably used to store grain (for the practice of lining storage pits with chaff, see Abujaber 1989). A second pit from this phase was dug against the face of the Phase 9 wall on the east side of Square A2.

Field Phase 7. Yet another pit was dug into the large shallow pit of Phase 8. In addition to the usual large numbers of sheep/goat bones there were two cattle bones. Pottery in the pit was, again, from the late Iron

II period.

Field Phase 6. The second pit phase was followed by a period of abandonment in which earth layers accumulated throughout Square A2. None of the pottery from these layers was later than Iron II.

Field Phase 5. Phase 5 was a plastered threshing (?) surface of uncertain date. The surface, which appeared in the northeastern portion of Square A2, was somewhat depressed like a bowl. Stratigraphically, it postdated the Iron II architectural remains of Phase 9, but predated a hard-packed Ayyubid/Mamluk dirt surface (Phase 3).

Field Phase 4. After the plaster floor went out of use there was a period in which debris accumulated on top of the floor. Pottery from this debris included sherds from the Early Bronze, Middle Bronze, Late Bronze, Iron I and Iron II Ages, as well as from the Ayyubid/Mamluk periods.

Field Phase 3. After an indefinite period of abandonment, a hard-packed dirt surface, possibly a floor, was created on top of the Phase 4 debris. It appears throughout most of Square A2 and, thus, could not be traced to any walls within the confines of the square. Pottery above and below the surface indicates that it cannot be earlier than Ayyubid/Mamluk.

Field Phase 2. Phase 2 comprised a number of graves that locals believed to be of Bani Şakhr slaves from the 19th century A.D. Eight burials were uncovered in Square A1 and ten more in A2. The lack of evidence for any special attention regarding the interments seems to confirm the lower social status of the people buried here. The graves were shallow and there were no notable grave goods except for a couple of copper bracelets. All of the skeletons were facing south, however, (toward Mecca) indicating Islamic burial rites. The skeletal remains were reinterred by local workers in the modern cemetery located on the acropolis.

Field Phase 1. Phase 1 was a recent accumulation of topsoil and subsurface debris. In Square A1 this was considerable due to the accumulated talus and loess on the steep slope.

Field B (James R. Fisher and Penny Clifford)

Eight phases were distinguished in Field B.

Field Phase 8. Field Phase 8 included ash lenses identical to those found in Field A (Phase 12). The lenses ran under the paving stones of Phase 7 and contained Iron I and Late Bronze Age sherds, including collared-rim storejars, carinated bowls, conical vessels, etc. The presence of identical ash layers in both fields suggests a massive destruction some time during the late Iron I period, but no definite occupational levels from this city have yet turned up.

Field Phase 7. In Squares B4 and B6 an approach ramp, possibly to a city gate complex, was excavated (Figs. 16, 17). The ramp ran upslope in a north to south direction along the east slope of the tell. It was paved with boulder-sized flagstones and had what appears to be a retaining wall on its upslope side (Fig. 16). While most of the pottery underneath the flagstones dated to the Iron I period, some distinctive burnished sherds from early Iron II (early ninth century B.C.) require that the pavement be dated no earlier than that period.

Field Phase 6. Phase 6 comprised a destruction/abandonment phase in which approximately a meter of debris accumulated on the surface of the pavement of Phase 7. The pottery from these layers dated to early Iron II (ninth / eighth centuries B.C.).

Field Phase 5. A robber trench could be discerned in Square B6 in which stones from the retaining wall of the pavement of Phase 7 had been removed (Fig. 17).

Field Phase 4. A new approach ramp was built along the same line as the earlier ramp of Phase 7 (Figs. 16, 18). As before,

the ramp was paved with boulder-sized flagstones and was bordered by what appeared to be a retaining wall on the upslope (western) side. The extensive ramp was uncovered in Squares B2, B3, B4, B5 and (possibly) B8. The pottery immediately under the pavement dated to the 9th/8th centuries B.C.

