Archaeology in Jordan

VIRGINIA EGAN AND PATRICIA M. BIKAI

The 1998 installment of the "Archaeology in Jordan" newsletter in *AJA* presents brief reports on recent excavations and projects in the Hashemite Kingdom (fig. 1). The material is once again arranged in chronological order after the section on general projects and surveys. A debt of gratitude is owed this year, as in the past, to the Department of Antiquities and to its director, Ghazi Bisheh. With their assistance, projects concerned with uncovering and understanding the cultural heritage of Jordan continue with success.

Institutions frequently cited in the text are abbreviated as follows: Department of Antiquities of Jordan (DAJ); American Center of Oriental Research (ACOR); British Institute at Amman for Archaeology and History (BIAAH); Deutsches Evengelisches Institut für Altertumswissenschaft des Heiligen Landes (DEI); and Institut français d'archéologie au Proche-Orient (IFAPO).

GENERAL PROJECTS AND SURVEYS

Shelter over the Petra Church. Patricia M. Bikai, ACOR, reports:

When planning for the excavations at the Petra Church site began in late 1991, it was already understood that it might be necessary to erect a shelter if mosaics were found. ACOR, the sponsor of the excavation, began collecting ideas about shelters and evaluating other such projects, but it was soon clear that there were few, if any, successful models available. By August of 1992, important mosaics had been uncovered in the two aisles of the Petra Church. Planning for the shelter began in earnest and, in late 1992, it was decided to hold an international competition for the design. By May 1993, eight design concepts had been submitted and were put on public display. The committee that reviewed the designs recommended that the prize be awarded jointly to Ammar Khammash of Jordan and Geoffrey Stennet of Australia. They further recommended, however, that neither design should be implemented, and that ACOR begin again with an architect who could make recommendations for an acceptable shelter in view of the lessons learned from the competition.

The architect chosen was Rob Shutler of Virginia. In February 1994, Shutler reviewed the history of sheltering at archaeological sites around the world, and confirmed that there were no good models. Some shelters had failed structurally, some provided no light, and some overwhelmed the antiquities. Others, particularly those built of stone, appeared to be antiquities themselves. Finally, the heavy structures, particularly those built of stone, required that massive foundations be built, necessitating the destruction of antiquities in the foundation trenches.

With this information in hand, design criteria for the shelter at Petra were refined. The basic requirement was that the shelter provide protection from rain and sun for the mosaics. Other criteria were that intervention at the site be minimal and that the shelter be clearly modern; removable without harming the site; able to be installed quickly so that damage to the site by the construction process itself would be minimized; have a long life with low maintenance requirements; provide museum-quality light without electricity; and be naturally ventilated. To distract least from the World Heritage site of Petra, another criterion was that it be as low as possible.

The only technology that met these criteria was a space-frame and, after another series of meetings by the technical committee, Shutler's design was accepted in late 1994. In July of 1995, after funding had been granted to ACOR by the United States Agency for International Development (USAID), the project was put out for bids. In January 1996, the award went to StarNet International of Longwood, Florida. The shelter was shipped to Jordan in March 1997. It covers 609 m^2 with an aluminum frame, which minimizes the weight and foundation size. The canopy rests on only six columns, thus minimizing intervention at the site. Over the frame is a high-tech fabric cover. It took only seven weeks to erect the shelter and the project was completed on 3 May 1997 (fig. 2).

Apart from the museums, the shelter is the only structure built at Petra solely for the purpose of protecting rather than exploiting the site. When final conservation is complete in 1998, it will be open to the public so that all can see the magnificent mosaics.

Central Jordan Palaeoenvironmental Project. Caroline Davies, Arizona State University, reports:

A study was undertaken to examine long-term climate change in the now arid central plateau region of Jordan by comparing palaeoenvironmental data from Jordan's upland interior playa lake basins. Transitional zones are the margins of contact between

American Journal of Archaeology 102 (1998) 571–606

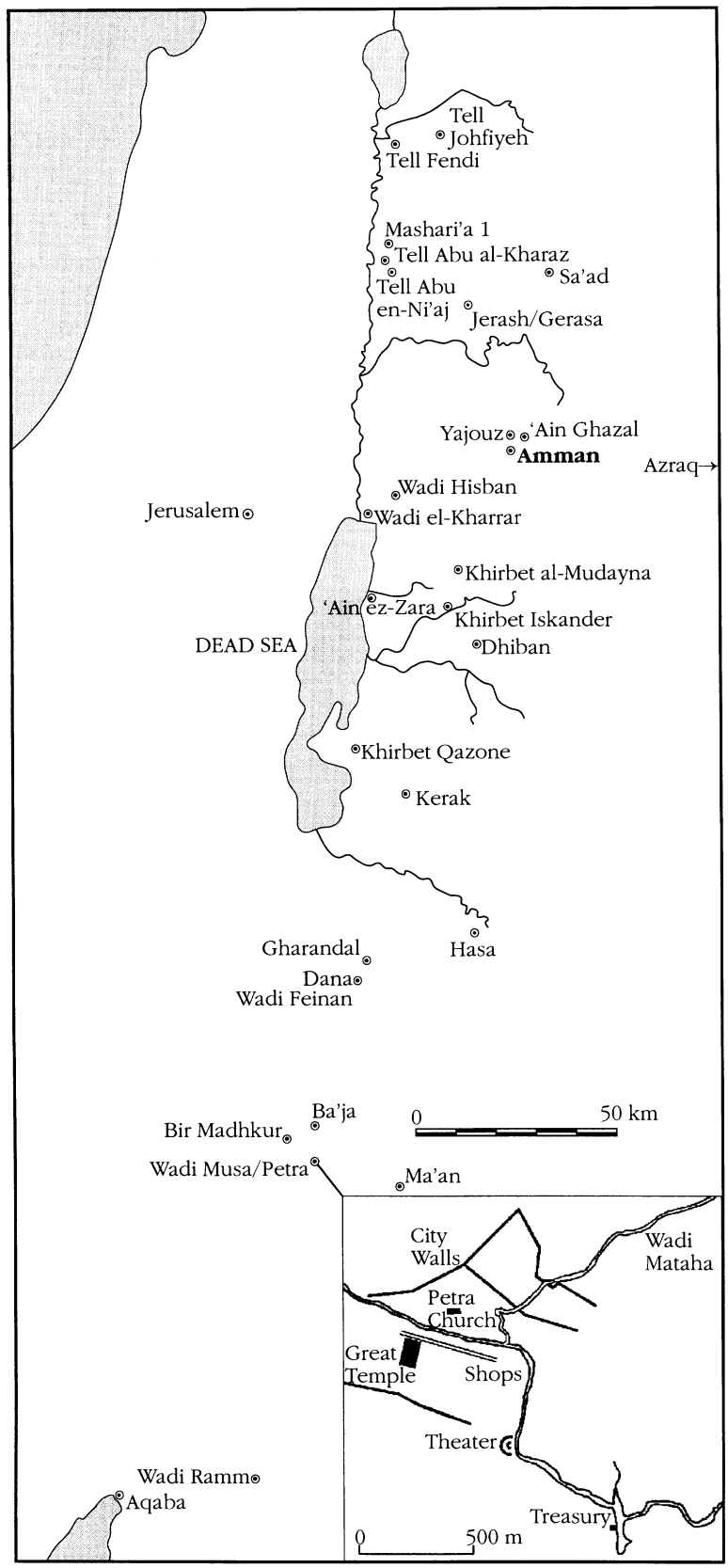

Fig. 1. Map of archaeological sites referred to in the text. (P.M. Bikai)

Fig. 2. Shelter over the Petra Church mosaics

major circulation systems that oscillate through space and time. These transitional zones are often the first areas to reflect a change in regional climate as seen by patterns in biota and hydrology. By examining fluctuations in major circulation systems, we may achieve a better understanding of climatic change under the boundary-zone conditions of most of the world's desert regions. Understanding the complexity of past climates in these transitional zones is an important step in resolving competing circulation models in arid lands and in understanding long-term human adaptation to fluctuating margin environments. Since the Middle East has one of the world's fastest growing populations, an understanding of past climates in the region may aid in predicting future changes in climate that may have important policy implications. The methodology developed here is applicable to other desert regions and climatic boundary zones.

The first drilling season of the Central Jordan Palaeoenvironmental Project successfully recovered sedimentological cores from the Qa el-Jafr and Qa el-Jinz basins and stratigraphic sections from the Wadi el-Hasa and Wadi Bouwaydah (Ma'an). The project continues in its second field season with the completion of mechanical drilling for sediment cores in three additional basins: Azraq basin, Qa Hafira, and Qa Disa. These additional basins provide data from playa lake basins along a north–south transect that parallels the Jordan Rift Plateau. This transect provides a comparison of interbasin concurrence of climatic changes throughout the Pleistocene and Holocene. In addition, examinations of LANDSAT imagery, aerial photography, and topographic maps for all basins were completed.

Preliminary core descriptions and laboratory results indicate significant episodes of climatic reversal. The further identification and refinement of these events requires a detailed chronology, currently being worked out. The comparison of proxy climatic data will provide the basis for establishing a regional perspective of long-term climatic change in the upland interior. This regional reconstruction will be contrasted with the climatic record from the western lowlands to determine changing influences of circulation patterns between the Northern Polar Jet and the Asian Monsoon. Current research concentrates on developing sedimentological, palynological, and microfaunal profiles and defining a chronology of climatic events.

Wadi Feinan, environmental investigations. H.A. Mohamed and C.O. Hunt, University of Huddersfield, report:

Holocene environmental change in the Wadi Feinan, on the margins of the Rift Valley in southern Jordan, is under investigation as part of a BIAAH-sponsored interdisciplinary study of settlement and ancient land use (G.W. Barker et al., *Levant* 29 [1997] 19–40; Barker et al., "Environments and Landuse in the Wadi Faynan, Southern Jordan: The Second Sea-

son of Geoarchaeology and Landuse Archaeology," *Levant*, in press). The area today is degraded steppe desert, with unstable soils and little vegetation. Palynological and sedimentological techniques were used to analyze soil and fluvial deposits associated with archaeological sites, reservoirs, and cisterns.

Initial results from site 5015, a Neolithic site on a terrace of the Wadi Dana, suggest that the inhabitants cultivated cereals and possibly olives in a relatively stable steppe landscape. Tree pollen is common. At a later period, probably shortly after it was abandoned, the site was covered with silty colluvium, evidence of environmental degradation and soil erosion.

A cistern (site 5051) associated with buildings containing Chalcolithic potsherds and lithics provides evidence of a later stage in the evolution of the landscape. The cistern was part of a small Chalcolithic catchment system that was not integrated into subsequent field systems. The fill provides evidence of cereal and olive cultivation. The palynology suggests a diverse steppe landscape, but the scarcity of tree pollen indicates that the area was becoming less humid or that resources were being depleted.

Fill behind a barrage at Khirbet Feinan provides evidence for perhaps 2,000 years of landscape history. Pollen found in the lower part of the fill indicates the cultivation of cereals and olives in a degraded and virtually treeless steppe landscape. Archaeological evidence suggests the widespread use of floodwater farming techniques during this time (reported in G.W. Barker et al., supra). After the area went out of cultivation, probably in the Arab period, it became considerably drier, a condition that has continued to the present.

Preliminary results indicate that the environment in the Wadi Feinan has changed considerably over the Holocene. Desertification began gradually but intensified after the end of floodwater farming in the area. It is too soon to ascribe causes to the environmental changes in the earlier Holocene, but the Arab-period desiccation is likely to have been the result of climatic, rather than anthropogenic, change.

Ecological studies of weed floras, Kerak region and northern Jordan. Michael Charles, Carol Palmer, Chantelle Hoppe, and Amy Bogaard, University of Sheffield, report:

Two ecological studies took place in April 1996 in the Kerak and Irbid areas as part of the three-year weed ecology study of the Department of Archaeology and Prehistory, University of Sheffield. The data will be incorporated into a weed ecology database to interpret archaeobotanical remains from the Near East and northwestern Europe. In both Kerak and Irbid, the studies were carried out in areas characterized by little or no use of herbicides, chemical fertilizers, or farm machinery.

In the Wadi ibn Hamad, in the Kerak area, a two-week study focused on the weed floras of irrigated and unirrigated cereal fields. Weed species recorded in surveys conducted in the spring of 1995 by Charles and Hoppe were collected and measured using the Functional Interpretation of Botanical Surveys (FIBS). This method relates functional plant attributes (e.g., canopy dimensions, root thickness, and stomatal and epidermal cell characteristics) to specific aspects of the agricultural environment such as productivity, the availability of water, and disturbance. The goal is to define suites of attributes that can be associated with different crop husbandry regimes. Measurements may then be conducted on living archaeological weed species to answer questions about crop husbandry in the past.

In the Irbid area, a two-week study focused on weed floras developed under differing regimes of crop rotation. The weed species studied were those identified by Palmer in field surveys conducted in 1990–1991, and the principal crop rotation regimes studied were cereal/fallow, cereal/legume, and cereal/legume/fallow. The primary goal of this study, using the FIBS approach, is to differentiate the effects of field location, e.g., location in the plains or the hills, from those of crop husbandry.

Archaeological survey of the Dhiban plateau. Chang-Ho C. Ji, La Sierra University, reports:

A survey by La Sierra University and Samyook University, Korea, was carried out in July and August 1997 in the Saliya and Aliyan regions of the Dhiban plateau. Of the 203 archaeological sites visited, 194 were previously unrecorded.

The Saliya region, on the southeastern edge of the Dhiban plateau, extends about 7 km north from the Wadi Mujib to Umm er-Rasas. At el-Museitiba, about 5 km southeast of Umm er-Rasas, a relatively well preserved rectilinear fort, a large building complex, and a rectangular Roman reservoir about 10 m deep were recorded. Roman, Byzantine, and Islamic pot sherds were identified, as well as examples from the Iron I and Nabataean periods. The site of Medeineh Saliya, at the junction of the Wadi Saliya and the Wadi Saiden, is surrounded by steep slopes and is connected with the plateau only by a narrow ridge on the eastern side. Medeineh Saliya appears to have been a Nabataean cultic site associated with a large village and several watchtowers. At er-Ramah, about 3.5 km southwest of Khirbat es-Saliya, the survey recorded impressive architectural remains, pos-

sibly Nabataean and Roman. Modern sheepfolds have damaged the acropolis, but a square tower remains intact at the summit.

The Saliya region appears to have been densely settled in the Nabataean to Byzantine periods. The survey revealed evidence of settlement in the Early Bronze (EB), Iron I, Iron II, and Islamic periods but found little evidence of Middle Bronze (MB) or Late Bronze (LB) occupation. Most archaeological sites in the area are located along the southern edge of the plateau, while few ancient remains—except for isolated cisterns and dams—were found in the central plateau between Khirbat es-Saliya and Khirbat er-Ramah. This pattern may result from environmental, political, and economic factors and warrants further research.

During the second half of the 1997 season, the survey team visited the Aliyan region—defined by the Wadi Walla in the north, the Wadi Umm ez-Zabayia in the west, and the modern road from Nitil to Umm er-Rasas in the east—and recorded 58 archaeological sites, predominantly small watchtowers and agricultural sites. Some ancient urban centers were found along the Wadi el-Butum, e.g., Umm Shujelrat esh-Shiyab, Khirbat el-Qahqah, Khirbat el-Kaum, Umm Shujelrat el-Gharbiya, and Khirbat Ammuriya.

At Umm Shujelrat esh-Shiyab, a small ruin damaged by the removal of stones for modern construction, most sherds recovered date from the Roman through Islamic periods. El-Qahqah, an extensive site overlooking the Wadi Qahqah, shows evidence of occupation in the Nabataean through Islamic periods. At el-Kaum, a large site on a commanding position over the Wadi el-Kaum, a rectilinear fort, walls, architectural remains, and numerous Ottoman and modern sheepfolds were recorded. Pottery found at el-Kaum dates to the Iron II, Hellenistic, Roman, Byzantine, and Islamic periods. In Ammuriya, about 2.5 km northwest of el-Kaum, ancient walls and architectural remains were identified among the Ottoman and modern stone houses and caves. Roman, Islamic, and some Nabataean painted sherds were collected. At Umm Shujelrat el-Gharbiya, a small Islamic ruin was recorded, incorporating the remains of several ancient buildings constructed of flint blocks.

Of the 58 sites surveyed in the Aliyan region, the majority can be dated to the Roman through Islamic periods. EB settlement was more sparse in the Aliyan region than in Saliya; MB and LB pottery was not identified. Iron Age settlement appears to have been sparse in the Aliyan region in general, concentrated at Khirbat Aliyan and el-Kaum.

Zara Archaeological Project. Mohammad Waheeb and Sa'ad Hadidi, DAJ, report:

The Jordan Valley Authority and the Directorate of Tourism Investment are planning to implement a touristic project in the ez-Zara area. To assess the impact of the project on the area, archaeological excavations were conducted between 15 February and 30 May 1997.

The area of ez-Zara was recently divided into two parts by construction of a modern road: an upper part, where several archaeological sites are located, and a lower part, which is thought to have been a harbor. Archaeological excavations were conducted in both areas. The team registered all of the archaeological sites found for the first time, as well as sites already known from previous explorations. Structures were documented, but the artifacts are still under analysis in order to date the sites.

