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Archaeology in Jordan

PATRICIA M. BIKAI AND VIRGINIA EGAN

The 1997 installment of *AJA's* annual "Archaeology in Jordan" newsletter presents brief reports on recent excavations and projects in the Hashemite Kingdom (fig. 1). The material is arranged in chronological order after the reports on general projects and surveys. A debt of gratitude is owed 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); and Institut français d'archéologie au Proche-Orient (IFAPO).

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GENERAL PROJECTS AND SURVEYS

Amman Citadel, Restoration of Ayyubid tower.

Antoni Ostrasz[†], University of Warsaw and ACOR, reported:

A tower formed part of the Ayyubid fortifications of the Citadel of Amman and was constructed in the late 12th to early 13th century. It is located against and over the remains of the temenos wall of the Great Temple, which was restored by ACOR in 1991–1993. Built mainly of stones robbed from the temple, the tower is 9.3 m long and 7.6 m wide. It was a one-room, one-story structure, entered through a doorway in the north wall. There was a recess in each of the three other walls, each with an arrow slit. A staircase built within the north and east walls of the tower led to the top.

The structure is well preserved from the level of the foundation to the level of the first course (counted up from ground level on the northern side). From course 1 upward, the state of preservation of the four walls of the monument varies considerably, and parts of the stonework above that level were endangered. Indeed, the stonework of the south wall, west of and above the window slit, was in precarious condition (fig. 2). Two stones were missing there and, in consequence, several stones had tilted from the horizontal. With the weathering of the tilted stones, that

part of the monument could have collapsed in an earthquake.

The restoration project, completed in August 1996, had two objectives. One was the conservation of the remaining masonry of the monument and the other the partial reconstruction of some features of its architecture. The former was necessary for the survival of the monument, the latter with creating a visual presentation of the architecture that would allow it to be understood. In the effort to achieve both objectives, we faced serious issues in regard to the principles of restoration of ancient monuments. In general, under those principles, no restoration should be undertaken for which there is no clear evidence of the original appearance of the parts of the monument to be restored.

In the case of the tower, the conservation of the remaining stonework of courses 3, 4, and 5 of parts of the east, south, and west facades required rebuilding the inner masonry of those courses of the walls. Very few stones in situ attested to the size of the stones in course 3, however, and none attested to the size for courses 4 and 5. Rebuilding those courses of the masonry could be based only on the restorer's arbitrary decision concerning the size of new stones used for the rebuilding. This procedure could be viewed as contrary to the strictest principles of restoration. Adhering to those principles, however, would not have ensured the stability of the surviving masonry above course 2 of the east, south, and west facades.

A similar problem was encountered in rebuilding the masonry over the three arrow slits, since there was no evidence for the length of the original stones. However, since the builders of the fortification towers of the Citadel chose haphazard lengths of stones for the courses, the restorer could follow their example. After serious consideration of the issues involved, it was decided that ensuring the stability of the remaining parts of the monument was the main objective. Thus, in partially rebuilding the tower, we compromised between ensuring the stability of the surviving masonry and following the theoretical principles of restoration of ancient monuments (fig. 3). [Antoni Ostrasz, who worked at Jerash for many years, passed away on 10 October 1996—eds.]

Limestone weathering analysis, Great Temple of Amman. Thomas R. Paradise, University of Hawaii at Hilo, reports:



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



Fig. 2. Amman Citadel. South face of Ayyubid tower before restoration, showing the precarious condition of the slit window.

Limestone weathers when its exposure environment (e.g., architecture) differs from its original environment (e.g., sediment basin). Differences in moisture, temperature, and pressure change the rock into a more stable state, though this alteration is often destructive. Understanding rock deterioration is vital for architectural conservation, landscape modification, and soil development.