Field Phase 3. There was a second period of destruction and abandonment in which debris accumulated over the ruins of the paved approach ramp of Phase 4. Most of the sherds in the debris dated to Iron II (ninth / eighth centuries B.C.).

Field Phase 2. A small number of 19th century bedouin slave burials, similar to those of Field A (Phase 2), were also exposed in Field B. There were two infant burials in Square B2 and four burials in Square B3. Again, these burial remains were reinterred in the modern cemetery on the acropolis by our Muslim workers. The burials were of the same nature as those found in Field A: shallow graves with no grave goods and the skeletons facing south. Because one of the graves in Square B3 (a teenager) appears to have been dug a little later than the others, we have subdivided Phase 2 into two sub-phases.

Field Phase 1. The uppermost phase consisted of topsoil and subsurface soils.

HINTERLAND INVESTIGATIONS

Investigations of the hinterland within a five kilometer radius of Tell el'Umeiri—which were begun in 1984 and continued during the 1987 and 1989 field seasons—culminated in the 1982 season. To a large degree, these investigations had been inspired by many unanswered questions resulting from our previous research at Tell Hesban and vicinity. While the Hesban project had brought into focus the question of how people in this region went about providing for their food, water, and security needs during successive historical periods, the fact that this question had come into fo-



16. Tell Jalul: Square B4: The earlier approach ramp is in the lower right corner (Phase 7: early ninth century B.C.); note a retaining wall on the left side and the later pavement in the upper left corner (Phase 4: ninth/eighth centuries B.C.).



17. Tell Jalul: Square B6: The earlier approach ramp (Phase 7: early ninth century B.C.); note where the retaining wall has been robbed out in the lower left corner (Phase 5: late ninth century B.C.?).

cus after the fieldwork had been completed meant that there were many gaps in our information.

As in previous years, the 1992 field season continued several concurrent lines of investigation, most of which were begun during previous seasons of fieldwork in

1984. These included an environment survey; an archaeological site survey; an ethnoarchaeological survey focusing on habitation caves and water provisioning; excavation of a habitation cave containing pre-Islamic Arabic inscriptions; excavation of a Bronze Age cemetery; and a sub-



18. Tell Jalul: The later approach ramp; note the remains of a thick wall (possibly meant to retain the edge of the pavement) to right of pavement (Phase 4: ninth to eighth centuries B.C.).

surface mapping project.²

The Environment Survey

The principle objective of the environment survey remained the same as during previous seasons, namely to gather data and insights to enable reconstruction of environmental correlates of food system changes in the past. The specific objective of the 1992 season was to complete a bedrock geology

map and a soil map of the project area as it appears today. The data needed to produce these maps was successfully obtained from paper maps of the geology and soils of Transjordan, aerial photographs of the project area, and field observations. These maps will be used to help reconstruct changes over time in land forms and distribution of agricultural soils throughout the project area.

2. As in previous seasons, the director responsible for planning and execution of the hinterland surveys and excavations was Oystein S. LaBianca of Andrews University.

Douglas Schnurrenbuerger (University of Maryland) was responsible for the environmental survey. Gary Christopherson (University of Arizona) headed the site survey. He was assisted by David Hopkins (Wesley Technological Seminary) — team leader; Gerald Mattingly (Johnson Bible College) — team leader; Rhonda Root (Andrews University) — artist; Mailen Kootsey (Andrews University) — GPS testing; Mazen Razmy (University of Jordan) — translator; Tischa Ives-photographer; and Phillip Slaughter— student assistant. Hinterland excavation probes were carried out by David Hopkins with the assistance of Mazen Razmy.

The ethnoarchaeological survey was carried out

primarily by Dorothy Irvin (Durham, NC) and Hanan Azar (Department of Antiquities). They were assisted part-time by Oystein LaBianca, Rula Qusous (Department of Antiquities), and Naifeh Issa (University of Jordan).