Test trenches and excavations at ez-Zara and in the harbor area revealed archaeological sites of several periods, including the Chalcolithic (e.g., site 25); Early Bronze Age (e.g., site 23); Roman and Byzantine periods (e.g., site 20); and Islamic period (e.g., site 18). Prior to excavation, the only architectural features visible in the area of the harbor were tumbled stones and heaps of pebbles toward the shore of the Dead Sea. Systematic excavation was begun in the harbor area along the ez-Zara beach. The goals were to check the stratigraphic and cultural sequence of the harbor area, and particularly to verify the possible presence of Roman–Byzantine remains and other occupations; to clarify the stratigraphy of the main structure and learn more about underlying structures; and to check suggestions by previous researchers that a thermal bath structure was established near the beach area in antiquity.

The remains uncovered in the harbor area consist of walls built of dressed ashlars of limestone, and foundations in good condition. Three main walls were discovered running north–south: wall 1 stood alone while walls 2 and 3 were joined and faced the shore of the Dead Sea. A space was left between wall 1 and walls 2/3. The internal sides of the walls and the floor of the space were coated with layers of lime plaster, possibly to prevent any seepage of water. The fact that the space was situated so near the water supply (the hot springs) suggests that the intention may have been to channel water into the space, possibly for aquatic performances.

The entire upper portion of the building has disappeared, probably as the result of earthquakes and other natural factors. Only a few fragments represent the plaster layers that would have been used for roofing the structure. No ceramic roof tiles were

recovered and only a few architectural elements were found, chiefly column drums and bases.

The harbor was in use over a long period of time and clearly must have had a complex history. The preliminary analysis of the recovered material indicates that the construction of the harbor area belongs broadly to the Roman period. It is clear, however, that reconstruction work was implemented in the Byzantine era.

Karak Resources Project. John I. Lawlor, Baptist Bible Seminary, and John D. Wineland, Roanoke Bible College, report:

After a preliminary season of intensive surface survey in 1995, the Karak Resources Project (KRP) conducted its first season of excavations at al-Mudaybi' in June and July 1997. The 1995 survey expanded on a survey by J.M. Miller and J.M. Pinkerton (see J.M. Miller ed., *Archaeological Survey of the Kerak Plateau*, Atlanta 1991) and plans were made to excavate at Mudaybi' as a case study in resource utilization. Located in the southeastern corner of the Karak plateau, Mudaybi' sits on the eastern rim of the Fajj-al-'Usaykir, a natural trade route between the modern Desert Highway and the King's Highway. The site was visited by early travelers and archaeologists, including Nelson Glueck. Before the 1997 season, this fortified hilltop was known for its well-preserved perimeter and interior acropolis walls and four proto-Aeolic capitals.

Members of KRP opened two fields of excavation in 1997. Field A consists of three 6 × 6 m squares linking the north exterior and interior acropolis walls and extending inside (i.e., south of) the latter. The founding levels of the two walls were not reached; pottery from these squares ranges in date from Iron Age II through the Late Islamic period. Debris from the collapse of both walls, probably the result of seismic activity, was encountered in the two northernmost squares and clearly marks the separation between later activity at the site (Late Byzantine to modern) and the earlier Iron II occupation. The earth layers on which the wall debris lay were deposited by wind over a long period; tumbled stone from both the perimeter and acropolis walls collapsed simultaneously on these same layers of soil. Domestic architecture inside the acropolis wall probably dates to the Early Islamic/Late Byzantine era. No clear floors or surfaces were reached. Immediately south of the perimeter wall, a series of superimposed plaster layers preserved what appeared to be a plaster dump, with pottery dated to the Middle Islamic era.

Field B consists of three 6 × 6 m squares extending from just outside the eastern gate complex to the acropolis wall, bisecting an Iron II monumental gateway. Excavation between the gate towers exposed a plastered bench, a large threshold, and flagstone pavers. A beaten earth surface was exposed in the first chamber on the south side of the gateway (fig. 3). Two projecting towers, visible on the surface, are linked with two pier walls, probably the remains of a four-chambered gate. Oxidized soil, ash deposits, burned clay with reed impressions, and carbonized fragments of roof beams above the floor level attest to an intensive fire in the gate structure. A complete limestone proto-Aeolic capital (fig. 4) was discovered in an extensive layer of tumbled architectural and windblown sediment. The base of this ornately carved capital measures 1.65 m, the same width as the gate piers. Whole capitals and fragments indicate that at least four of these stood in the gate structure. The gate area was reused in the Late Byzantine/Early Islamic period, when the acropolis was constructed, and was abandoned thereafter.

In keeping with the goal of examining the ancient and modern use of natural resources on the Karak plateau, the 1997 KRP team included specialists who studied the environmental, historical, and cultural heritage of the region. This off-site team continued the archaeological survey and investigated geology, geomorphology, soils, and ethnography to place Mudaybi' in a wider context.

Sandstone weathering, Petra. Thomas R. Paradise, University of Hawaii, reports:

Previous research (A.R. Young and R. Young, *Sandstone Landforms*, New York 1992) has shown the efficacy of wetting/drying and heating/cooling in the weathering of sandstone in arid regions. Ongoing research, however, is clarifying the unique balance between moisture and insolation-induced weathering—a previously obscure relationship—through the comparison of differing aspects on similar sandstones subjected to the same microclimatic influences. The influence of aspect, causing western and eastern surfaces to weather faster than other aspects, was confirmed with observations throughout Petra.

Many Nabataean structures were hewn directly from local Palaeozoic sandstone. Before the carving was undertaken, the Nabataeans dressed these rock surfaces using techniques similar to Roman stone-dressing, although in a uniquely Nabataean herringbone pattern dating from 100 B.C. to A.D. 100 (I. Browning, *Petra*,[3] London 1989). These dressed surfaces, found throughout Petra, present excellent surfaces for sandstone weathering analysis, since their exposure span is known, and they are stationary and relatively unaltered.

Djin blocks, obelisks, and Nasara quarry stones

Fig. 3. Al-Mudaybi'. Gate threshold and passageway. A broken limestone lintel is visible in the first chamber of this gateway's southern half. The first pier of the multichambered gate can be seen on the right. Ash deposits are visible on the surface just right of the threshold and paving stones.

were studied for their varying aspects and associated weathering-induced surface recession and features. Stones with unobscured surfaces of consistent Nabataean stone-dressing, relatively vertical surfaces, and easy access were selected for the study. Using the original Nabataean dressed surface as a false datum, weathering-constrained erosional features (i.e., tafoni, karren, and alveoli) were measured on vertical wall surfaces of varying aspects.

Of the four primary djin blocks at Bab al-Siq, the block nearest the diversion channel (fig. 5) was chosen for study, since the nearest cliff face was 7 m away, while the northern faces of the other blocks were obscured by nearly adjacent cliffs. Two obelisks on the Attuf ridge displayed similar weathering characteristics and surface recession, with the exception of a narrow white sandstone bed within each obelisk (Disi formation) that showed accelerated weathering due to its lower iron matrix constituents (T.R. Paradise, *Physical Geography* 16 [1995] 205–22). Four large vertical faces (>5 × 5 m) from the Nasara quarry also displayed varied surface characteristics that could be attributed to aspect.

Northern aspects (±000° N) showed minimal weathering, with 90 ± 5% of the original stone-dressing apparent, and with no recesses exceeding 2 cm in any dimension. The relatively minor weathering of northern faces can be attributed to decreased surface erosion and increased surface weathering from lichen attachment (see Paradise, supra), since lichens are rarely found on other aspects, and also to decreased solar flux and consequently less frequent wetting and drying cycles (C. Ollier, *Weathering*,[2] London 1984).

On southern (±180° N) aspects, 40 ± 10% of the original dressing remained, with scarce tafoni (discrete pocket cavities) rarely exceeding 15 cm in dimension. The increased surface recession on south-facing surfaces can be attributed to increased solar flux increasing diurnal heating and cooling cycles

Fig. 4. Al-Mudaybi'. Proto-Aeolic capital found in field B.

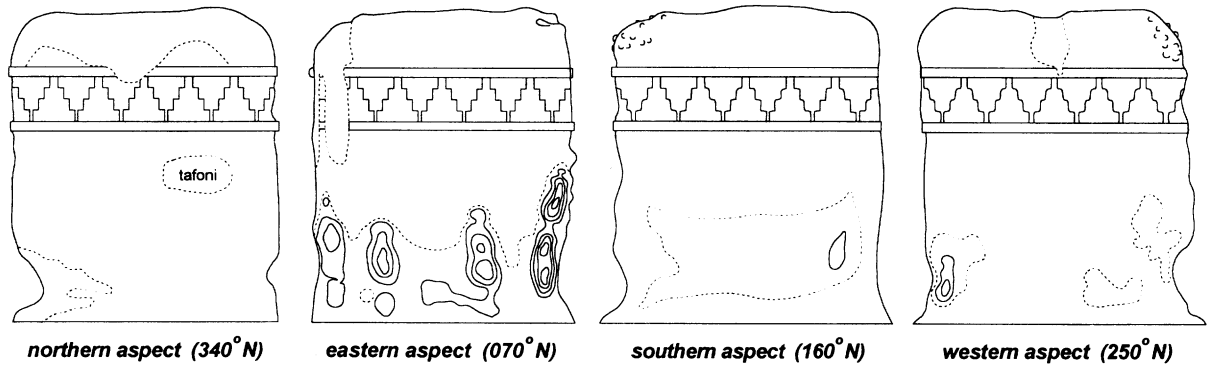

Fig. 5. Petra. Surface recession (weathering) on a djin block at Bab al-Siq. Dashed lines represent first 1-cm surface recession; solid lines represent 5-cm surface recession.

(J.P. McGreevy, *Earth Surface Processes and Landforms* 10 [1985] 125–36).

Western (±270° N) and eastern (±090° N) aspects, however, displayed the greatest surface recession, with very little (<10%) original Nabataean stone-dressing remaining and numerous tafoni often exceeding 20 cm. This increased weathering can be attributed to the ideal diurnal and annual balance that occurs on these faces. Moisture is more available than on southern faces, while exposure to insolation is greater than on northern faces. Summer surface temperatures on eastern, southern, and western faces exceed 50°C, and the surfaces are also exposed to contact moisture (when relative humidities are high enough) from diurnal dew and from seasonal precipitation.

Wadi Mataha, Petra. David J. Johnson and Joel Janetski, Brigham Young University, report:

A first season of photographic reconnaissance, survey, and excavation in a small wadi draining into the Wadi Mataha, in the northern Petra basin, was recently completed by D.J. Johnson and J. Janetski, with the assistance of A. Khalifa of the DAJ. The expedition recorded and photographed 14 major Nabataean tombs, eight cultic features, six water-control systems, and one previously unrecorded large Early Natufian site.

The study area was divided into six 100-m squares beginning in the northwest corner and running to the southwest corner near the Wadi Mataha. Each square was then systematically surveyed, and cultural features were noted, recorded, photographed, and sketched.

Four of the tomb structures were located on the west side of the study area behind the Mughara al-Nasara. Another 10 tomb structures were recorded at the western edge of the Wadi Mataha. Of these, tomb complex 14, near the edge of the Wadi Mataha, is the most complete, with a heavy ashlar wall recently damaged by vandalism, cultic niches, and cisterns. An exterior stairway north of the complex leads to the roof, and the opening from the roof into the tomb is covered by large ashlar blocks in situ. A number of cist graves, many robbed out but some intact, were found along the western edge of the Wadi Mataha. The eight cultic features recorded include altars, niches, blocks, shrines, and associated triclinia. At one shrine, a stairway leads to a platform and a deep niche containing a rectangular block, with a faint but unreadable inscription directly above. Six water-control systems in the study area channeled runoff from the sandstone ridges into a series of plaster-lined cisterns. Two of the systems on the southern ridge were mapped, measured, and extensively described. The remaining four were identified and photographed, but time did not permit detailed measurement.

The large Natufian site, site 2, is located north of the wadi against the southern face of the sandstone cliffs of the Mughur al-Mataha, on a cobble-covered slope leading up to a slightly recessed alcove. Excavation was carried out in three locations: two 1 × 1 m test pits, and an area with seven bedrock mortars at the top of the slope. The bedrock mortars (fig. 6) are cut into a sandstone ledge overhung by the cliff face. Two are conical, 0.30 m deep, one with evident peck marks and the other ground smooth. Three are shallow conical depressions with evident peck marks. Two others, much deeper, are tube-shaped, with side flutes and conical bottoms. One of these was used to cache a basalt grinder, a quartzite hammerstone, a set of shells including four dentalia and one Nerite bead, a basalt pestle, and a pecked sandstone ball. Soil samples from two of the mortars were taken for botanical analysis.

A test pit dug into the blackened midden near the top of the mound revealed the outlines of a structure and two horn cores from a large ovocaprid, prob-

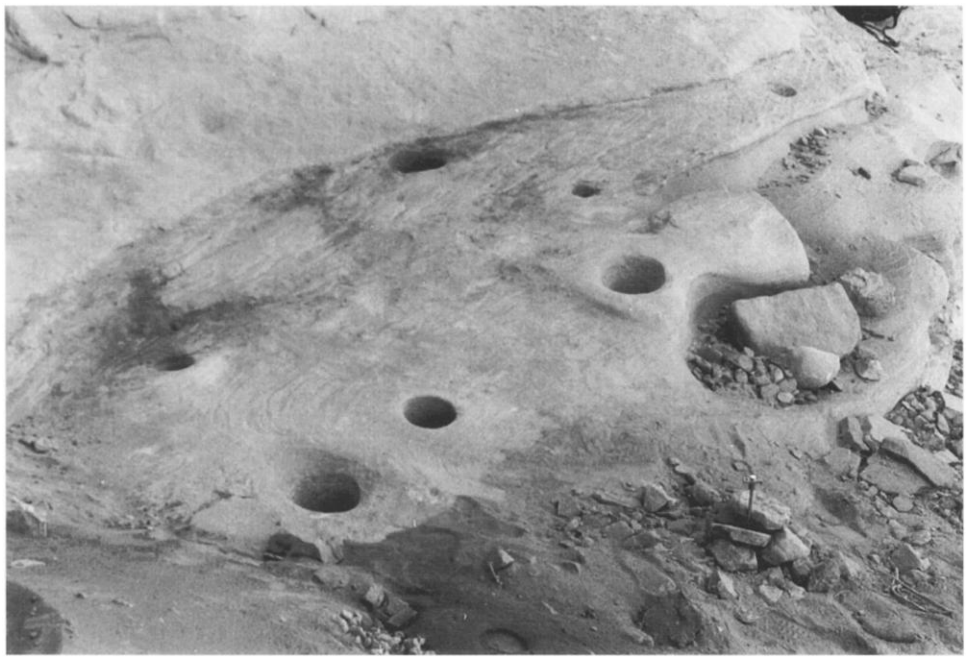

Fig. 6. Wadi Mataha. Bedrock mortars near Early Natufian site 2.

ably wild sheep. Other bones indicate that wild goat, sheep, gazelle, wild cattle, fish, and birds were exploited for food. A second test pit further down the slope produced the outline of a round stone house. A beautifully worked tanged point and a quantity of lithic debris were found on the floor of this structure. Lithic debris included cores, lunates with abrupt and Helwan retouch, notched and denticulate bladelets, and endscrapers on blades. Both test pits and the seven bedrock mortars were backfilled at the end of the season.

PREHISTORIC

Mashari'a 1. Phillip C. Edwards, La Trobe University, reports:

A project to identify Lower Palaeolithic sites in the eastern Jordan Valley was undertaken by La Trobe University in 1993–1994. The main focus of the project was the excavation of the Late Acheulian site of Mashari'a 1, located near Tabaqat Fahl (ancient Pella) and stratified in the Tabaqat Fahl Formation. Essential to the initial recognition of Mashari'a 1 was the key discovery by project geologist P. Macumber that the 100-m thick Tabaqat Fahl massif was not Cretaceous (dating to ca. 125–65 million years ago), as previously thought, but Middle Pleistocene (from ca. 730,000 years ago). Judging by its stratigraphic position and by the technology and typology of its lithic assemblage, Mashari'a 1 is thought to date to ca. 250,000 years ago.

Tabaqat Fahl rises to an altitude of 125 m above the Jordan Valley floor, which in this region lies at about 180 m below sea level, and gives its name to the sediments comprising the Tabaqat Fahl Formation. Within this formation, the Mashari'a 1 site is contained in an 80-m-thick tufa member that comprises large numbers of fossil reeds and the freshwater gastropod *Melanopsis praemorsa* cemented in a calcareous matrix. The deposits were formed by spring deposition in a zone of groundwater outflow adjacent to a large lake within the Jordan Valley. The system that produced the tufa of the Tabaqat Fahl Formation was a massive version of the modern, adjacent Wadi Jirm spring system—now cultivated, but until recently a riparian jungle, with dense stands of *Phragmites* reeds.

Mashari'a 1 extends in cliff section for several hundred meters along the southern edge of the Tabaqat Fahl plateau. At this level, and over the face below, numerous bifaces and flakes have eroded from the deposit. Artifacts, including discrete clusters of flakes, are also embedded in solid rock.

Excavations encompassed a 115-m stretch of the site. Preservation was excellent, as confirmed by numerous finds of fine shatter chips and small flakes, but particularly by a refitting flake core, where a single 5-cm-deep spit yielded six conjoinable flakes struck from a chert core (fig. 7). The core was embedded in a rich layer of additional knapping debris, yielding an equivalent density of 15,125 pieces/m^2. According to the fragments so far conjoined, the core is a small, semi-ovoid flake core (65 mm long × 51

Fig. 7. Mashari'a 1. Late Acheulian core with conjoining flakes. Scale 1:1.

mm wide), with the cortical end having been faceted before five small flakes were detached. A single flake had also been struck from a cortical platform at the opposite end.