The Great Temple of Amman is located approximately 120 km east of the Mediterranean Sea in a semiarid region with mean annual precipitation ranging from 300 to 500 mm. It is situated at 838

masl atop the Citadel of Amman (Jebel al-Qal'a), a prominent hill near the urban center. The Roman temple is a large colonnaded building on a stepped podium, aligned east-west, constructed of pink limestone ca. A.D. 165 (C. Kanellopoulos, *The Great Temple of Amman: The Architecture*, Amman 1994). The colonnade, entablature, and architrave collapsed in the great Levant earthquake of 748; however, the podium and plinth course were unaffected and have since remained relatively exposed. The plinth course was selected for study since it exhibits a wide range of weathering rates, with some surfaces showing major

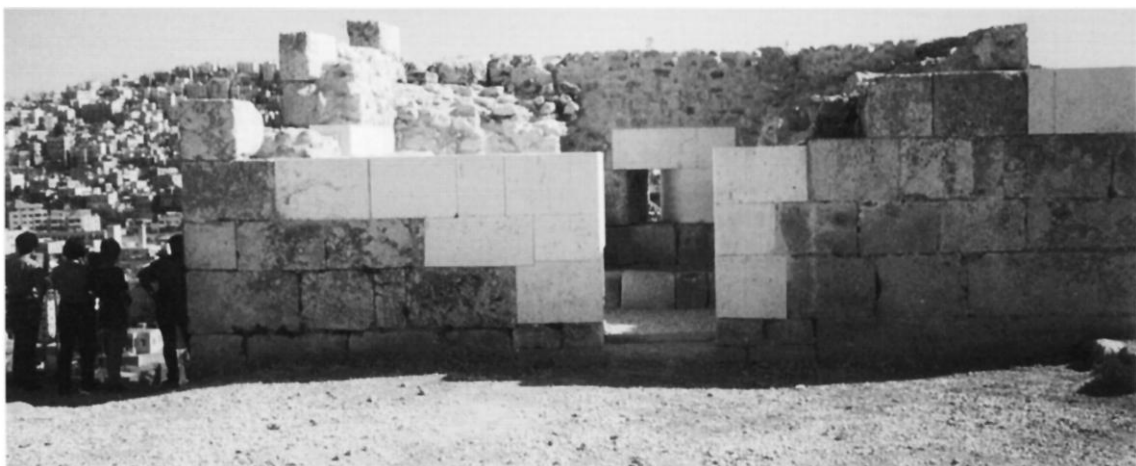


Fig. 3. Amman Citadel. North face of Ayyubid tower after restoration. The slit window of the south wall is visible from the inside. The new stones, of the same limestone as the ancient ones, will weather from white to pink in about 10 years.



Fig. 4. Great Temple, Amman. Southern plinth course.

recession and others nearly unaffected, displaying original Roman stone-dressing grooves (fig. 4).

Using archaeometric methods, a false datum was created representing the original dressed surface from which the weathered depressions were measured across two large plinth blocks. These two blocks were chosen for their identical microclimatic characteristics (i.e., aspect, elevation, and lack of obstructions), their varied surface conditions, and original Roman dressing marks indicating the least recessed (weathered) surface. These Roman dressing marks were used to establish the hypothetical original surface.

Statistical analyses of climatic and lithologic variables with recession depths indicate that the increasingly significant factors accelerating weathering at the site were 1) moisture availability on horizontal surfaces (0–200); 2) insolation on nearby vertical surfaces (90–700); and 3) percent constituency of mollusc-shell material in the limestone. Mean surface-recession depths were two to three times greater on surfaces where mollusc constituency exceeded 50%. Weathering recesses on the plinth course ranged from 0 to 15 mm \pm 1 mm, with mean rates of 1–2 mm per millennium for low mollusc content (<10%), and from 3 to 5 mm per millennium for limestone containing a large mollusc constituency (>50%).