Excavation of the inscription cave at Khirbet Ru-feisah was carried out by Oystein S. LaBianca, Fawzi Zayadine (Department of Antiquities), and Rula Qusous. They were assisted by two students, Sameh Foad Khamis (University of Jordan) and Ibrahim Fayoumi (University of Jordan). Excavation of the Bronze Age cemetery was carried out by Howard Krug (Rochester, NY), Douglas Waterhouse (Andrews University), Jalal Abu Hamdan (University of Jordan), and Stacy Knapp (Dubuque, Iowa).

The sub-surface mapping project was done by Jon Cole (Walla Walla College) and Gerald and Scott Sandness (Richland, Washington).

The Site Survey

As in previous seasons, the major objective of the site survey has been to document in as much detail as possible changes over time in settlement and landuse patterns within the project area. Completion of the site survey—which, over four field seasons, has recorded 134 sites—involved five specific tasks:

The first was to re-visit and re-record sites which had not been documented using the standardized recording system perfected during the 1989 field season. This was done to enable uniform presentation of all sites surveyed in the final report on the survey and to facilitate GIS-assisted spatial analysis of all sites and site features, ascertaining their relationship to agricultural soils, water sources, and roads.

The second task was to complete a tour of all sites with predominantly Iron Age pottery, followed by a tour of all sites with predominantly Byzantine pottery, in order to get a better feel for the locational and archaeological features which distinguish these two periods of settlement. An observation yielded by these tours was that, whereas sites with predominantly Iron Age pottery tended to be located the primarily in gently rolling hills and level areas, those with Byzantine pottery were found in all types of terrain.

The third task was to improve the recording of hinterland sites through utilization of a survey artist. A total of 175 drawings were completed, including detailed drawings of installations related to the production of olive oil (olive crushers, olive presses, and olive oil separation vats), farmstead layouts, herding stations, entrances to habitation caves, and wine presses.

The fourth task was to test GPS (global positioning system) technology for use in recording the precise geographic location of archaeological sites. The equipment tested included two Magellan GPS NAV 1000 PRO receivers made by Magellan Systems

Corporation of San Dimas, California. An exterior antenna kit arrived too late to be used in the field. It was found that the precision with which locations could be pinpointed varied depending on how many satellites were within communication range. Greatest precision (3 m accuracy) was obtained using two receivers during times when signals from 3 satellites could be picked up simultaneously.

The fifth task was to experiment with the use of limited archaeological probes to ascertain more precisely the date of construction of four “rectilinear structures” turned up by the site survey. Three of these probes succeeded in establishing the most probable date of construction (Sites 52 and 69 were Iron II, while Site 85 was Byzantine).

The Ethnoarchaeological Survey

An important source of insight into the process of food system intensification and abatement within the project area has been our studies of recent changes in settlement and landuse patterns. In past seasons these studies have focused on delineating various archaeological correlates of how, over the past several decades, individual households and villages have converted from primarily subsistence production of cereals and sheep and goats to market-oriented production of fruits and vegetables.

During the 1992 season two important correlates of this process were investigated. The first had to do with the manner in which the use of habitation caves and whole cave villages were abandoned in favor of village housing. A major goal, in this regard, was to locate and document abandoned habitation caves and cave villages, and to find out about the factors which contributed to their abandonment. The 1992 season added four such abandoned cave villages to those already discovered and studied during previous seasons.

The second correlate had to do with the process of abandonment of cisterns in favor

of reliance on the integrated water network. To this end "water interviews" were carried out to learn more about what the project area's present-day residents could tell us about how they used to provide for their water needs before the integrated water network came into use. Interviews included questions about the different kinds of cisterns that used to be maintained—and, in some cases, continue to be maintained: who owned and who had the right to use them; how they were cleaned and filled; why the majority of cisterns had been abandoned; what is the cost to repair abandoned cisterns; what were the pros and cons of relying on cisterns vs. relying on the integrated water system.

Perhaps the most significant insight gained from these interviews was that, as villagers were connected to the integrated system, they gradually ceased to maintain their cisterns and thus increasingly gave up personal responsibility for collecting and storing rainwater. This situation has led to increased pressure on the underground aquifers on which the integrated system depends for its supplies, while rainfall and surface runoff are wasted to a greater extent than was the case when individual households collected and stored rainwater. Therefore, when the integrated water system is shut off due to shortages, the poor in some villages are worse off today than when they had access to cistern water. This is because they cannot afford to buy water as often and thus are forced to make do with less.³

Khirbet Rufeisah Inscription Cave (Site 22:6, Field A).