A single slender and asymmetrically shaped biface (fig. 8, middle) was found, very similar in form to surface finds from Mashari'a 1 and the Tabaqat Fahl Formation (fig. 8, left and right). A number of other biface types were found on the slopes just below Mashari'a 1 (but none above it), these having eroded from the sediments. They include pointed bifaces of Micoquian type, and cordiform to ovate types. The range of retouched forms includes a flake trimmed by deep, invasive retouching, marginally retouched flakes, a sidescraper, and numerous notches on thick flakes, many of which have been formed through use rather than formal patterning.

Mashari'a 1 is the only Lower Palaeolithic site clearly in situ known in the eastern Jordan Valley, and it is the only excavated site of its kind in this region.

Wadi al-Hasa. N.R. Coinman, Iowa State University, and D. I. Olszewski, Bishop Museum, Honolulu, report:

The Eastern Hasa Late Pleistocene Project (EHLPP) conducted the first of two field seasons in June and July 1997. Research focused on settlement patterns associated with the lake/marsh ecology that typified areas of the Wadi al-Hasa from about 25,000 to 11,000 B.P. Fieldwork included test excavations at four new sites, block excavations and further testing at ʿAin el-Buhira, and geoarchaeological investigations at each site, as well as at the confluences of the Wadi al-Hasa with the Wadi Ahmar and Wadi Khasra.

At Tor Sadaf, early Upper Palaeolithic (Ahmarian) occupation was identified, the first record of such settlement in the Hasa. Test excavations at a second rockshelter, Tor Sageer, uncovered an Early Epipalaeolithic occupation characterized by relatively robust, narrow-backed microliths, with little manufacture of microlithic tools and with few microburins. Indications of spatial differentiation in activities were noted within the 1 × 2 m area tested.

Stepped section cuts were used to investigate lithic scatters at the Multaka al-Wadian, the confluence of the Wadi al-Hasa and Wadi Khasra (previously Kharaf). A partially intact, probable Upper Palaeolithic component is present at Multaka al-Wadian (site WHNBS 195) at ca. 836 masl. Other lithic scatters represent the remains of at least one site component that probably existed at a higher elevation within the marls.

Four test units were excavated at Tabaqa, on the east bank of the Wadi Ahmar near its confluence with the Hasa. Early Natufian occupation on the 30–35 m terrace occurs over at least 1,200 m². Lithics include Helwan lunates, produced with the microburin technique, and other microliths.

Fig. 8. Mashari'a 1. Late Acheulian biface from excavated sediments (middle) and surface finds from Mashari'a 1 (left) and the Tabaqat Fahl Formation (right). Scale 1:2.

Investigations at the large open site of ʿAin el-Buhira centered on Late Ahmarian occupation at the spring area, where lacustrine marls are capped by spring tufa deposits dated to 20,300 ± 600 B.P. Sixteen contiguous 1-m² units were excavated. Lithics reflect a spectrum of reduction activities, with large numbers of trimming flakes and half of the retouched pieces identified as very finely retouched Ouchtata bladelets. Quantities of well-preserved, large mammal bones and teeth—most likely *Bos* and equids—and ostrich eggshell, worked bone awls, and points were also recovered. Discrete concentrations of Ouchtata bladelets, dentalium shell, and hematite were noted in most of the contiguous units, and two remnant hearths were uncovered.

Extensive surface and subsurface testing in other parts of ʿAin el-Buhira have revealed a technological sequence that includes the late Middle Palaeolithic, the transitional Middle/Upper Palaeolithic, and Early Ahmarian. Earlier buried occupations, however, have eroded away, leaving an extensive thick mantle of diagnostic lithics across the site.

Investigations revealed a previously unrecognized but substantial early to middle Upper Palaeolithic presence in the eastern Hasa basin. An Early Ahmarian lithic assemblage was found at site WHS 618x, adjacent to ʿAin el-Buhira, and another early (or middle) Upper Palaeolithic site, EHLPP 2, on the marls southeast of ʿAin el-Buhira (site WHS 618). These new sites, together with Tor Sadaf, the Multaka al-Wadian site complex, and the Late Ahmarian assemblages from ʿAin el-Buhira and Yutil al-Hasa, suggest that the archaeological record in this area affords potential to study responses to fluctuations in the lake/marsh ecology during the Upper Palaeolithic period and to document technological continuity and change within the Ahmarian.

Geomorphological studies included new investigations at Tor Sadaf, Tabaqa, and the Multaka al-Wadian, and continued work at ʿAin el-Buhira. The Natufian site of Tabaqa is situated in marl deposits indicating an ancient marsh environment. The site is also buried under alluvial deposits that suggest slow-moving water at a higher elevation and later date than previously known, indicating that the terrace was still an active floodplain in the Early Natufian and afterward, with implications for models of Pleistocene Lake Hasa and its disappearance.

Wadi al-Hisban. Phillip C. Edwards, La Trobe University, reports:

Excavations took place between 1989 and 1993 at three superimposed Epipalaeolithic sites in Wadi al-Hisban. The locale lies immediately north of Tell Iktanu, where the Wadi al-Hisban meets the eastern Jordan Valley; the sequence was discovered by P. Macumber while he was involved in K. Prag's project at Tell Iktanu. The three sites excavated were in situ, rich in artifacts, horizontally bedded, and superimposed in a straightforward manner. From lowest to uppermost, the sites were designated Wadi Hisban 2, Wadi Hisban 5, and Wadi Hisban 6.

Wadi Hisban 2 is a dense band of lithics and burnt animal bone 0.33 m thick extending 10 m across a cutting in the wadi terrace. The site is extraordinarily rich, containing 135,044 lithic fragments per cubic meter. Bone is almost exclusively present as small burnt fragments; the few diagnostic faunal pieces comprise several *Gazella* sp. (gazelle) and *Potamon potamon* (freshwater crab) phalanges.

The most common retouched artifact type is a geometric microlith (fig. 9), a tiny triangle. Both its diminutive size and the painstaking care taken in its production are remarkable considering the expendable types of cores and the profligate use of local wadi chert. A specific version of the microburin technique was used to produce the triangles. Blades produced from blade cores were initially selected for microburin production, the first step being the production of concave truncated bladelets. The tips of these bladelets were then broken off using the microburin technique and leaving, in some cases, long-bladed microburins. The resultant tiny trihedral piece was further retouched to form small triangles. A few backed bladelets were also present at Wadi Hisban 2, including a micrograveTte and several broken, pointed bladelets.

Wadi Hisban 5 is visible in section as a thin, distinct band of outcropping archaeological material in the bank of the wadi, extending for 45 m. This culturally rich band lies 0.5 m below the terrace surface, embedded in a gray clay deposit with numerous flecks of charcoal and burnt bone. Constructed features are absent from the dense artifact band, but stone-ringed hearths were found both above and below it.

At Wadi Hisban 5, the same technique of bladelet core reduction found at Wadi Hisban 2 was noted, but otherwise its microlithic component (fig. 9) is quite different. This site contains a variety of straight and obliquely truncated bladelets, sometimes double-truncated to form a variety of shorter and longer trapezes. Use of the microburin technique, frequent in the lower site, is virtually absent here. In addition to the flaked stone tools, a small pebble with a grooved waist was found.

At Wadi Hisban 6, Natufian flaked stone artifacts were found scattered over a circular area of about 600–800 m². A hearth of burnt pebbles protruded

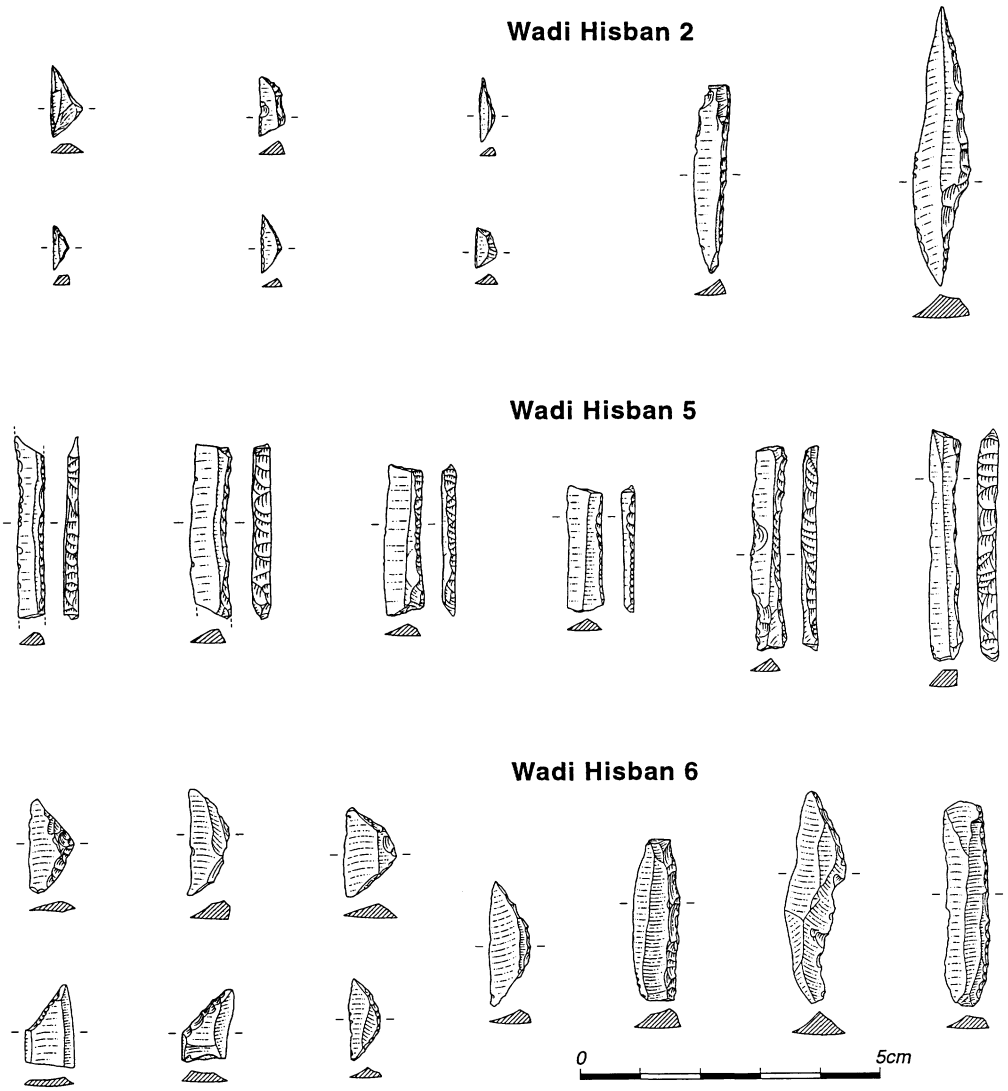

Fig. 9. Wadi al-Hisban. Microliths from Epipalaeolithic sites.

through the surface in this area, and three similar hearths were found in the upper part of a small excavation pit. Some indeterminate animal bone fragments were retrieved nearby, and 0.10 m to the west lay a small, roughly hewn limestone bowl. Although stone arrangements were restricted to the upper 0.25 m of the site, burnt stone fragments continued to occur down to the base, along with Natufian lithics, animal bone fragments, gastropods, fragments of red ocher, and burnt sediments. Retouched forms (fig. 9) included truncated and backed bladelets, a geometric component comprising abrupt lunates, and a triangle.

Neolithic art and symbolism at ʿAin Ghazal. Denise Schmandt-Besserat, University of Texas at Austin, reports:

The study of Neolithic art and symbolism at ʿAin Ghazal concentrated in 1997 on 32 large statues recovered in two Prepottery Neolithic B (PPNB) caches. Cache 1, excavated in 1983 and dated to ca. 6750 B.C., yielded 13 full figures and 12 one-headed busts (G.O. Rollefson and A.H. Simmons, *BASOR* Suppl. 23 [1985] 48–50). Three two-headed busts were found in 1985 among the seven statues of cache 2 (Rollefson and Simmons, *BASOR* Suppl. 25 [1987] 95–96; K.W. Tubb and C.A. Grissom, in *Studies in the History and Archaeology of Jordan* 5 [1995] 437–47). The double-headed busts are the most remarkable pieces of the extraordinary collection. Each rough, quasipyramidal base supports two long parallel necks, two heads, two faces, and four staring eyes (figs. 10–11). Like all the ʿAin Ghazal statues, they are made of plaster over a core of reed bundles bound with twine. The double-headed figures are coarser than the busts of cache 1, on which each single head extends naturally from a carefully smoothed, human-shaped torso, but the

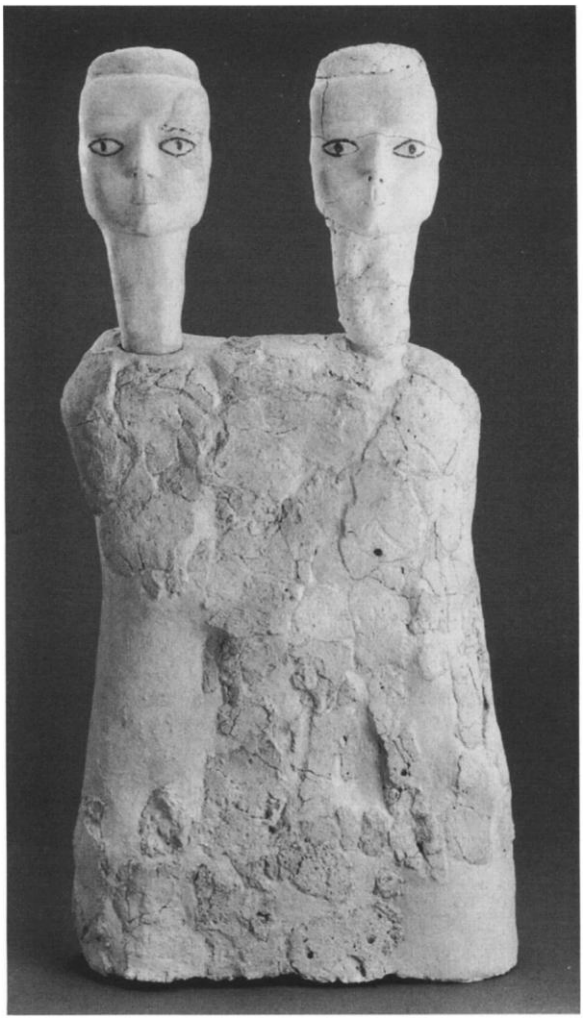

Fig. 10. ʿAin Ghazal. Double-headed bust from cache 2, ca. 6750 B.C. H. 0.84 m. (Photo J. Tsantes, courtesy Arthur M. Sackler Gallery)

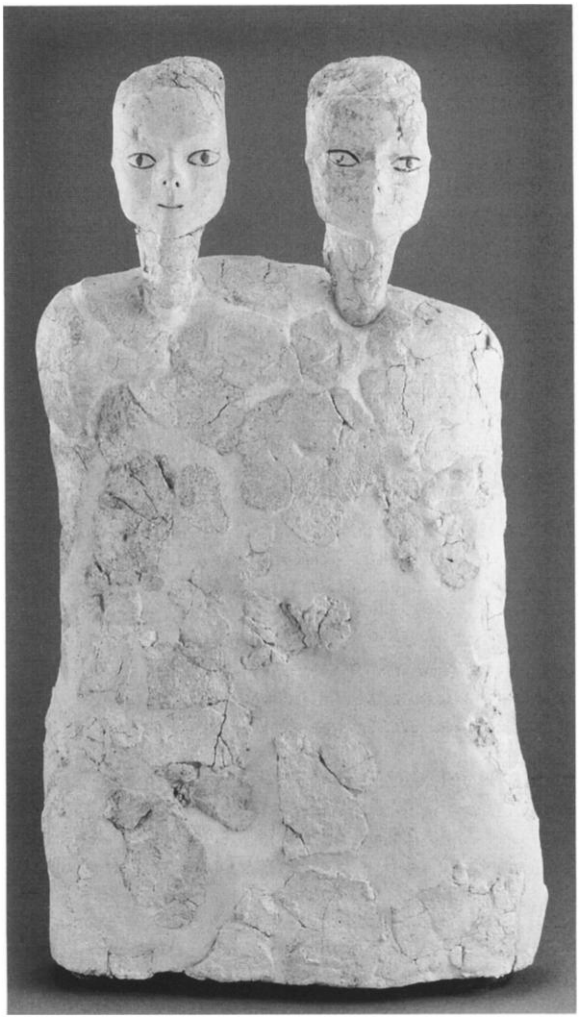

Fig. 11. ʿAin Ghazal. Double-headed bust made of reed bundles and plaster, PPNB. H. 0.88 m. (Photo J. Tsantes, courtesy Arthur M. Sackler Gallery)

treatment of the visage is similar. Busts and full statues have oversized foreheads topped by a recessed feature. The ears are visible, placed near the eyes and often above eye level. All the figures have the same striking facial features: the nose is conspicuously short and upturned, exhibiting long, thin nostrils; the minuscule mouth has no lips; and the eyes are disproportionately large, the globe bulging slightly, surrounded by a deep oval ridge filled with black bitumen. But unlike the more human cache 1 busts, the cache 2 figures—including the four-eyed figures—have diamond-shaped feline pupils that magnify their eerie, alien look.