Wadi Ramm epigraphic survey. Saba Farès-Frappeau, IFAPO, Beirut, reports:

In February 1996, IFAPO, in collaboration with the DAJ, initiated a new epigraphical survey in an

area of 40 km² around Wadi Ramm, in southeastern Jordan. Nabataean, Minaean, and Greek inscriptions were discovered in ‘Ayn ash-Shallah and al-Khaz’aly in 1932 and published by Savignac (*RBibl* 43 [1934] 572–89). In 1980, W.J. Jobling (University of Sydney) began an epigraphic project in the south of Jordan, but during his six seasons of work in the region, he did not visit Wadi Ramm.

The 1996 preliminary survey indicated a high concentration of inscriptions in the Wadi Ramm area. During this season, ‘Ayn ash-Shallah, al-Khaz’aly, Jabal Umm ‘ishrin, ad-Diseh, Wadi Hafir, and Sahl as-Suwwan were studied intensively. During the survey, up to 50 unpublished inscriptions were discovered. Most were Thamudic, five were Nabataean, and one was close to the Lihyanite. It should be noted that the Greek inscription of Zenon (*IGLSyr* 21.4.138), published by Jobling and then by Sartre, is not situated in Hadeibet al-Fala, as indicated, but 50 km away, in Sahl as-Suwwan.

At ad-Diseh, under a remarkable rock shelter—an obvious caravan station—the survey discovered an inscription written in a Lihyanite type (northern Arabia) and 13 Thamudic inscriptions with footprints of adults and children nearby. Numerous inscriptions and petroglyphs (fig. 5) were discovered in Wadi Hafir, northeast of ad-Diseh. Wadi Hafir appears to have been a major encampment, judging from the large number of graffiti at the site.

The texts discovered are primarily graffiti and signatures. Most record personal names or genealogy



Fig. 5. Wadi Hafir. Petroglyph.

and are often related to fight scenes; no funerary inscriptions have been found on these sites. The new Thamudic inscriptions will help further our knowledge of this northern Arabian language, which is still being documented. Additional study in Wadi Hafir and the southern area of Wadi Ramm in 1997 will complete the epigraphic survey.

Wadi Faynan Project. Alison McQuitty, BIAAH, reports:

The Wadi Faynan Project is a 10-year project initiated by BIAAH to address various research topics

from a multidisciplinary point of view. These topics include the study of settlement and land use in an arid region; the socioeconomic and environmental impact of the exploitation of local metal resources; burial and ritual in the Wadi Faynan; and possible applications of ancient land-use and water-management practices on the future development of the area.

Wadi Faynan lies 70 km south of the Dead Sea at a point where the wadis running west from the Shara'a mountains meet the Wadi Arabah. The mountains are rich in copper deposits, and the exploitation of these ores has been the focus of a research program initiated by the Bochum Mining Museum, Germany, and the DAJ. Many archaeologists have visited the area and reported on the impressive tell of Khirbat Faynan, its standing structures of large buildings, a tower, and churches; the classical aqueduct, associated water channel, reservoir, and water mill; the ubiquitous slag heaps; extensive field systems (fig. 6); and numerous cemeteries of all periods. BIAAH seeks to complement the work already done and to look at all aspects of human occupation in the area. The BIAAH fieldwork began in 1994, and the results are summarized below.

Mapping. Based on aerial photographs of 1978,



Fig. 6. Khirbat Faynan. View of tell and field systems.

a photogrammetric map showing the structures, the complex field system, and the hydrological features of the project area has been prepared by L. Blank, University College London. In the spring and winter of 1995, H. Barnes, BIAAH, carried out two seasons of detailed mapping of Khirbat Faynan and one of the many cemeteries, the Byzantine south cemetery, was targeted for rescue excavation (see below).

Surveys and assessments. In spring 1995, a team led by I. Ruben, BIAAH, carried out intensive and systematic fieldwalking of a portion of the wadi. Three transects were walked, and numerous sites not previously identified were noted. The survey team also observed that the ceramics in the field system appeared to be mainly classical near the multiperiod site of Khirbat Faynan, while farther west the ceramics appeared to date to the Bronze Age. This raises very interesting questions about the age of the field systems and water-management systems in the wadi.