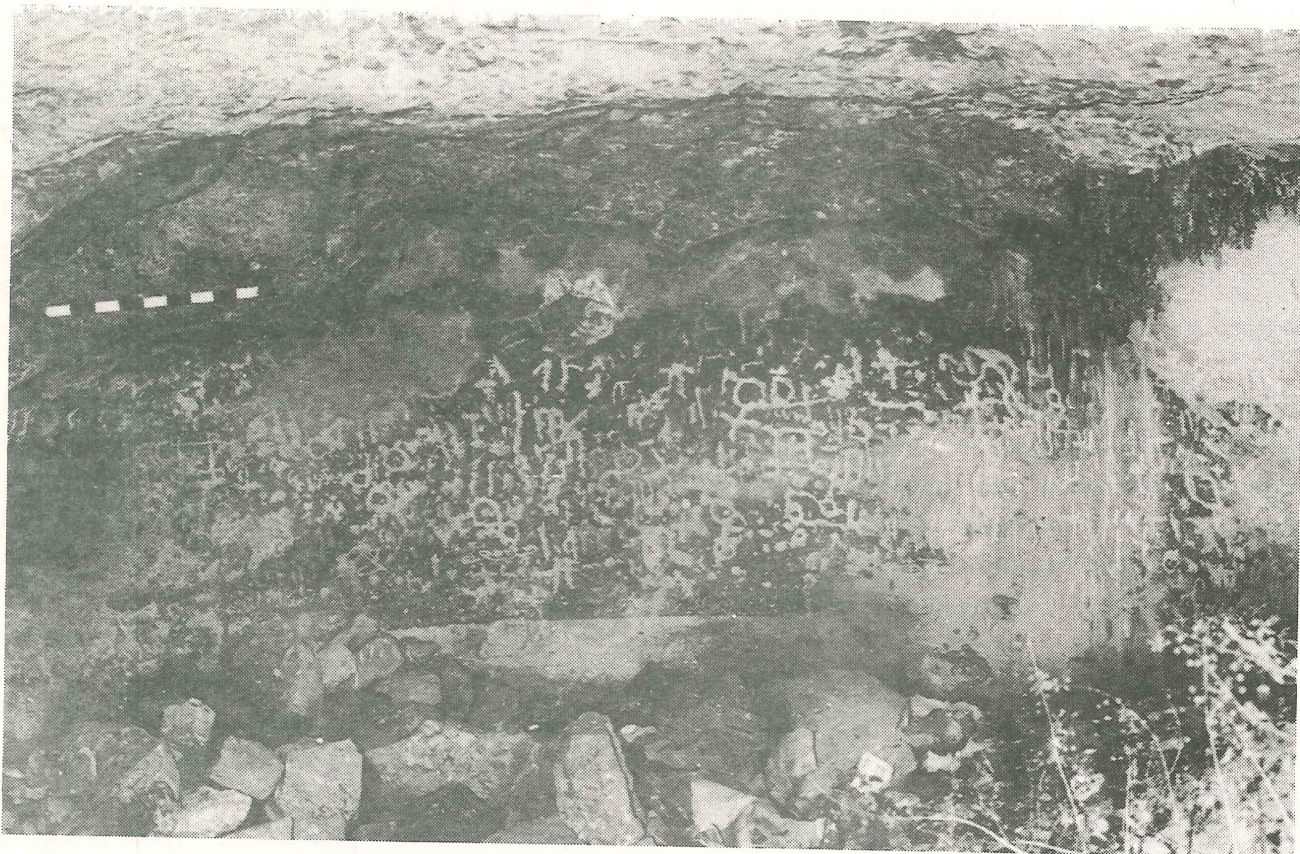
During the second week of July in the course of a routine search for habitation caves by the ethnoarchaeological team, Dorothy Irvin and Hanan Azar came upon what may be the largest assemblage discovered to date in Jordan of pre-Islamic Arab alphabetic characters, tribal signs, and pictographs (Fig. 19). Inscribed on a black-painted, plastered panel 25 m long and 1.5 m high, the inscriptions are located inside an otherwise unremarkable habitation cave at Khirbet Rufeisah, near Yadoudeh. Well over 1000 engraved characters and pictographs cover the panel.