The striking double-headed busts may help us to understand the significance of the ʿAin Ghazal statuary assemblage. The customary interpretation—that the full figures and one-headed busts portrayed venerated ancestors—seems inadequate to explain the odd two-headed humanoids. These double-headed busts are not unique in Near Eastern iconography, however; other examples exist of twin figures from prehistory to the late historic period. Two-headed statuettes are known from Cyprus, Anatolia (Catal Hüyük, Hacılar, Alaca Hüyük, and Kültepe), and Syria (Tell Brak). Figures with two, three, and four faces are common in historic Mesopotamia. The key to these double-headed images may ultimately be revealed by late texts such as the following (H. McCall, *Mesopotamian Myths* [Austin 1990] 54), describing Marduk, the greatest Babylonian god, as having two heads, four ears, and four eyes:

> Anu his father's begetter beheld him,
> And rejoiced, beamed; his heart was filled with joy.
> He made him so perfect that his godhead was doubled.
> . . . Four were his eyes, four were his ears.

Fig. 12. Ba'ja. LPPNB architecture.

References to double-headed deities in various texts in the ancient Near East, such as the above verses from Enuma elish, suggest that two heads were a metaphor for infinite beauty, four ears expressed ultimate wisdom, and four eyes symbolized an all-seeing vision. The remarkable double-headed busts from ʿAin Ghazal may be considered the point of departure of a symbolic tradition to evoke godly omniscience. Finally, if these particular figures may be divine representations, it is likely that all the statues of the two caches had a similar significance.

Ba'ja. Hans-Dieter Bienert, DEI, and Hans Georg Gebel, ex oriente e. V., Berlin, report:

The Early Neolithic settlement of Ba'ja, located about 11 km north of Wadi Musa, was discovered in 1983 by the team of Manfred Lindner from the Naturhistorische Gesellschaft Nürnberg. The site rests on topographically differentiated intramontane steep slopes and is bordered by the Siq al-Ba'ja to the south and nearly vertical rock formations to the north.

The first investigations at the site were undertaken in 1984 by H.G. Gebel, who opened three soundings. Large-scale excavations were first conducted in 1997 by the DEI in collaboration with the German Institute of Archaeology—Orient Section, Berlin, and ex oriente e. V., a research association based at the Seminar für Vorderasiatische Altertumskunde, Freie Universität Berlin.

The excavations covered an area of approximately 250 m^2. According to the site survey and the surface distribution of Late PPNB artifacts, the Neolithic settlement extended over some 12,000 m^2. In most parts of the excavation, well-preserved architectural remains have been uncovered (fig. 12). The Neolithic walls are double-faced and form rectangular or polygonal rooms. The groundplan resembles that of LPPNB architecture well known from a number of other contemporary sites (e.g., Basta, Sifiya, and ʿAin Jamman). There is also evidence for large rooms or courtyards in the northern squares of the excavation area. It is not yet clear, however, whether those rooms were roofed. Floor levels have not been reached in some rooms. Where a floor could be found it was made of cobbles or lime plaster. Connections between the rooms existed via wall openings and, probably, via rooftops. The specific function of each room and courtyard is in most cases not detectable. No human burials have been encountered although isolated human bones were found within the cultural debris.

Within the excavated area three major activity zones were identified. In the eastern fringe of the excavated area, almost all rooms included remains

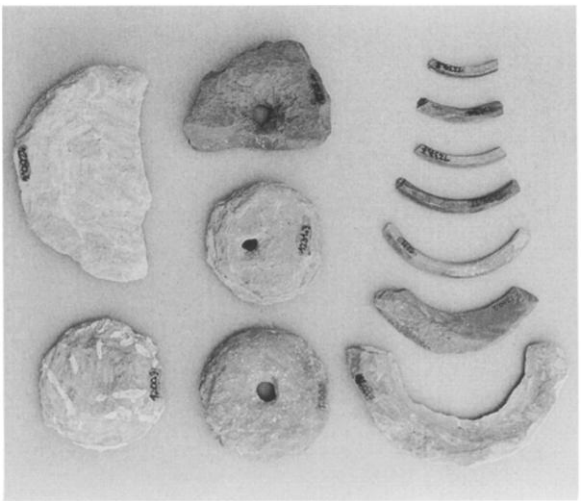

Fig. 13. Ba'ja. Stone bracelets showing different stages of production.

of ovens associated with ashy layers, often rich in animal bones. Farther to the west, food-processing activities had taken place as indicated by large numbers of grinding slabs and manos. In the same area and nearby, a concentration of stone discs was found together with partially formed products (fig. 13), indicating a manufacturing area for sandstone rings. It seems that the Neolithic settlement was a center for the production of sandstone rings on a large scale. The abundant tabular raw material is available locally. The rest of the ornament industry is very poor. Only a few pendants made of mother-of-pearl have been found.

Both the groundstone and the chipped lithic industries are well represented and reflect the spectra of types known from other LPPNB sites. The flint and groundstone industries of Ba'ja suggest a self-reliant regional center rather than a center enveloped in large-scale surplus production and exchange, allowing a distinction between a manufacture and industrial mode in lithic production. The worked bone industry is almost exclusively represented by tools and tool fragments belonging to piercers and spatulas. Emmer wheat and wild pistachio have been identified, as well as juniper and pistachio wood; a diet of animal protein included the following species: wild goat, domestic sheep/goat, gazelle, wild boar, aurochs, African wild ass, hare, hedgehog, hyrax, and various birds.

Tell Fendi. David Lasby, Kevin Fisher, and Mark Blackham, University of Toronto, report:

Tell Fendi was excavated in October 1996 both to investigate the nature of Chalcolithic chronology and settlement in the northern Jordan Valley as a whole, and as part of the Wadi Ziqlab Project at the University of Toronto. Tell Fendi is reported in a number of surveys. While no previous excavations have taken place at this site, Kareem did conduct an intrusive surface survey in 1986 as part of the Jist Sheikh Hussein Project. The site lies at an elevation of 248 m below sea level and is situated within the Beisan depression of the northern Jordan Valley, approximately 2 km west of Khirbet Marqa'a and 7 km east of Beth Shan.

The tell itself is a low mound that rises 4 m above the surrounding alluvial plain and measures ca. 130 m east–west by 140 m north–south, covering about 2 ha. It is well situated relative to water and land resources. The course of the Wadi Ziqlab drainage lies immediately north of the site, from where it continues to the southwest for 1.7 km to meet the Jordan River. About 16 km upstream from Tell Fendi, the Wadi Ziqlab is fed by the perennial spring ʿAin Sabha. Relatively abundant water resources, in conjunction with the surrounding flat plain of fertile valley soils, would have made Tell Fendi a desirable location for a farming community during the Chalcolithic.

The Tell Fendi mound was not formed entirely by the deposition of cultural sediments. Probes extending to a depth of 2.4 m indicate that the thickness of cultural deposits ranges from about 0.4 m on the southern slope to 1.0 m on the top of the tell. These overlying soil deposits are a gray-brown clay loam. The remaining basal deposits consist of a fine white-gray calcareous clay and form part of the Lisan marls. The material culture represented at this site is primarily Late Chalcolithic; there are no Bronze or Iron Age deposits but Persian, Byzantine, and Mamluke ceramics were found in small quantities.

The Chalcolithic pottery recovered at Tell Fendi closely parallels that found at Pella in areas XIV and XXV, at Tell Abu Habil North, and at the recently excavated site of Tubna, in the hills of the Wadi Ziqlab. There is less typological agreement with the assemblages at Neve Ur, Tell Tsaf, and Abu Hamid, which appear to have closer parallels to the Ghassulian assemblage.

The chipped stone assemblage from Tell Fendi can be considered typical of the Late Chalcolithic and has parallels at sites such as Teleilat Ghassul, Abu Hamid, and Pella, among others. As is typical during the Chalcolithic, the density of formed tools is quite low, with the bulk of the assemblage consisting of ad hoc tools and unutilized debitage.

Excavations uncovered the foundations of a Chal-

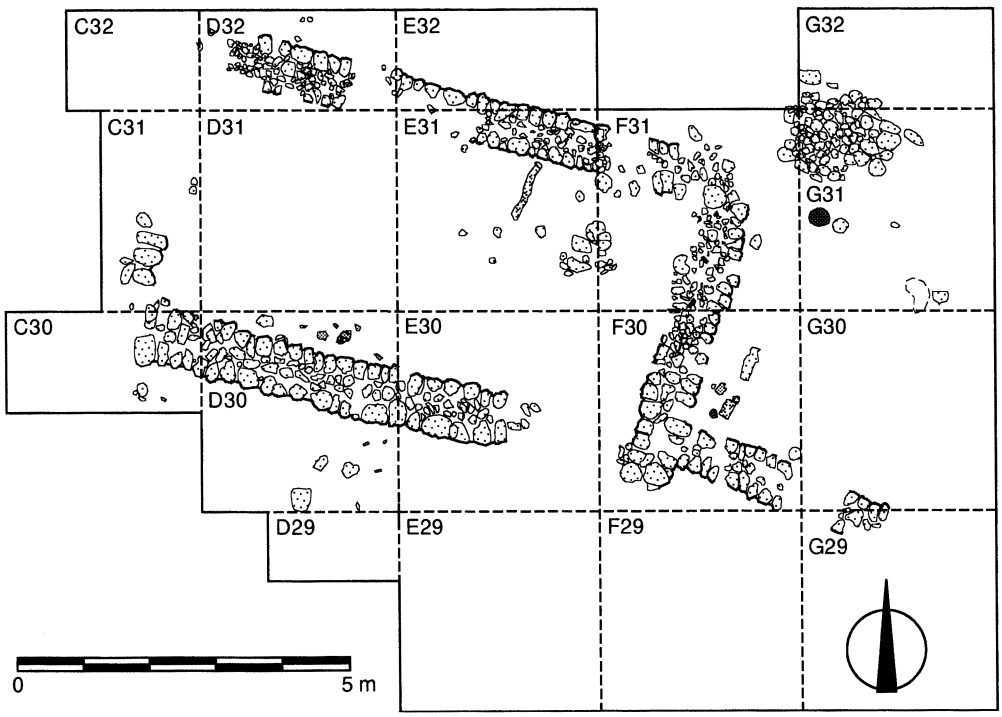

Fig. 14. Tell Fendi. Plan of a Chalcolithic house. (E.B. Banning)

colithic house (fig. 14), several other related architectural features, stone and bone tools, and abundant Chalcolithic pottery. The artifacts and features found suggest that the site was once a small farming community whose inhabitants were exploiting the rich valley-bottom soils. On the basis of ceramic parallels, it is suggested that Tell Fendi existed contemporaneously with the larger settlement at Pella, Tabaqat Fahl.

BRONZE AGE AND IRON AGE

Tell Abu al-Kharaz. Peter M. Fischer, Göteborg University, reports:

In the eighth season of excavation at Tell Abu al-Kharaz in the northern Jordan Valley, in 1997, three areas were investigated: area 2, in the western part of the upper plateau, where excavations had been carried out from 1989 until 1993; area 7, in the northern part of the tell, partly excavated in 1993 and 1994; and area 10, on the summit of the tell, where an impressive white-plastered building was discovered in 1996. All three areas were now extended.

Early Bronze Age IB/II. Complementary information from the second part of EB I and the beginning of EB II was obtained in area 2. Parts of a rectangular EB IB house with an almost undisturbed interior were exposed; fortunately, the entire remains of the house had been sealed under a thick destruction layer. This was the first evidence of a catastrophe, local or general, during the first phase of occupation of the site (phase I). The house contained a variety of complete household objects, among them platters, jugs, and juglets—including one with a tiny spout—and storage jars, some of which still contained grain. One unusual find is a jar with a pillar handle: the pillar depicts a head resembling a bat with large ears, with both human and animal traits. In one room lay the well-preserved remains of a plaited basket, with a ropelike handle, containing grain and a wooden spoon. A cylindrical jar, the second vessel of its kind found at the site, is an Egyptian import from the Naqada IIIb/c culture.

The remains from EB II (phase II) include bowls, platters, and jugs of Metallic Burnished ware (see previous reports in *AJA* and *ADAJ*). The transitional EB II/III period (phase III) is sparsely represented.

Fourteen recently obtained, high-precision calibrated ^{14}C datings, synchronized with the ceramic sequence, show the duration of the three earliest occupational phases at the site and their position within the Palestinian and Egyptian chronological framework: phase I, dated 3200–3100 B.C., EB IB (later part), corresponds with the later part of Dynasty "0"; phase II, dated 3100–2850 B.C., EB II, corresponds with Dynasty 1 and the first half of Dynasty 2; phase III, dated 2850–2775 B.C., EB II/III transitional, corresponds with Dynasty 2.

Late Bronze Age. The LBA is represented by a 4-m-

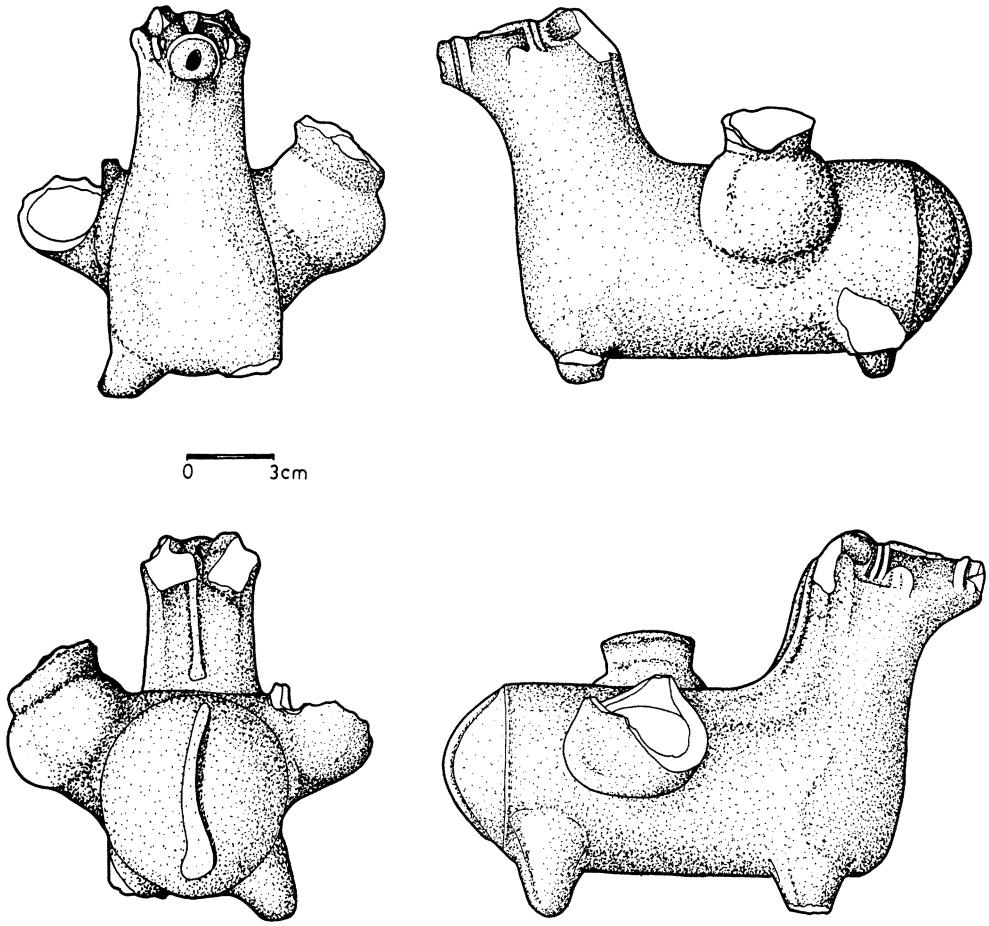

Fig. 15. Tell Abu al-Kharaz. Ceramic rhyton.

wide city wall in area 2. An impressive, 10 × 10 m construction inside the wall resembles a tower with stone-paved internal rooms. Chocolate-on-White ware was produced at the beginning of the LBA.

Iron Age. Evidence of Iron Age occupation was found in all areas. Domestic buildings in area 2 were found near a well-preserved, plastered cistern. A four-room house with a courtyard was identified in area 7. A ceramic rhyton (fig. 15), an iron dagger with bronze rivets, and a bone/ivory handle were found just outside the house. The ceramic rhyton, almost complete, is in the form of an animal, perhaps a donkey, with two attached vessels. The animal has a detailed, modeled bridle and a hollow trunk that connects the two vessels with the hole in the animal's muzzle.

The 10 × 10 m "white building" on the summit of the tell was further exposed. It is carefully plastered on the outside and contains four rooms. The building may be part of a fortress and/or an administrative building complex.

Khirbet Iskander. Suzanne Richard, Drew University, and Jesse C. Long, Jr., Lubbock Christian University, report:

The sixth campaign at Khirbet Iskander and its vicinity, sponsored by Drew University, Lubbock Christian University, and Gannon University, took place in July and August 1997. Work at the site was renewed with a view to completing excavations in area B at the northwest corner of the mound, the location of the massive tower and fortifications, and further investigating a building complex in which great quantities of whole and restorable EB IV pottery had been found. The primary goals were to expose the entire phase B, EB IV building; to investigate occupational levels of earlier phases C–E; and to clarify the history of the construction of the fortifications.

In area B east, the phase B building complex consists of a bench-lined broad room on the west with a doorway into a long, central room parallel to the fortifications. One hundred three vessels, mostly storejars, have so far been reconstructed from this complex. Further exposure to the east revealed a

square tower at the easternmost edge of the building, thus reconfirming the use of the fortifications in the EB IV period. To the south, a series of ancillary corridor rooms was revealed; fewer restorable vessels were found here, in the same destruction debris layer found throughout the complex.