R. Kana'an (BIAAH) documented the aqueduct, reservoir, water mill, and associated water channels, and assessed the environmental impact of refurbishing this system. In spring 1996, G.W. Barker, S.J. McLaren, and D.J. Mattingly (University of Leicester), D. Gilbertson (University of Aberystwyth), and C. Hunt (University of Huddersfield) carried out the initial campaign of geoarchaeological fieldwork examining the geomorphology of the area and its field systems.

In 1996, B. Finlayson (University of Edinburgh) and S. Mithen (University of Reading) carried out a reconnaissance survey in the Dana-Faynan area (see the report below by Mithen on the Dana-Faynan Epipalaeolithic Project). K. Wright (University College London) conducted the first season of investigations into the fourth and third millennia of Wadi Faynan. Wright conducted a detailed survey of Khirbat el-Hamra, one of the sites identified during the 1995 fieldwalking survey.

South cemetery excavation. The rescue excavation of the large Byzantine cemetery east of Khirbat Faynan took place in the winter of 1995–1996 under the joint directorship of G.M. Findlater (BIAAH) and M. Najjar (Yarmouk University). J. Darweesh and E. Droos represented DAJ. The site itself covers an area of 36,000 m² and is distinguished by at least 1,200 sandstone orthostats. Over 200 of these presumed headstones were engraved with a variety of Christian crosses. It is known from Eusebius that Christian slaves were sent to work in the copper mines of Phaino, where many perished or were martyred. In addition, the large settlement site of Khirbat Faynan testifies to a large Byzantine population in

the area. Sixty percent of the graves had been looted, so there was an obvious need to carry out rescue work on the site.

A total of 50 inhumations were recovered during the season, and these are being analyzed at Yarmouk University. Excavation showed that many graves did not have markers, and the count from the fieldwalking survey must be seen as the minimum number of graves. Most burials did not include grave goods; however, many skeletons had extensive remains of textile shrouds, and leather shoes were frequently found. The richer grave goods recovered were invariably found with female inhumations and relate to a distinct cosmetic assemblage that has parallels with other Late Roman–Byzantine cemeteries. These finds include bead necklaces, ivory and copper bracelets, wooden combs, mirrors, spatulas, ivory makeup bottles, and glass vessels. Apart from several inscribed headstones, five inscriptions were recovered from the site, two of which had been previously recorded.

Archaeological survey of 'Iraq el-Amir and the Wadi es-Seer. Chang-ho C. Ji, La Sierra University, reports:

The first season of archaeological survey took place in the region of 'Iraq el-Amir and the Wadi es-Seer in July and August 1996. 'Iraq el-Amir is situated on the west bank of the Wadi es-Seer, about 17 km west of Amman and 4 km upstream from the confluence of the Wadi es-Seer with the Wadi Kefrain.

Two different field strategies—random square survey and site survey—were implemented. The 5-km radius of 'Iraq el-Amir contains 1,962 squares of 200 × 200 m. Each square was assigned a sequence number, and 50 squares were randomly selected for archaeological investigation. The site survey was designed to identify new archaeological sites in the survey area.

In the random square survey, Early Bronze (EB) pottery came from 13 squares, Middle Bronze (MB) pottery from only one square, and Late Bronze (LB) pottery was completely absent. Iron I pottery was found in two random squares, and Iron II pottery in five squares, although Iron Age body sherds were collected from 12 squares. Roman-period pottery was present in only two squares, pottery from the Byzantine period was found in 31 squares, and Early Islamic pottery came from 23 squares. Mid-Islamic pottery was found in six squares.