Preliminary reading of the inscription by Fawzi Zayadine of the Department of Antiquities and David Graf of the University of Miami indicated that it contains characters belonging to a succession of pre-Islamic Arabic alphabets. It appears to be a palimpsest which, in addition to the most recent set of inscriptions, contains the partially erased remains of earlier ones as well. The panel thus appears to have been used by Arab tribesmen as a sort of "tribal bulletin board" throughout most of the Classical Era.

Because of the obvious significance of the inscription, the entire cave complex was cleaned of all debris and excavations were undertaken in order to establish a chronological framework for the site and to ascertain more precisely by whom and for what reason the cave had been used.⁴ Areas of

3. These "water interviews" were spurred in part by efforts to obtain funding for "Project Rainkeep," which entails a plan for development of incentives for local residents to clean, repair, and bring back into use their abandoned cisterns as a way to improve water security and socio-economic conditions in the project area. Funding for the project is being sought from USAID, NORAD, and other potential sources of support.

4. Excavations were carried out jointly by the Madaba Plains Project and the Department of Antiquities. As mentioned above, Fawzi Zayadine co-directed excavations with Oystein LaBianca and Rula Qusous. The Department supplied wheelbarrows, picks, and other equipment, along with assistance in dealing with press inquiries about the discovery.



19. A portion of the Khirbet Rufeisah inscription discovered by the hinterland survey.

excavation were thus opened immediately inside the walled-off entrance to the cave (Squares 1 and 2) and immediately outside the opening (Square 5). Square 1 covered approximately 10 square meters, while Squares 2 and 5 covered approximately 4 square meters each.

Eleven sequential earth layers were excavated in Squares 1 and 2. They were separated on the basis of debris composition and texture changes. Square 5 was subdivided into 8 layers on the same basis. Most of the sharply sloping layers in both excavation zones were probably fill layers deposited after the primary use of the cave. Due to the limited time available between the discovery of the cave and the expedition's closing date, excavations ceased in all three squares before bedrock could be reached.

Square 1 produced 345 potsherds of which 95 were judged diagnostic, while

Square 2 yielded 181 sherds with 30 diagnostics and Square 5 produced 411 sherds with 165 diagnostics. The range of periods represented included Roman, Byzantine, Umayyad, Late Islamic and Modern. Two sherds were judged possibly Iron Age. More analysis will be needed before any successional patterning can be said to exist on the basis of the sherds recovered to date.

The most interesting objects recovered in the excavations were one tent pin from Locus A1:6; one needle fragment from Locus A1:10; and one earring from Locus A2:2. These objects are consistent with the interpretation of the site as having been used primarily by tent and cave dwelling bedouins. Further archaeological investigations are planned.

Bronze Age Cemetery Excavations

In 1987, a survey team working south of Khirbet Bisharat (Site 73) observed several

shaft openings in the ground made visible by recent robbing activities. Based on preliminary observations, a few of these shafts appeared to be examples of Early Bronze Age shaft tombs. Up to 12 tombs were documented.

We went back to the site in 1992 because of new encroaching construction near the cemetery and because of the possibility of documenting Early Bronze Age tombs there. As no tombs from this period had been documented yet within the project area, and as the nature of the area's Bronze Age occupation has remained elusive, it was deemed all the more worthwhile to devote some time to careful excavation of this site.

A total of three tombs were excavated. Although Tomb 1 had been robbed, it was cleared to gain a fuller understanding of its architectural type. The rock cut chamber (3.25 x 2.30 x 1.60 m), exhibiting tool marks and a small ledge around three of the sides, was semi-circular with a sloping ceiling. Most of the potsherds in the debris of the chamber were Iron Age, although older fragments were found. The chamber also had a plaster-like substance on the wall supporting a theory of reuse. No intact objects were found.