In the southern section of the complex, below the phase B level, excavations revealed a new phase (C) with substantial, well-preserved walls. Although only a small area was explored, the discovery of an associated midden with either very early EB IV or transitional EB III/IV pottery is significant. An excellent stratigraphic profile of the mound was revealed just south of the northwest tower in area B west. Below the phase B remains were two phases of a well-preserved structure over 2 m high, built at the same level as the tower, in all likelihood part of a gate structure, which only further excavation to the south will confirm. In the later reuse, the doorway adjoining the tower was blocked, and a new doorway with a paved threshold was constructed in the center of the wall. A thick layer of burned material covered the threshold, and above this layer was rock tumble and massive mudbrick debris. Associated with this reuse was an outer wall hastily built against the tower on its western side. Significantly, the pottery was similar to that "transitional" or early EB IV pottery found in phase C in area B east, although EB II/III sherds were included in the matrix.

In the earlier, founding phase, the structure apparently functioned as a room guarding the entrance and stairway to a platform that presumably led to a mudbrick tower above the tower socle. Surface pottery is dated to EB II/III. A thick layer of burned debris and extensive mudbrick collapse lay above the surface. This is the first stratified interior occupational layer discovered that is associated with the founding of the fortifications. It is now likely that this founding predates the EB IV period. We are tentatively calling these two phases C1 and C2. Two phases of wall lines were revealed below, one of which is curvilinear. Both had associated EB I pottery.

Thus, the most significant discoveries of the season were the exposure of EB II/III occupational layers on the mound and their stratigraphic association with the founding of the massive fortifications at the site; and the discernment of a new ceramic horizon, which may be early EB IV or transitional EB III/IV.

Jordan Valley Village Project. Steven E. Falconer, Patricia L. Fall, and Jennifer E. Jones, Arizona State University, report:

The Jordan Valley Village Project (JVVP) focuses on the nature of village economy during the Early and Middle Bronze Ages. These periods witnessed dramatic changes in social and political organization stemming from a cycle of urban development, collapse, and rejuvenation. Villages appear to be remarkably persistent in the face of social and political changes associated with early urbanism. The main goal of the JVVP is to reconstruct the rural economy and ecology of these resilient villages, building on the 1982–1985 excavations at the MB village of Tell el-Hayyat and the brief testing at Tell Abu en-Ni'aj in 1985 (S.E. Falconer and B. Magness-Gardiner, *NatGeogRes* 5 [1989] 335–47).

Current research by the JVVP suggests that EB and MB villagers pursued economic strategies designed to buffer themselves from the demands of cities while simultaneously allowing them to participate in expanded markets for secondary products such as wool and olive oil (Falconer, *JFA* 22 [1995] 399–419).

A six-week field season in December 1996 and January 1997 continued excavations in the northern Jordan Valley at two EB IV (2300/2200–2000 B.C.) villages: Tell Abu en-Ni'aj and Dhahrat Umm al-Marar. A few days of testing at Umm el-Ba'ir, just south of Marar, produced only a few Iron Age sherds and was curtailed. During EB IV, the first cities in this region were abandoned, and the population depended on village and pastoral economies.

Abu en-Ni'aj is a 2.5-ha village located on the broad agricultural flood plain above the Jordan River. It contains at least four phases of stratified EB IV material in 3.30 m of deposits and mudbrick architecture (figs. 16–17). Several EB III sherds found in the basal levels of one excavation unit suggest a transitional EB III/IV occupation. Dhahrat Umm al-Marar is an interesting contrast to Ni'aj as an EB IV settlement. Marar is a single-period hilltop village of approximately 2.5 ha, located 7 km southeast of Ni'aj, in the lower foothills overlooking the Jordan Valley. A combination of stone and mudbrick architecture is found in shallow and widespread EB IV deposits. The remains of a single-course wall running 110 m along two sides of Marar suggest elements of public architecture not found at Abu en-Ni'aj.

Preliminary analysis of the floral and faunal remains from Abu en-Ni'aj shows species expected at a settled agricultural community. Unfortunately, faunal and floral preservation at Marar was poor due to the shallow depth of deposits. The majority of the identifiable fauna from Ni'aj are from sheep and goats (48%), pigs (38%), and cattle (14%). Only 2.5% of the Ni'aj specimens are from wild fauna, including small carnivores, rodents, birds, and fish. Analysis of floral remains from the 1985 excavations shows orchard crops such as olive, fig, and grapes, along with lentils, peas, chickpeas, barley, and emmer wheat.

Fig. 16. Tell Abu en-Ni'aj. Mudbrick walls and doorway with ceramic vessel in situ.

Groundstone tools from Abu en-Ni'aj are made from locally obtained limestone, chert, and basalt cobbles. Large slab and boulder mortars are found at both sites, indicating both villages were grinding grain. The large number of heavily battered hammerstones and basalt, limestone, and chert flakes found at Ni'aj suggests that villagers were shaping and refurbishing groundstone implements on site.

Continuing lines of analysis focus on animal butchering patterns and use, floral distributions, lithic production, groundstone production and use, pottery production, intrasite vessel use, and chronological distinctions in ceramic form. The JVVP plans to continue excavating at Tell Abu en-Ni'aj and Dhahrat Umm al-Marar, with the next field season anticipated in 2000.

Tell Johfiyeh. Roland Lamprichs, Universität Freiburg, reports:

A survey of Iron Age sites in northern Jordan in 1996 focused on surface structures and surface finds at Tell Johfiyeh, situated some 7.5 km southwest of Irbid. In 1997, the survey concentrated on the archaeological sites forming a semicircle around Tell Johfiyeh: Tell Beit Yafa, Tell esh-Sheqaq, Zaharet Soq'ah, Tell Kufr Yuba, and Qasr el-Ghul. Excavations in the area may begin in 1998 in cooperation with Ziad al-Sa'ad of Yarmouk University.

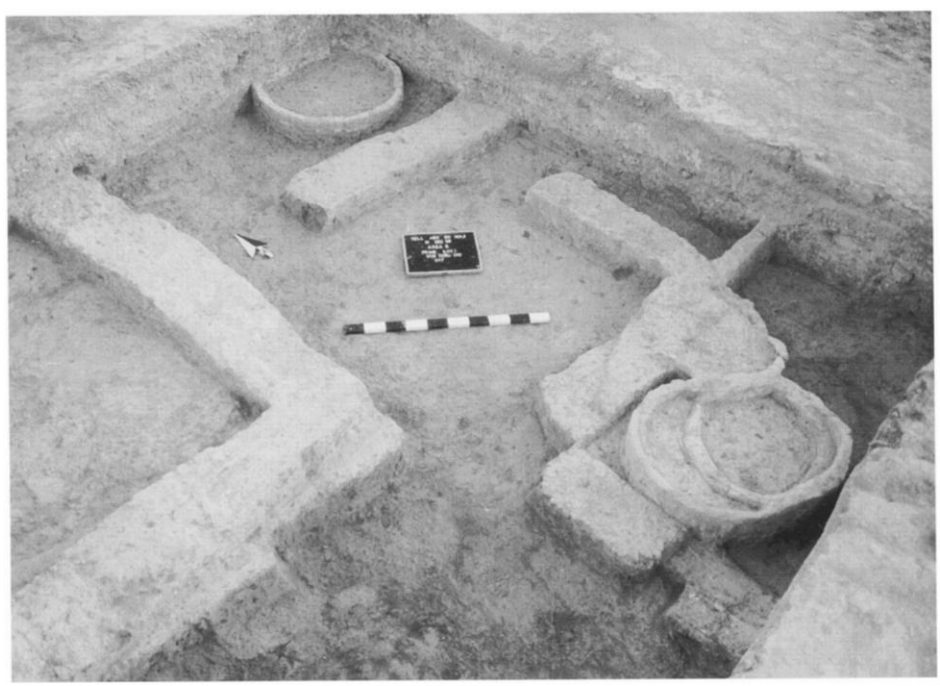

Fig. 17. Tell Abu en-Ni'aj. Series of rooms with mudbrick walls and circular clay-lined storage bins.

The sites surveyed in 1997 have some common characteristics. Except for Qasr el-Ghul, they are generally built on hilltops in cultivated areas, so that modern farming activities have encroached upon them. Most of the sites are of approximately the same size, shape, and date. With their hilltop locations, they are in view of one another and, with a few exceptions, their general state of preservation is quite good. Surface structures and surface finds indicate that most of the sites may contain some kind of fortified building dating to the Iron Age, probably Iron Age II. Only a few potsherds indicate later occupational phases. Since none of these sites has been excavated, however, exact dates and functions are unknown.

N. Glueck suggested in the late 1940s and early 1950s that the sites were part of an early watchtower or fortification system, but this proposal was not supported by the 1997 survey. Some of the sites visited may have had a fortification element, but this was certainly not their only function. The military characteristics of the sites appear to be mainly defensive, i.e., they sheltered the population of the immediate vicinity rather than providing a base for a military effort against outside threats. The distribution of the sites follows natural geographical contours, with no apparent lines or borders. No surface evidence of weaponry was noted.

The semicircular settlement pattern may, therefore, be attributed to topography and to the division of farmland. For the time being, an interpretation of the sites as agricultural facilities or small clan settlements seems most appropriate. This domestic function, however, does not preclude a defensive function in times of emergency. Without further data, the line between private and public functions, or defensive and offensive, will remain unclear. It is hoped that future archaeological investigations in Tell Johfiyeh—and a systematic survey of the region, including the sites of Tell Beit Yafa, Tell esh-Sheqaq, Zaharet Soq'ah, and Tell Kufr Yuba—will provide this data.

Khirbet al-Mudayna. Cristian G. Rata, University of Toronto, reports:

The second season of excavations at Khirbet al-Mudayna on the Wadi ath-Thamad took place under the supervision of Michèle Daviau, Wilfrid Laurier University. Work again concentrated on field C, on the northern top of the tell, and on fields L and N at the bottom of the tell. The regional survey was also continued.

In field C, excavations confirmed the existence of a gate approximately 15.3 m long and 15.0 m wide, dating to the Iron II period (ca. 800–600 B.C.), connected to a casemate wall that appears to surround the tell. Excavations revealed that the structure was initially built on bedrock with six chambers. The gate, with three western chambers sealed by a wall on the eastern side, is similar in construction to the Iron Age gate at Hazor, stratum X. No evidence suggested an occupation earlier than Iron II, but a final determination awaits further analysis.

In field L, on the lower northern slope of the tell, excavations revealed that building 700, measuring 10 × 16 m, had at least two phases. In the first phase, walls of boulder and chink are preserved up to five courses high. Water channels and plaster suggest a Nabataean/Early Roman reservoir resembling the reservoir at Mampsis in construction. Ten piers about 0.5 m apart on the plaster surface were built in header-and-stretcher style and appear to be part of a large support system for the ceiling. A later plaster surface associated with these piers, and with an oven and Roman-period cooking pots, was found in secondary use. This second phase is also visible in the wall construction, and the finds suggest a domestic use for the building.

Excavations in field N support the hypothesis that building 800 was a Nabataean temple (fig. 18). A single boulder with drafted margins may represent the Nabataean god Dushara. In room 801, a flight of 10 steps leads to a platform that towers over the remains of the building. Additional rooms on the western side of the temple have floors lined with plaster and arches to support the ceilings. A Roman coin found in the debris may help to date a later occupation phase to the late third century A.D.

No large inscriptions were found in 1997, but a potsherd inscribed with two letters reinforces the assumption that, at this time, the Moabite *yodh* had a rounded tail, slightly curved toward the back. This assumption was made in 1996 upon the discovery of a longer, incomplete inscription with the same sequence of letters. The incomplete inscription can tentatively be translated as "may Kemosh judge." The few broken Greek and Thamudic inscriptions found toward the end of the season indicate a literate community in the ancient city.

During the 1996 regional survey, a complete female figurine and fragments of anthropomorphic vessels were found at site 13, south of er-Rumeil. A salvage excavation conducted in 1997 produced several additional figurines and fragments of anthropomorphic vessels. Most of the figurines are ceramic representations of women holding either their breasts or a disc. Other finds include murex and cowrie shells, miniature juglets for perfume or incense, a limestone figurine head (fig. 19), and a

Fig. 18. Khirbet al-Mudayna. Nabataean temple complex.

blue faience Pharaonic amulet. The amulet, as well as the hairstyle and dress of some figurines, suggest a stronger Egyptian influence here than in neighboring Judah. The architecture of site 13 is still unclear, but its location and the finds suggest that it was an Iron Age II cultic place. The area has been looted, but most of the objects found this season were preserved under a layer of cobblestones in what appears to be a favissa.

Fig. 19. Khirbet al-Mudayna. Iron Age II figurine from site 13.

The regional survey to investigate site distribution and settlement patterns along the Wadi ath-Thamad and Wadi Shabi was continued under the supervision of J.A. Dearman, Austin Presbyterian Seminary. Of the 33 sites recorded thus far, most belong to the periods attested at Khirbet al-Mudayna: Iron Age II or Nabataean. An abundance of Iron Age watchtowers suggests that the area was on the border between Moab and Amon. The Nabataean sites are mainly farming settlements overlooking agricultural land. Numerous structures were noted at some sites, including no fewer than 33 cisterns at er-Rumeil. Only one site (RS-33), on a terrace south of Wadi ath-Thamad, yielded a sample of Chalcolithic–EB lithics. Further exploration is planned.

NABATAEAN–ROMAN–BYZANTINE

Wadi Ramm Recovery Project. Dennine Dudley and M. Barbara Reeves, University of Victoria, report:

The second season of the Wadi Ramm Recovery Project was carried out in June and July 1997 at the Eastern Complex, a palatial structure containing a bathhouse and public and private units, situated near the Nabataean temple at the foot of Jebel Ramm. In 1996, the exposed remains were documented. In 1997, the goals were to examine some of the peripheral areas of the complex and to probe two of the core bathing rooms.

The area called "the villa" consists of two rectan-

gular structures separated by a corridor, and two paved rooms or courtyards. It was thought that the main entrance of the complex would be found in alignment with the axial doorways of the villa's central rectangular unit. This hypothesis was disproved by a probe along the southern perimeter, revealing a complicated architectural plan. The grand nature of the architecture and finds recovered in 1996 indicated that the core of the villa originally served a public or official function and that the northwestern section—the focus of the 1997 work—contained the private quarters. A probe in the corridor revealed well-built steps (fig. 20) into the northwest courtyard and a threshold carved from a single block, with sockets for double doors, identical to the grand doorways excavated in 1996. Exploration in the courtyard revealed strong parallels in plan and finds to those of the (much larger) eastern courtyard. This similarity between the two courtyards, both used for dining, supports the theory that the northwestern section housed the private quarters.

Excavation in the bathhouse concentrated on the frigidarium (fig. 21) and the tepidarium. At the center of the frigidarium is an immersion pool 1.24 m long × 2.59 m wide × 0.94 m deep. Two plastered steps in the northeastern corner of the pool give access to the northern half of the frigidarium. This portion of the room is paved with flagstones; a bench runs along the outside of the pool. Access to the basin from the southern half of the room is presumed to exist, but this area is not fully excavated. To the west, between the frigidarium and the caldarium, is a room that probably functioned as a tepidarium. Excavation failed to reveal a hypocaust like that beneath the caldarium, but much soot was found encrusted on the wall plaster in the soil fill, suggesting that the tepidarium was heated by a brazier rather than a hypocaust.

Preliminary analysis of the finds suggests that the Eastern Complex was built in the first century B.C./first century A.D. Results of the 1997 work indicate that the complex was constructed in units, with distinct public and private spaces. The private apartments were built with the same elaborate architecture and decorative features found in the more public areas, indicating that personal luxury was as important as public display. The entrance to the complex appears to have been complicated and carefully controlled, suggesting that the complex was primarily a residence or palace, although certain areas of the structure were suitable for public use. Whether the bathhouse was primarily intended for public or private use is not yet clear; it is located next to the public areas, but the doors to the bathing block could have closed the area from the public.

Wadi Ramm. Laurent Tholbecq, IFAPO, reports:

A second archaeological campaign was carried out in Wadi Ramm by the IFAPO, following the 1996 season to clear and record the remains excavated by the DAJ in 1964 (see *AJA* 101 [1997] 516–17). Five limited probes in the temple and the associated western complex provided the chronological sequence that had remained unknown since the site was discovered in the early 1930s. Stratigraphy and ceramic evidence produced the following preliminary results.

A Thamudic inscription reused in the foundation of the central chapel indicates that a first sanctuary, dedicated to Lat, preceded the building of the existing Nabataean temple. No remains have been found of this early sanctuary. A podium supporting columns was built in the late first century B.C./early first century A.D., possibly during the reign of Aretas IV. In the rear a dwarf wall, not supporting an entablature, was built between the columns. A square cistern 1.8 m deep, covered with water-resistant mortar, was built inside it. A major wall was built in the early first century A.D. on the southern, western, and northern sides of the podium. Finally, the temple was extended and reorganized in the late first/early second century, possibly during the reign of Rabbel II. The *môtab* abutting the facade of the temple was built at this time.

The second aim of the season was to define the chronology of the western complex. Two probes revealed that the standing structures can be dated to the late first/early second century A.D. These were preceded by earlier structures, tentatively dated to the late first century B.C./early first century A.D., built on a similar grid and contemporary with the first phase of the Nabataean temple. The levels not excavated in 1964 are dated to the third century A.D., while the latest surface sherds found in the complex date to the mid-fifth century. The function of this complex remains unclear. It does not exhibit the classical features of banqueting halls in similar contexts, such as at Khirbat at-Tannur and Khirbat adh-Dharih. In the temple itself, there is no evidence of later occupation or destruction of the building, but epigraphic evidence indicates that the temple was still in use in the first half of the third century.

Another season is planned to determine whether the temple had a temenos, to establish the nature and chronology of the monumental approach to the sanctuary, and to determine the function of the associated structures of the western complex.

Bir Madhkur. Megan A. Perry, University of New

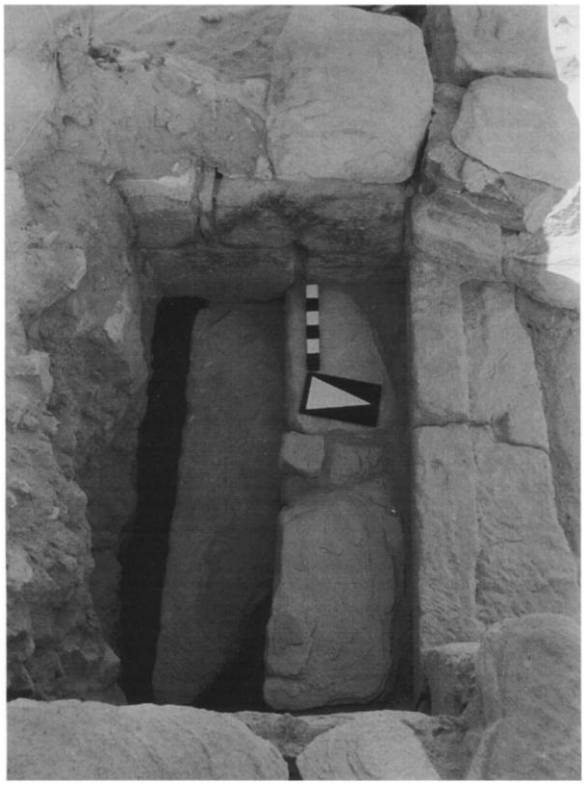

Fig. 20. Wadi Ramm Eastern Complex. Staircase at the northern end of the central corridor.

Mexico, and Andrew M. Smith II, University of Maryland, report:

Preliminary field research was conducted during the summer of 1997 at Bir Madhkur, a Nabataean, Roman, and Byzantine site ca. 10 km northwest of Petra in the foothills of the esh-Shera range east of Wadi Araba. Excavations within the cemetery and a survey of the immediate environs were undertaken to assess the feasibility of continued fieldwork at the site. Bir Madhkur was probably incorporated within the administrative zone of the nearest metropolis, Petra, and the research aims to clarify its role in the economy of southern Jordan and to elucidate the function of such outposts in both a military and a civilian capacity.

Excavations were conducted within two cemetery areas associated with the site. The burials selected for excavation displayed a non-Islamic orientation and thus were thought to date from the Nabataean, Roman, and/or Byzantine periods. A final determination will be provided by amino-acid dating of the skeletal remains. Three burials were identified, and two were completely excavated. In addition, the burial in a wooden coffin of a woman more than 60 years old and the burial of a child about three years old suggest that civilians coexisted with the military population at the site. Further research in the scat-

Fig. 21. Wadi Ramm Eastern Complex. Frigidarium from the west, with bench at right.

Fig. 22. Petra. Aerial view of excavations at the Great Temple, looking south. (A.A.W. Joukowsky)

tered cemeteries of the area will be conducted to study the subpopulations associated with Bir Madhkur: the military, traders using the Petra–Gaza road, and the sedentary and nomadic civilian populations.

A reconnaissance survey of the environs of Bir Madhkur was undertaken to examine the natural environment in relation to the cultural landscape and to gather data for the development of a more systematic and intensive survey. A group of sites was recorded in the valley west of Bir Madhkur. Various agricultural site types were identified—several groups of terraces, field walls, a single field house, many isolated walls and structures, and threshing floors—suggesting that the area was an important agricultural center in the Araba. In this same area, an unpaved and presumably ancient road was discovered, with a possible milestone (anepigraphic and badly damaged) nearby. Two small forts or caravan-

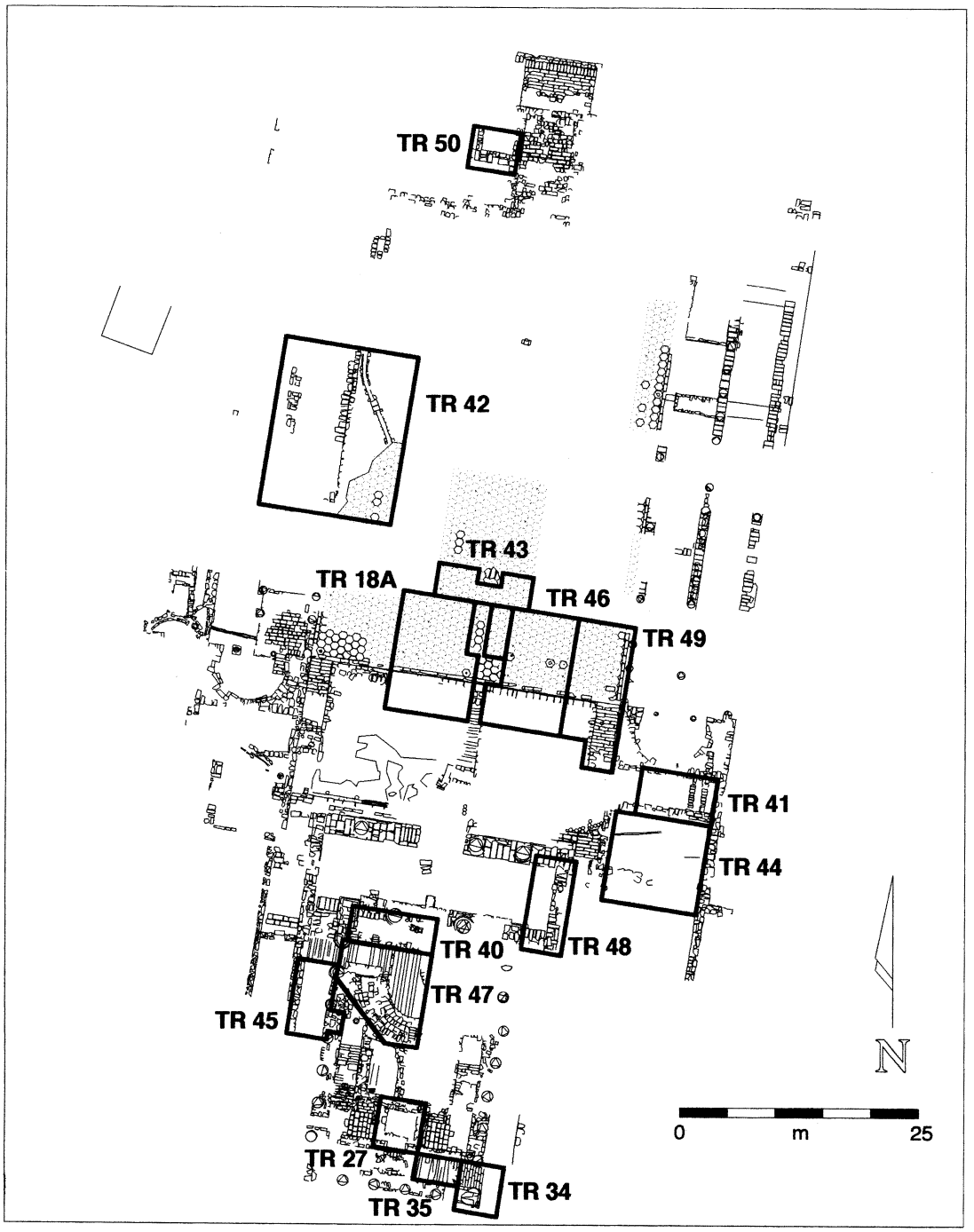

Fig. 23. Petra. Plan of the Great Temple, with trenches also indicated. (P.C. Zimmerman, L.P. Traxler, and D. Pitney)

serais were also recorded in the valley far to the south and west of Bir Madhkur. Surface artifacts indicate that these sites were primarily occupied in the Early Roman/Nabataean period, with limited evidence at one site of occupation extending into the Late Roman period.

The study affirmed the feasibility of future research at Bir Madhkur. Fieldwork will continue in January 1998 with remote sensing and excavation in the cemetery areas, limited soundings within the occupation areas, and a more intensive survey of the environs.

The Great Temple at Petra. Martha Sharp Joukowsky, Brown University, reports:

Excavations continued at the Great Temple (or Southern Temple) from June to August 1997 (figs. 22–23). Work was initiated to the west of the propylaeum that defines a west terrace structure. At the

southern end of the lower temenos, the full expanse of the massive east–west retaining wall was exposed, as was the eastern stairway leading from the lower temenos to the temple forecourt. A large area of hexagonal pavement in the lower temenos was cleared, and the canalization system under the pavement to the west produced an extraordinary cache of Nabataean wares. To help the public understand the layout of the precinct, columns in the east colonnade were reconstructed, and a sign was designed to illustrate the site plan and explain the major features of the temple in Arabic and English.

In the upper temenos, an elegant series of seven arches defines a probable cistern bound to the east exedra. Excavated to a depth of 5 m, a portion was found to contain Nabataean wares and stacks of imported marble pavers. In the temple forecourt, the massive, precariously positioned one-ton sandstone drums fallen from the porch are now stabilized to prevent further collapse onto the lower temenos.

In the temple itself, half of an apsidal structure has been recovered, facing north, tentatively identified as a small Nabataean theater or bouleuterion (council hall). Five courses of seats were revealed—there may originally have been as many as 13 courses—with two six-step stairways above a 1.5-m-high apsidal wall. The diameter of the structure is ca. 6.5 m, the width of the walkway on the cavea wall measures 1.5 m, and the seats average 0.40 m in height and 0.55 m in depth. Capacity is estimated at 120–240 persons. This theater or bouleuterion must have been the focal point of the building, and its discovery raises questions about the function of the Great Temple. It may have been primarily a center of worship, or it may have been a gathering place for the people of Petra, an administrative center where the decisions of the day could be announced and discussed. Perhaps the temple served both religious and administrative functions. The precinct's location, adjacent to the temenos gate and the most sacred Qasr el-Bint, would have made it accessible to the public, and the Nabataeans are known for a tendency to borrow architectural concepts from the classical world and to adapt them creatively to local needs. The questions raised by this discovery require further study and discussion.

The Great Temple was highly decorated; walls were frescoed with red, yellow, and blue, and the columns were covered with red and white stucco. Earth choking the eastern exterior and interior antae has been removed to expose the full 7.5 × 20.0 m sweep of the pronaos. In the rear of the temple, eight courses of a massive heart-shaped southeastern column have been removed for reconstruction. A flight of stairs 8 m long associated with the Attic base of this column extends east–west from the upper adyton to the eastern interior corridor. The eastern corridor floor lies 7 m below ground level.

Some 115,000 artifacts are now recorded in a database, and a study of the glass has been initiated. The 1997 catalogue contains 33 coins, 68 lamps, and 46 other items, including Nabataean wares, a partial Greek inscription, bronze finials, and an extraordinary sculpture of a lion head. Fragments of elephant-headed capitals continue to be recovered, but it is still not known what part of the lower temenos these capitals adorned. Many architectural decorative elements have been recovered; of particular interest is a pilaster with the relief of a life-size male torso.

Khirbet Qazone. Konstantinos D. Politis, British Museum, reports:

During April and May 1997, rescue excavations were conducted at the Nabataean cemetery of Khirbet Qazone, just southwest of Bab edh-Drah, under the direction of K.D. Politis. The objective was to continue the urgent measures taken in 1996 (surface collections, survey, and rescue excavations of six burials) to investigate this unusual site with over 3,500 robbed-out shaft graves. The project was sponsored by the DAJ and the British Museum.

Eighteen shaft graves were investigated during 1997 and 14 of them were excavated. Each grave contained a single burial, with no evidence of reinterment. Most of the graves were dug into the soil, undercut to the east, and covered by adobe brick slabs, though some consisted of stone cists. Men, women, and children were laid out with their heads to the south. Many corpses were well preserved due to the dry conditions of the soil; some still had leather (fig. 24) and textile shrouds (fig. 25) wrapped around them. A few burials contained grave goods such as iron, copper, silver, and gold earrings. Bracelets, beads, a scarab, a wooden staff, a pair of sandals, and a wreath were also recovered. Surface collections yielded additional metalwork and fragments of pottery and glass from the first and second centuries A.D. During 1996, five funerary stelae were discovered from robbed-out tombs; four of them had engraved rectangular signs (*betyles*, or "Dusares blocks"), and one was inscribed in Greek.

Earlier surveys revealed first- and second-century A.D. potsherds to the north, in the ashy deposits of the Medieval/Islamic sugar factory in Mazra'a, near the Wadi Kerak, where the settlement site related to the Khirbet Qazone cemetery may have been located. Regional investigations indicate the possibility of similar cemeteries and settlements at Khirbet Sekine and Haditha. These may have been part of

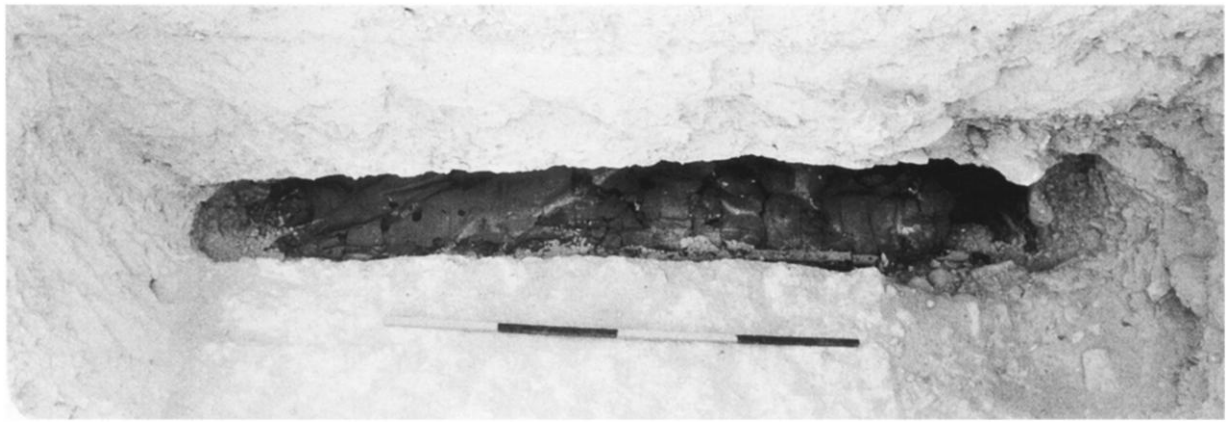

Fig. 24. Khirbet Qazone. Nabataean burial with leather shroud.

Fig. 25. Khirbet Qazone. Nabataean burial with textile shroud.

the Nabataean community living near the Dead Sea, described by the ancient historians Diodorus, Strabo, and Josephus.

Gerasa, Sanctuary of Zeus. Jean-Pierre Braun, IFAPO, reports:

In December 1996 IFAPO, with a new team under the direction of J.-P. Braun, began a project to study the Upper Temple of Zeus complex and to prepare a partial anastylosis and presentation of the site. The program entails comprehensive recording of the architectural remains and explorative excavations supervised by L. Tholbecq and L. Pontin. Two seasons of excavation and architectural studies have yielded much new information, with the following preliminary results.

Evidence that the temple was never finished is seen in the incomplete decorations on architrave blocks. In addition, bedrock outcroppings on the north and south sides of the temenos were not leveled to make a walking surface or to install a pavement. Finally, while the lower parts of the temple have been well executed, the upper parts show signs of carelessness.

Pottery and other finds from the 1997 excavations date the temenos wall to the second century A.D., the date of the temple itself, indicating that the wall was part of the original building program of the upper temple complex. The court has been defined on three sides: the north (already known), and the newly discovered sides west and south of the temple. The fact that the temenos wall was built in the second century, after the surrounding buildings, helps explain the swinging out of the temenos on the northern side of the court. The proximity of the south theater (fig. 26, A) and of the building below (fig. 26, B) limited the extent of the terrace grounds.

The 1997 fieldwork clearly established that the

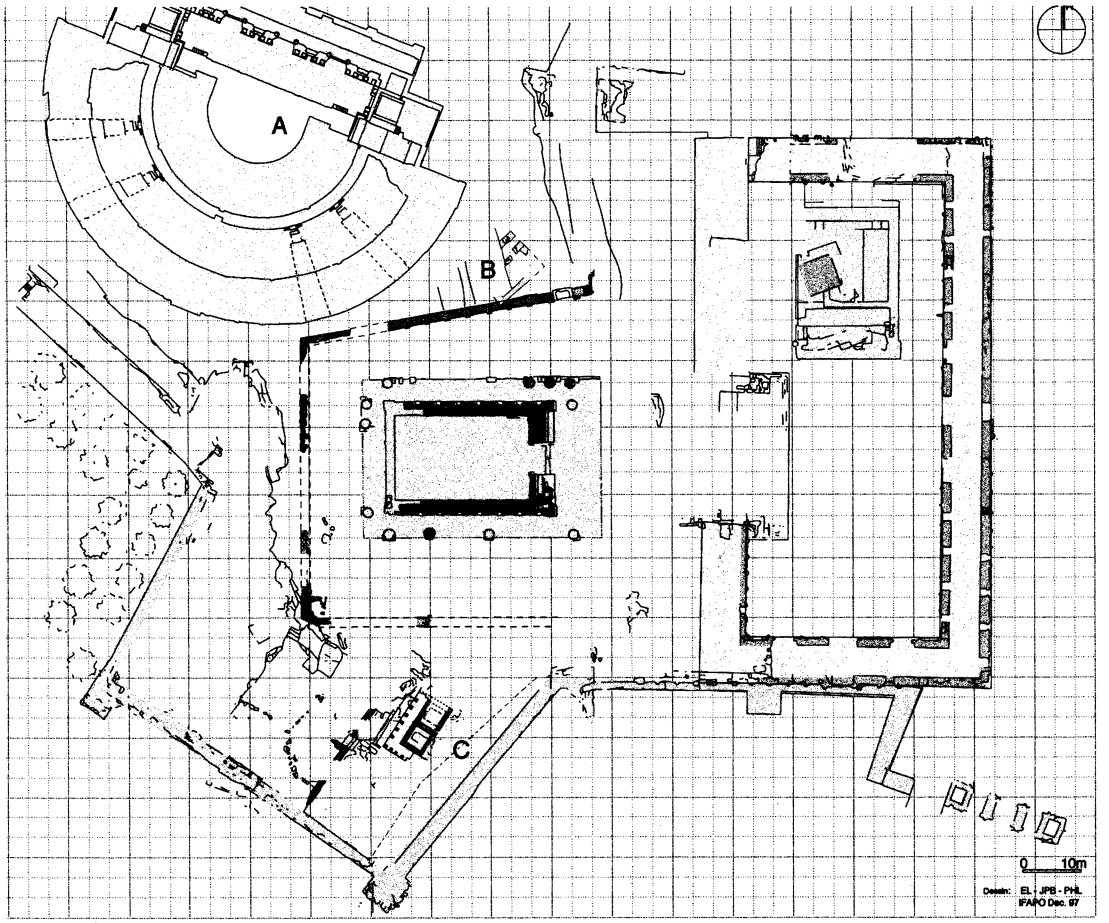

Fig. 26. Gerasa. Plan of the Upper Sanctuary of Zeus showing areas of excavation in 1997. (J.-P. Braun, E. Léna, and P. Lenhardt)

sanctuary complex was built on a quarry site and that the structures were designed to fit within outcroppings and quarry cuts. The use of the quarry in antiquity will be studied in detail to identify the sources of the building blocks of the temple complex.