In an area marked by a slight depression in the bedrock, a probe revealed the shaft of Tomb 11. The bottom of the shaft opened into two chambers, one on the north and another on the south. The entrance to the north chamber was blocked by nari stones which crumbled quite easily, revealing a chamber, shaped like a rounded rectangle in plan (3.20 x 2.81 x 1.8 m), that still preserved toolmarks in the bedrock. It was filled with debris that almost reached the ceiling, covering unarticulated fragmentary

skeletal remains. The grave goods consisted of finds typical to the Amman region in the EB IV (Palumbo and Peterman 1993): two globular strap-handled vessels, one four-spouted lamp, and one cup.

The south chamber was somewhat larger than the northern one. While it was similar in design, only a few fragmentary sherds dated the construction of the tomb to the EB IV. The rest of the assemblage, indicative of a later use in the MB IIA, consisted of four ovoid jars, a burnished juglet, a small juglet, a carinated bowl, and a toggle pin. The chamber contained commingled, unarticulated skeletal fragments of at least seven adults.

Tomb 12 was accessed through a hole in the west wall of the north chamber of Tomb 11, due to significant roof collapse in the area around the shaft. The chamber (4.10 x 2.60 x 1.16 m) contained only disturbed fragmented skeletal remains and a typical EB IV assemblage: three four-spouted lamps, one cup, one globular strap-handled jug, and one bronze dagger. The dagger was in very good condition with rivets still in evidence on each side of the blade above the tang, but the handle was missing.

While the analysis is preliminary, Tombs 11 and 12 appear to have been constructed in EB IV, while the south chamber of Tomb 11 was reused in MB IIA. More detailed analysis of the tombs' contents, including its skeletal remains, will be forthcoming.⁵

Sub-Surface Mapping Project

Using a variety of technologies—including seismic refraction (SR), ground penetrating radar (GPR), and electromagnetic induction (EMI)—the sub-surface mapping team collected data for eight different aspects of our project.

5. A preliminary study of the human skeletal remains from Tombs 11 and 12 has been supplied by Stacy Knapp. Her report indicates that Tomb 11 contained at least seven individuals, one of

which appears to be a secondary burial; the rest appear to be tertiary burials. Tomb 12 contained the remains of only one person in a primary burial arrangement.

Four of these were conducted at Tell el-'Umeiri: 1) The extent of the western defense system was investigated using ground penetrating radar transects. This was a continuation of a 1989 project where GPR was used along the southern balk of Field B for correlation of radar signals with excavated structural features. 2) GPR was also used this season to extend the measurement area in the region south of Field A to a total area of approximately 350 square meters on a 0.6 meter grid layout. 3) The location of a possible gate and approach on the upper south slope of the tell was investigated by a one meter GPR grid pattern over a 30 by 45 m section. 4) Electromagnetic induction was used along a 150m transect on the south hillside of the wadi south of the tell to locate possible tombs in an area of rock outcropping.

At Site 73, Khirbet Bisharat, a variety of data was collected in order to be able to evaluate the efficacy of various techniques for locating tombs. Electromagnetic induction data were obtained on a 900 square meter area in a one by one meter grid using 300 and 500 megahertz antennae. As a part of the tomb-finding technique development, four parallel 40 meter EMI transects also explored an area of bedrock outcropping immediately north of the fertile bottom

lands of Wadi el-Bisharat.

The radar antennae also provided profiles along eight transects in Madaba in an attempt to locate a possible cistern. Unfortunately, surface clutter limited the effectiveness of the GPR units.

Seismic refraction was used on Tell Jalul to obtain additional data along the transect line used in 1989 for collecting seismic refraction and ground penetrating radar data. This line passes through a depression which is considered a possible water collection feature.

The data obtained in July will be analyzed in the Battelle Pacific Northwest Laboratories and Walla Walla College laboratories during the forthcoming months and made available for planning for the next season's excavations.