Architectural remains discovered outside the southern temenos wall (figs. 26, C, and 27) have been identified as "banqueting halls" of the upper temple. All that remains of the second-century structures are the foundations of the biclinia, the pavement, portico, and other architectural elements. The study of their function within the temple complex (access, use, and abandonment) will add to the understanding of sacred urban centers in the Roman cities of Jordan.

The temple was not destroyed in a single but several earthquakes. The gradual collapse of the building complex was probably accelerated by the exposure of damaged parts to weathering. Excavations indicate that the earliest significant collapse took place in the later sixth century, but there is also evidence of damage in the third to early fourth centuries.

The complex functioned as a sanctuary for only a short period. In the third and fourth centuries, parts of the sacred grounds were used for industrial purposes. There are traces of Byzantine occupation, and fairly persistent if modest reoccupations occurred in confined spots during the Islamic periods: Umayyad, Mamluk, and later.

ʿAin ez-Zara (Kallirrhoe). Christa Clamer reports:

The oasis of ʿAin ez-Zara, 2 km south of the Wadi Zerqa Ma'in gorge and almost 400 m below sea level, has been identified with the ancient thermal bath of Kallirrhoe ("beautiful fountain"). The thermal baths were well known in antiquity; King Herod the Great visited the hot springs prior to his death in 4 B.C., according to accounts by Flavius Josephus (*BJ* 1.657; *AJ* 17.171). The site was rediscovered at the beginning of the 19th century, and its identification was confirmed by the illustration on the Madaba mosaic map uncovered in 1884.

The oasis, watered by about 40 perennial springs of different temperatures, is a semicircular area with terraces rising toward the center. It is bordered by the steep escarpment of the Moabite Mountains that

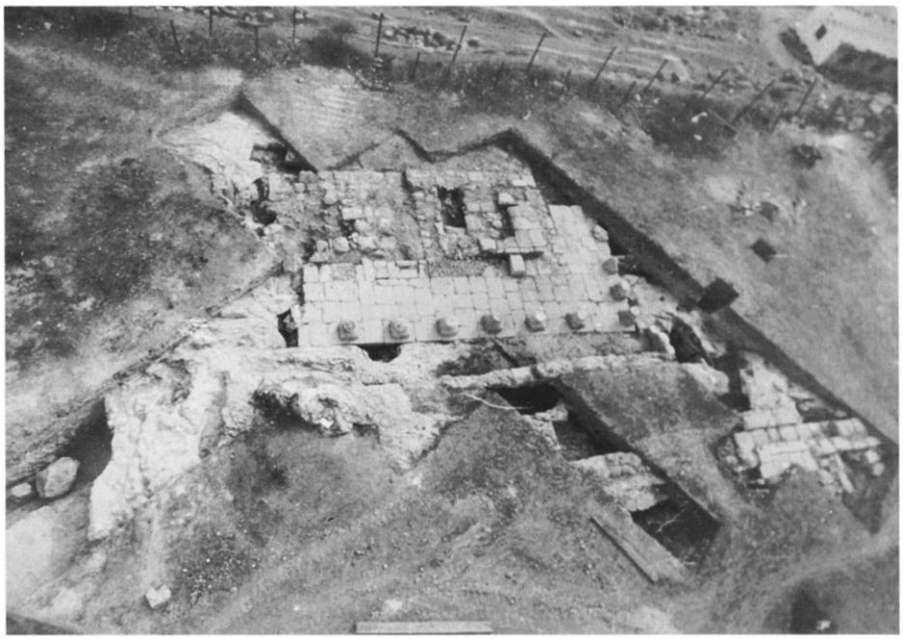

Fig. 27. Gerasa. View overlooking the southern part of the upper sanctuary complex, with banqueting halls. (J.-P. Braun)

climb more than 1,000 m to the eastern plateau. Archaeological excavations were first conducted in 1985, 1986, and 1989 by the DEI, directed by A. Strobel (C. Clamer, *Fouilles archéologiques de 'Ain ez-Zara/Callirrhoe, villégiature herodienne*, Beirut 1997). On the lower rock terrace, these excavations revealed a large Early Roman villa composed of two complexes with an arrangement of rooms including a triclinium, open courtyards, and a thermal pool fed by a nearby hot spring. The rooms were elaborately decorated, as indicated by stucco fragments and the scattered column drums of a portico. The villa can be compared with Late Hasmonean residences on the western side of the Dead Sea and with Herod's palaces in Jericho. Ceramic and numismatic evidence indicates that the villa was built at the end of the first century B.C. and destroyed toward the end of the first century A.D., at the time of the First Jewish Revolt. After a gap of about 300 years, the site of the villa was reoccupied, and rooms were built on the ruins. Though architectural remains of the Early Byzantine period were poorly preserved, numismatic and ceramic finds were abundant and dated the occupation from the second half of the fourth to the end of the fifth century.

Excavations were begun in February 1997 to explore the archaeological remains near the seashore. A rock-cut pool or nymphaeum and the monumental ruins on the beach have been recorded for half a century, but recent surveys revealed many more antiquities within the oasis, and new development projects will endanger these sites. Excavations began on the lower rock terraces, where two large villas or farmhouses were exposed. Both buildings have been severely damaged by agricultural activities. The southern one, building C, was first recorded during the 1986 excavations. It is a square, massive structure measuring 21 × 22 m, built against the sloping bedrock and enclosing an open courtyard with large rooms on two sides. Building D, at the northern end of the oasis, is a large L-shaped complex with inner courtyards and a series of rooms leading down to a watercourse. In the courtyards, two tabuns were built against the walls. The main complex measures 28 × 12 m, and the wing measures 18 × 5 m. Pottery recovered from the floors dates to the Early Roman period. In antiquity, these villas, surrounded by farmland and situated near a watercourse, would have been pleasant country houses for well-to-do people from Jericho or Jerusalem.

Roman Street Project, Petra. Zbigniew T. Fiema, ACOR, reports:

The Roman Street Project was developed to enhance the touristic attraction of Petra and to investigate Petra's urban history by exposing a part of the civic center. The excavation phase, sponsored by ACOR, began in late spring 1997.

Three rooms located at the eastern end of the colonnaded street, along its southern side, were excavated. These rooms are situated directly to the west of the stairway (fig. 28) that leads to the "upper market." Two additional rooms were excavated east of the stairway. Judging from their location, all rooms were commercial establishments, such as shops or

Fig. 28. Roman Street Project, Petra. Stairway and rooms XXVI–XXVIII after the 1997 excavations. (Z.T. Fiema)

taverns. The second phase of the project will include the anastylosis of the exposed entities. The following tentative interpretation of the site will most likely be modified by future study, but the occupation of the area is now firmly attested for the period between the first century B.C. through the sixth–seventh centuries A.D.

The three rooms west of the stairway were probably constructed in the first half of the first century A.D., or later. In the following phase, the stairway was constructed, presumably with a monumental arch in front of it. An inscription dated to A.D. 114 that seemingly belonged to the arch has been found in the area. The original rooms were enlarged through the construction of a new facade further north. Excavations indicate that the stairway is contemporary in construction with the stylobate and colonnade, the expanded shops, and the extant pavement of the street. The relevant pottery does not date beyond the beginning of the second century. Thus, development could have occurred in the last decades of Nabataean independence, but the Trajanic, post-annexation period is more likely.

The predominance of storage jars, amphoras, and unused cooking pots among the recovered ceramics supports the interpretation of the commercial function of the rooms. The recovery of 186 coins in the eastern rooms may somehow relate to specific operations conducted there; the majority date to the fourth century, but fifth-century types are also present. Many were minted before A.D. 363, but the impact of the earthquake of that year on this area cannot be fully defined at this point. Any damage must have been repaired, as the collapse of the arches inside the rooms certainly occurred later. Flood-control installations in the valley and the stability of the hillsides might have been affected. Earthquake damage and the increased threat of flooding may have led to the construction of the so-called "Byzantine shops" on the sidewalk, often encroaching upon the street itself, and the blocking of the original doorways. The gradual abandonment of the shops progressed from east to west; the eastern rooms were abandoned in the fifth century, but the latest ceramics found in the westernmost room date to the sixth–seventh century. Last to be abandoned were the northern spaces of the rooms, as the southern arches appear to have collapsed first. Occupation of this area of the street continued during the seventh century.

Roman Aqaba Project. Mary-Louise Mussell, Carleton University, reports:

The third field season of the Roman Aqaba Project focused on the massive mudbrick structure, tentatively identified as a Christian basilica, discovered in 1994. The structure measures at least 25 × 15 m and may have been two stories high, as suggested by stone steps preserved to the seventh riser. Mudbrick walls sit upon bases of eight courses of stone. The rooms were vaulted, with arched doorways, and the walls were decorated with painted plaster. The building is oriented east–west and is associated with a cemetery.

At the end of the 1996 season, three rooms had been identified within the structure. The western

room, paved with purple composite pavers, contains the staircase with risers of purple granite and yellow sandstone. A box of approximately 100 coins was found broken on the floor of this room; the coins were scattered among mudbrick fragments and shards of a type of glass often associated with churches. The floor of the larger eastern room was covered with mudbrick from the collapse of the structure. Between the western and eastern rooms is a small room, its vaulted ceiling intact, that can be entered through a door in its west wall.

The plan of the structure was further defined in the 1997 season. Existing trenches were extended southward, while new trenches were opened to the north and east. The eastern trench proved to be outside the structure. The southward extensions revealed an aisle 2.50 m wide running parallel to the existing rooms. A northern aisle, also 2.50 m wide, can be entered from a double corridor running northward from the coin room. The corridor, at right angles to the aisle, terminates in two arched doorways that still stand, having been blocked with mudbrick in antiquity. West of the corridor is a room approximately 2.5 × 3.0 m, decorated with fine white plaster, where fragments of a decorative plaster molding were found.

If this structure is a basilica, the white plaster room would be the baptistery, and the coin room would be the narthex. The small vaulted room may be the entrance to a crypt; excavation there suggests an underground chamber, but possible collapse of the vault has limited excavation. The eastern central room is the nave, flanked by side aisles. Possible remnants of a chancel screen can be seen in a low stone wall that divided the room. This wall was later covered by a cobblestone floor contemporary with the hexagonal pavers. A new chancel screen was installed at this time further to the east.

Ceramics and coins indicate that the structure was destroyed after 350/355, suggesting destruction by the 363 earthquake. At this time the structure was abandoned and the mudbrick vaulting began to collapse. Late in the fourth or early in the fifth century, the city wall was cut into ancillary structures. The building was reused in the fifth century, possibly as a workshop for bone inlay. Excavation of this structure will continue in 1998.

Wadi el-Kharrar (al-Maghtas). Mohammad Waheeb, DAJ, reports:

Wadi el-Kharrar is near the eastern shore of the Jordan River. The area is bordered to the east by barren terraces of marl and limestone, and the wadi, running southwest, provides a natural route from Kharrar to the river. Emergency survey and excavations were initiated by the DAJ in the area of al-Maghtas to contribute to the master plan being prepared by the Jordan Valley Authority for the improvement of the area. The general aims of the project are to study phases of human occupation in the region; to understand the evolution of settlement from the Early Roman to the Late Byzantine period; to investigate the factors influencing settlement location; and to study the organization of urban and rural settlements.

The eastern areas near al-Maghtas have several important archaeological sites, i.e., Nimrin, el-Rameh, Iktanu el-Kafrein, el-Hammam, el-Tahuneh, and Swimmeh. G.L. Harding visited Wadi el-Kharrar and noted a mound and traces of an ancient hamlet attributed to the Byzantine period. Prior to the 1997 excavations, only a few architectural features were visible among tumbled stones and heaps of sand.

At the mouth of Wadi el-Kharrar, near the Jordan River, is what appears to be a masonry birket (pool), each side of which terminates in a vaulted arch. During the excavations three pools were discovered: one pool to the north and two pools on the southern edge of a low tell in Wadi el-Kharrar. The northern and western slopes of the tell fall steeply to the bed of the wadi.

Excavations revealed walls of well-dressed stone, most of which were damaged by agricultural activity. Part of a monochrome mosaic floor was discovered, and colored mosaic fragments were found on the surface of the area, along with Byzantine sherds.

The eastern side of the Jordan River may correspond to the location referred to in the Bible as the "wilderness," where John the Baptist preached. He is said to have baptized "in Bethabara beyond the Jordan" (John 1:28 and 10:40). The discovery of Byzantine remains at Kharrar may indicate that this was where that activity was commemorated. The site is generally opposite the monastery of St. John on the west bank of the Jordan River. The only ruins recorded east of the river were found in Wadi el-Kharrar, where several remains, possibly of churches, await excavation.

BYZANTINE–ISLAMIC

Petra Church Project, Petra papyri. Traianos Gagos, University of Michigan, reports:

The University of Michigan team in 1997 continued its work on the papyri from the Petra Church by establishing a final text for roll 10 (*Papyrus Petra Khaled and Suha Shoman*), by dealing with the historical and cultural implications of the information contained in that document, and by producing transcripts for most of the other priority rolls.

As previously reported (*AJA* 101 [1997] 531), papyrus roll 10 is a division of property among three brothers named Bassos, Epiphanios, and Sabinos. The property consists of houses in the metropolis of Petra and in the nearby village of Seril, as well as land in the surrounding countryside. Study of the other documents in the archive suggests that roll 10 is the oldest document, predating the earliest securely dated document of A.D. 528. Unfortunately, this cannot be proven since the dating formula at the beginning of the roll has been destroyed.

Roll 10 provides unique information on property ownership and inheritance, and it sheds light on the nature of Petra's economy and its hinterland. Above all, this papyrus is an important document in the history of the Arabic language, given its wealth of Semitic (mostly Arabic) names for places, houses (e.g., lines 85–86: Gr. *Darath al-Ebad* = Ar. *Darat al-'Ibad*, "House of the Worshippers"), and parts of houses (e.g., line 86: Gr. *Elliath Aphthonis* = Ar. *Elliat Afthonis*, "Penthouse of Aphthonios"). About 50 such names appear in roll 10, and perhaps another 30 in the rest of the archive. Most of the names are in a form of pre-Islamic Arabic—of great importance, as Arabic was not a written language with its own alphabet until the Koran was written down a century later. The few unquestionably authentic remnants of pre-Islamic Arabic are written in other, nonvocalized Semitic scripts. In these papyri, however, Greek vowels render the Arabic vowels.

The many Arabic toponyms that appear in roll 10 are of particular interest because several of them are still in use in the larger Petra area. With the help of linguists, archaeologists, and local residents, it has been possible to identify several of them. A few examples may suffice here: *al-Bassa* and *Xaphphath al-Hawawer* are names based on words meaning "moist place" and "pan (in the topographical sense) of white earth." They were identified with two existing places in the town of Wadi Musa, next to Petra. Some five other places in the same town have names identical with or closely similar to place-names in roll 10. Clearly, the family of the archive owned much prime farmland around what is now Wadi Musa, and they probably owned land to the north, around Umm Louza, which is still an agricultural region today.

Roll 60 deals with the registration of a vineyard called *Malouda*, situated in a deserted hamlet called *Baith Tel al-Keb*. It records the transfer to Theodoros son of Obodianos, of the responsibility for paying taxes on that property to the local authorities. For reasons that are obscure, Theodoros and his father paid the taxes in the past to a municipal official, Flavius Leontios, and his father, Valens. The text can be securely dated to January/February 540. The taxes for land previously registered in the land register of Augustopolis are now being collected by the tax office in the metropolis of Petra. The vineyard fell under the fiscal authority of the city (it is called "free" land, meaning free from the fiscal authority of the imperial administration; in other words, land that was under the control of the city). The rate of taxation is high, 47.5%, a rate corroborated by other documents in the archive that seem to record even higher rates. Roll 67 is a document addressed by Flavius Dusarios son of Valens, who had been prefect of *Kastron Ammatha* (modern al-Hammam, a settlement southeast of Petra, near the modern city of Ma'an), to Alpheios son of Valens, the keeper of the public records, probably in Petra. Dusarios had held a post in Ammatha, as the document informs us, but was a citizen of Petra. In this document, he asks the keeper of the public records to transfer tax responsibility for a piece of land (part of which was a vineyard) to Theodoros son of Obodianos. The property was located near *Kastron Zadakathon* (modern Sadaqa, approximately 20 km southeast of Petra) in an uninhabited hamlet. As in many of the other documents from Petra, the plot of land bears an Arabic name.