L. G. Herr,
Canadian Union College

L. T. Geraty,
Atlantic Union College

O. S. LaBianca,
Andrews University

R. W. Younker,
Andrews University

Bibliography

- Abujaber, R. S.
 1989 *Pioneers over Jordan*. London: I. B. Tauris.
- Albright, W. F.
 1933 Archaeological and Topological Explorations in Palestine and Syria. *BASOR* 49: 23-31.
- Boling, R. G.
 1988 *The Early Biblical Community in Transjordan*. Sheffield: Almond Press.
- Dearman, A.
 1989 Levitical Cities of Reuben and Moabite Toponymy. *BASOR* 276: 55-66.
- Finkelstein, I.
 1992 Middle Bronze Age 'Fortifications': A Reflection of Social Organization and Political Formations. *Tel Aviv* 19: 201-220.
- Fohrer, G.
 1961 Eisenzeitliche Anlagen im Raume sudlich von Na'ur. *ZDPV* 77: 56-71.
- Geraty, L. G.
 1983 Heshbon: The First Casualty in the Israelite Quest for the Kingdom of God. Pp. 239-250 in H.B. Huffmon, F.A. Spine and A.R.W. Green (eds.), *The Quest for the Kingdom of God: Studies in Honor of George E. Mendenhall*. Winona Lake, IN: Eisenbrauns.
- Geraty, L. T., Herr, L. G., and LaBianca, O. S.
 1986 Madaba Plains Project: A Preliminary Report of the 1984 Season at Tell el-'Umeiri and Vicinity. *BASOR* Supplement 24: 117-119.
 1987 The Madaba Plains Project: A Preliminary Report on the First Season at Tell el-'Umeiri and Vicinity. *ADAJ* 31: 187-199.
 1988 The Joint Madaba Plains Project: A Preliminary Report on the Second Season at Tell el-'Umeiri and Vicinity (June 18 to August 6, 1987). *Andrews University Seminary Studies* 26: 217-252.
 1989a Madaba Plains Project: The 1987 Season at Tell el-'Umeiri and Vicinity. *ADAJ* 33: 145-176.
- Geraty, L. T., Herr, L. G., LaBianca, O. S., and Younker, R. W.
 1989b *Madaba Plains Project 1: The 1984 Season at Tell el-'Umeiri and Vicinity and Subsequent Studies*. Berrien Springs, MI: Andrews University.
- Glueck, N.
 1934b *Explorations in Eastern Palestine*, I. *AASOR* 14.
- Herr, L. G., Geraty, L. T., LaBianca, O. S., and Younker, R. W.
 1991a *Madaba Plains Project 2: The 1987 Season at Tell el-'Umeiri and Vicinity and Subsequent Studies*. Berrien Springs, MI: Andrews University.
 1991b Madaba Plains Project: The 1989 Excavations at Tell el-'Umeiri and Vicinity. *ADAJ* 35: 155-180.
- Horn, S. H.
 1982 *Hesban in the Bible and Archaeology*. Occasional Papers of the Horn Archaeological Museum, Number 2. Berrien Springs, MI: Horn Archaeology Museum, Andrews University.

Ibach, R. D.

1978 An Intensive Surface Survey at Jalul. *Andrews University Seminary Studies* 16: 215-222.

1987 *Hesban 5: Archaeological Survey of the Hesban Region*. Berrien Springs, MI: Institute of Archaeology, Andrews University.

Lugenbeal, E. N. and Sauer, J. A.

1972 Pottery from Heshbon. *Andrews University Seminary Studies* 10: 21-69.

Palumbo, G. and Peterman, G.

1993 Early Bronze Age IV Ceramic Regionalism in Central Jordan. *Bulletin of the American Schools of Oriental Research* 289: 23-32.

Redford, D. B.

1982 A Bronze Age Itinerary in Transjordan (Nos. 89-101 of Thutmose III's List of Asiatic Toponyms). *Journal for the Society for the Study of Egyptian Archaeology* 12.2: 55-74.