It is too early to draw general historical conclusions, but it is certain that in the sixth century, Petra's agricultural economy was still functioning and the city maintained economic and administrative ties with several other communities in the area, including Augustopolis, Ammatha, and Zadakatha. Furthermore, the documents inform us that at least the local administration (both in Petra and Augustopolis) was still fully functional in the middle of the sixth century.

Yajouz. Lutfi Khalil, University of Jordan, reports:

Kirbet Yajouz lies 1 km north of the Sweileh-Zarqa main road, on a hillside east of the modern cemetery and a stand of 2,000-year-old oak trees. It was documented by several travelers, e.g., Condor and Glueck, and the DAJ discovered a basilica church there in 1994. During three seasons of excavations undertaken by the University of Jordan (1995–1997), a chapel, a cemetery, a winepress, and other architectural features were discovered.

The chapel (area B) consists of a main hall, an apse with two levels of polychrome mosaic floors (fig. 29), an altar in the center of the apse, and a chancel screen. Five rooms were revealed on three sides of the main hall. The room west of the chapel, the largest room, has four internal arches at the entrance to the chapel and a colored mosaic floor in a geometric pattern. An eight-line Greek dedication inscription names Bishop Theodocious, a priest, and

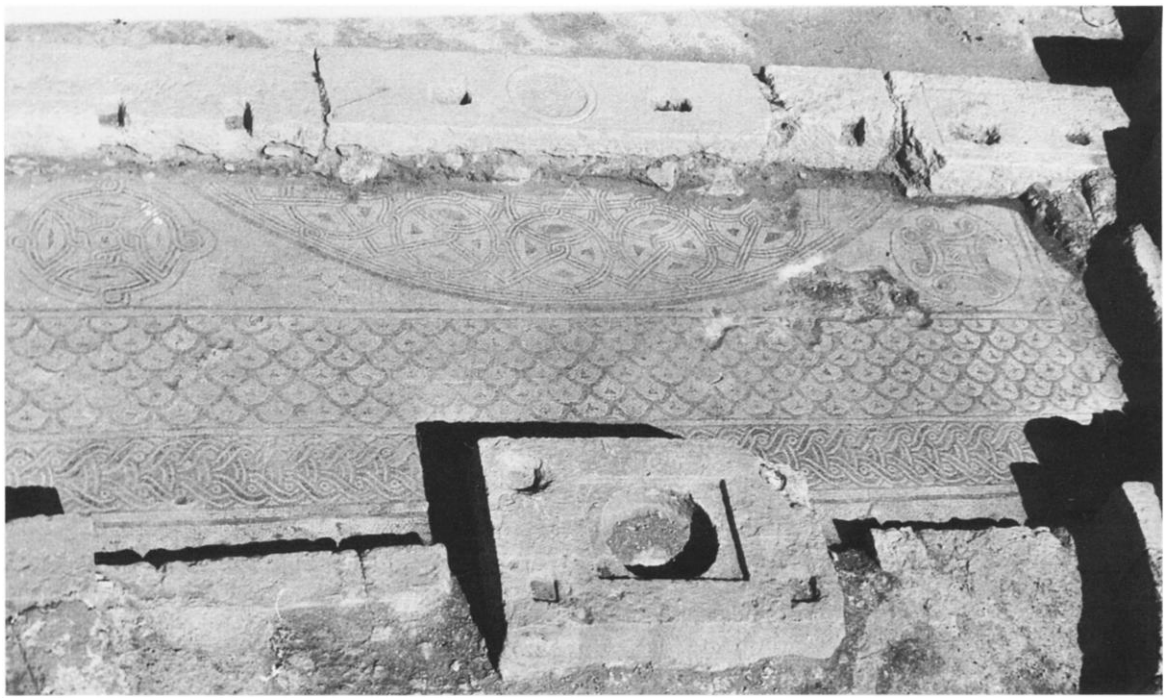

Fig. 29. Yajouz. Mosaic floor between the chancel screen and the altar in the chapel.

a curator. A similar inscription at Yadudeh mentions a bishop Theodocious; if these inscriptions refer to the same bishop, the chapel was founded in 508. A thick layer of ash and collapsed arches covered the floors, perhaps a result of the earthquake of 749.

An intact cemetery was discovered near the southern side of the chapel. A large courtyard with three internal arches is cut into the limestone bedrock at the cemetery entrance. On the east side of the courtyard is a chancel screen, and a staircase cut into the bedrock leads toward the west and to the southern chapel entrance. Two types of graves were discovered: seven loculi were carved into the rock, and six graves were built up with dressed stones. About 132 skeletal remains were found. Ceramics included candlesticks, lamps, and other vessels. A number of complete glass vessels were also retrieved, as well as copper, bracelets, and iron nails. A preliminary study of the finds suggests that the cemetery dates to the fifth through eighth centuries.

An industrial area (area C) was excavated in the middle of the site, and a grain mill, winepress, and other structures were identified. The mill consists of a grinding stone, a basalt core, and a stone basin to collect the ground flour. The mill building is constructed of well-dressed stone, with the main entrance from the south. Two adjacent large rooms with internal arches lie west and south of the mill building. The last room, with eight collapsed arches and a plaster floor, may have been used as living quarters or a storage area.

The winepress (fig. 30) was found about 7 m southeast of the mill. Three basins for the primary pressing of the grapes were found. Well-dressed stones and plaster are used in the construction, and the floor of the complex is covered with white mosaic. At a lower level is a courtyard, and to the west of it a deep reservoir. Copper coins, complete vessels, and potsherds from the industrial area date to the Byzantine and Umayyad periods. In a lower stratum in area C, sigillata sherds of the second century were excavated.

In area D, about 100 m north of area C toward the summit of the site, a room with internal arches was discovered. In its courtyard, a tabun and a cave—both with domestic functions—were excavated. Pottery from the cave dates to the Late Roman–Byzantine periods. At area E, in the southwest sector of the site, a few squares were excavated to reveal walls and vaulted arches. Pottery from this area dates to the Umayyad–Mamluk periods.

It is clear that Yajouz was a major city on the road between Amman and Jerash during the Roman period. Reused carved stones and pottery date to the Roman occupation, and two second-century Roman milestones were found in the nearby area (Shafa-Badran). Yajouz continued to flourish during the Byzantine period, when the basilica church, chapel,

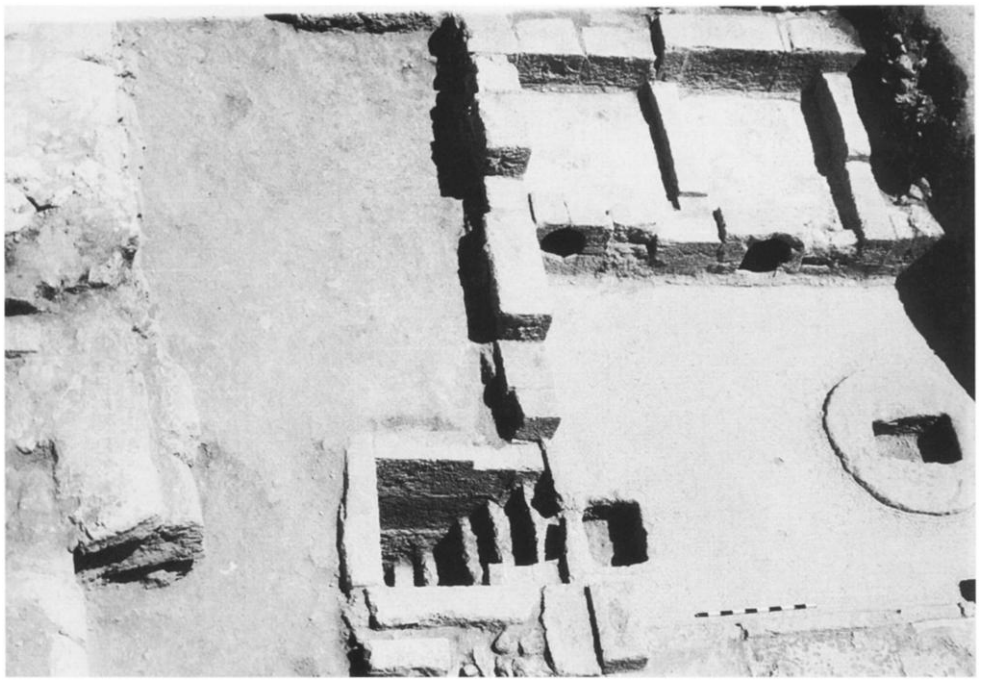

Fig. 30. Yajouz. Basins and reservoir of the winepress.

cemetery, mill, and winepress were constructed. Evidence of Islamic occupation was found, but more seasons of study are required.

Sa'ad. Shelley McGinnis, University of Arkansas, and Mahmoud El-Najjar, Yarmouk University, report:

Joint excavations continued at the site of Sa'ad, a medium-sized agricultural village 30 km from the Roman city of Jerash. Excavations began in Necropolis II, an extensive Byzantine tomb complex located in a small wadi, where horizontal rows of tombs were cut into the bedrock of the hillside. The 1995 and 1996 excavations produced 52 tombs, of which 20 had been robbed in recent times. The 1997 work doubled the number of human remains found over the past two years and revealed a wide variety of tomb types previously unknown at the site.

Sixteen additional tombs were excavated in Necropolis II in 1997. Two had been abandoned before construction was completed, and half of the completed tombs had been robbed. The majority of these tombs showed the standard construction of other Necropolis II tombs, which were made by digging an entranceway averaging 1.81 m in length and 0.77 m in width down into the bedrock. A horizontal tomb was then cut into the rock averaging 2.14 m in length, 0.77 m in width, and 1.12 m in height. The doorway was sealed with courses of rock after the body was laid inside.

Burial goods such as metal pendants, semiprecious stone beads, iron and bronze clasps, bronze bracelets, and metal rings were found in 12 of the graves. Of special note are a complete bronze hairpin from tomb 55 and a pair of gold foil earrings from tomb 65, both of which were found in situ. Preliminary skeletal analysis indicates that there were 10 adults and two subadults in the graves, as well as one individual of unknown age.

Three caves used as tombs, all of which showed evidence of looting, were identified northwest of Necropolis II. Caves were used as burial sites for people of low social or economic status who could not afford more costly cut tombs (S.D. Waterhouse, in D. Merling and L.T. Geraty eds., *Hesban after 25 Years*, [Berrien Springs 1994] 283–99). Cave I is a tomb with two graves and a carved shelf that was subsequently modified and used as a domestic structure. Cave IIB, a shaft tomb, contained three graves, one of which held the remains of multiple individuals. Cave III contained only one grave with minimal skeletal material.

Two additional robbed tombs were discovered on a hill southeast of Necropolis II. Tomb I, a vertical shaft tomb with two slit trench graves, contained a wide variety of burial goods, including beads, bracelet fragments, and broken lamps. The tomb contained at least 10 individuals ranging in age from infant to adult. The second tomb in this area, a cave distinguished by three steps, a lamp niche, and a triclinium, is likely to have been modified and used as a living space in the Ayyubid/Mamluk period.

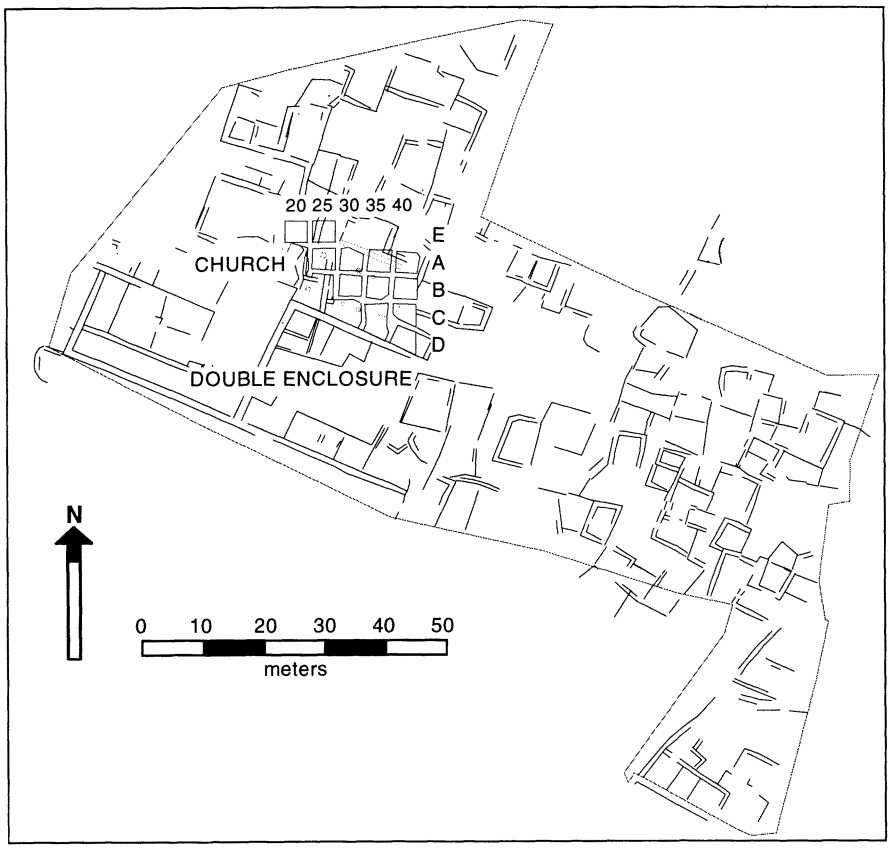

Fig. 31. Gharandal. Plan of visible remains on DAJ property. (H. Barnes)

During the last two days of the season, a rock-cut tomb with two graves discovered in 1995 was cleaned and reevaluated. A previously unexcavated corner of the tomb yielded approximately 175 liters of bone, nine Byzantine ceramic lamps, a bronze pendant in the form of a human hand, a bronze bell, glass beads, and a Byzantine glass goblet base. No skeletal analysis was possible, but the bones appeared to be large and robust, in contrast to the gracile remains from other areas of the site, indicating possible economic distinctions.

Gharandal (Arindela). Alan Walmsley, University of Sydney, reports:

A first season of fieldwork at Gharandal in the Tafilah district—Byzantine Arindela and Early Islamic ʿArandal—was conducted in April and May 1997 to investigate aspects of the social and economic history of southern Jordan in the Late Antique and Islamic periods. This project of the Australian Research Council is a collaborative undertaking of the University of Sydney, the DAJ, and the BIAAH.

The remains of Gharandal/Arindela comprise a church, an adjacent double enclosure, other public buildings, and extensive domestic quarters. The 1997 season had three main aims. The first was to record the topography and remains of Gharandal by mapping and photography. This was a major priority, as rapid development has damaged many sites. Regional and site maps were produced, including a detailed plan of the part of the site on DAJ property (fig. 31). The second aim was to excavate the church (area A). Excavations in 1994 by J. Darwish uncovered many Islamic domestic structures between standing monolithic columns. A priority in 1997 was to investigate the occupational history of the church. Balks were removed and new squares (E20 and E25) opened to excavate the northern aisle and areas immediately to the west and north of the church. Third, an assessment of outlying sites in the Gharandal catchment area was made using aerial photographs. Undertaken with D. Kennedy, this work shows great promise, not only for the valuable contribution of aerial photographs, but also for the possibility of locating other sites in the vicinity.

Work at Gharandal has revealed a long and complex settlement sequence beginning no later than the Nabataean period. The large double enclosure (fig. 31) is probably Nabataean; its masonry is similar to that of Khirbat Tannur and al-Qasr. Later structures attest to the continuing function of the double

compound in the Late Antique–Early Islamic town, and the changing nature of this use is one of the most exciting prospects for future research at Gharandal.

Excavations within the church also established a long occupational sequence. The church is a single-apsed, colonnaded basilica with three western doorways opening into a narthex, the floor of which was laid with mosaic in a geometric pattern. Aisles were also laid with mosaic; the nave was evenly laid with pavers. The still-standing, one-piece columns are closely spaced, suggesting that the colonnades had flat lintels. Walls were apparently decorated with mosaic, while the roof was tiled. Many pieces of white marble screens were recovered, especially open lattice types. Excavations revealed that the sanctuary was stripped after the mid-eighth century, and a yellow fill was placed within the church to level the nave with the sanctuary. Presumably the building no longer functioned as a church. Dividing walls dating to the 11th–12th century were uncovered and were associated with handmade pottery: thin, unpainted, and with much short-cut chaff. A later occupation phase is marked by further wall construction; red painted pottery with thin wavy lines and dots was recovered from this phase. Domestic occupation intensified in the Mamluk period, with many more walls, tabuns, and the prevalence of handmade, geometric painted ware.

The Gharandal sequence promises to increase our understanding of Byzantine and Islamic ceramics in southern Jordan. Links to the firmly dated sequence of northern Jordan reveal the dissimilarity of southern pottery types, with Byzantine-style light orange to reddish blooms and wavy combing continuing well into the Islamic period.

AMERICAN CENTER OF ORIENTAL RESEARCH
P.O. BOX 2470
AMMAN 11181
JORDAN
ACOR@GO.COM.JO