The site survey recorded 86 new archaeological sites, including two EB cemeteries that contained numerous rock-cut chamber tombs and no fewer than 15 dolmens. Iron Age sites—Khirbet Hasaan, Khirbet eth-Thugra, Khirbet Farawit, Tell abu-'Uneiz, and el-Muweina—are found mainly on the high hills sit-



Fig. 7. 'Iraq el-Amir. Site 44, a dolmen, view to the south.

uated along the Wadi es-Seer, the Wadi Kefrain, and the Wadi Amir. These sites enjoy a commanding view and appear to have been reoccupied in the Byzantine and Islamic periods. An extensive building complex was discovered 100 m east of 'Iraq el-Amir, from which EB, Iron II, Hellenistic, and Byzantine sherds were recovered. The two most important Roman and Byzantine sites are Khirbet es-Sur and Barthoun. In addition, the survey recorded Byzantine cemeteries at Barthoun and al-Bassa, as well as two Byzantine hermitages carved through steep cliffs on the southern slope of the Wadi es-Seer. The survey team also recorded seven ancient water mills along the Wadi es-Seer.

In addition to the random square survey and the site survey, at site 44 a salvage excavation was conducted at a rock-cut chamber tomb associated with a dolmen (fig. 7). It revealed more than 12 human skulls and a large quantity of human bones, indicating that the tomb was a multiple, secondary burial for nomads. The cave seems to have been originally cut for habitation in EB IA and was reused for burial late in EB IB and possibly EB IV.

The region of 'Iraq el-Amir and Wadi es-Seer appears to have supported a substantial population during the Byzantine and Islamic periods. EB and Iron II pottery were also collected at more than 10 sites. Thus, the survey area may have witnessed dense settlement during the Byzantine and Islamic periods and sparse settlement in the EB, Iron II, and possibly

Late Roman periods. Settlement abatement followed each of these settlement peaks.

Archaeological survey of the Dhiban plateau.

Chang-ho C. Ji, La Sierra University, reports:

The Dhiban plateau, about 20 km south of the Madaba Plains, is a semiarid, flat land located between the Wadi Mujib in the south and the Wadi el-Walla in the north. The purposes of the Dhiban archaeological survey are 1) to understand the occupational history and settlement pattern of the Dhiban plateau; 2) to verify the dating of N. Glueck's sites (*Explorations in Eastern Palestine I*, Philadelphia 1934; *Explorations in Eastern Palestine III*, New Haven 1939) by revisiting the sites and conducting an intensive collection of pottery; and 3) to locate new archaeological sites in the region.

In September 1996, a reconnaissance survey was carried out in preparation for extensive archaeological surveys in the Dhiban plateau. Eleven archaeological sites were visited: seven from Glueck's survey and four new sites. The seven sites listed in Glueck's survey are Rujm Selim, Rujm es-Sakran, Khirbet es-Saliyeh, Khirbet el-Jumaiyil, Khirbet el-'Aqrabah, Khirbet Aliyan, and er-Rumeil. Glueck's claim of EB and Iron I settlements at el-Jumaiyil and es-Saliyeh warrants further investigation, since the survey team found no diagnostic pottery earlier than Iron II at these sites. At Rujm Selim, occupation in the Iron II period was verified, providing a better understanding of its settlement history.

Site 7, one of the four new archaeological sites, is Rujm Rumeil, a small watchtower near the road from Khirbet Aliyan to er-Rumeil. It is currently used by local villagers for burials. A few nondiagnostic sherds dated to the Iron Age and Byzantine periods were collected there. Site 8, another new site, is a small Roman milestone station north of Dhiban with five milestones. All have bases and are scattered along the Wadi Duhfura, which flows into the Wadi el-Walla. One milestone has Latin inscriptions, and one Late Roman-Byzantine sherd was found at this site. Site 9 is another small site including two Roman milestones, located about 1.2 km south of site 8. About 150 m northeast of site 9 is a small rock-cut installation with 12 small cup-holes and two large basins. Two Byzantine sherds were found inside a large basin, and two Byzantine sherds and one possible Iron Age bodysherd were found around the installations.

The reconnaissance survey of the Dhiban plateau shows that a systematic archaeological survey is both warranted and long overdue. Glueck's sites need to be revisited for more precise dating. In addition, there appear to be many archaeological sites that Glueck did not identify. The first season of an intensive survey of the region is planned for the summer of 1997.

'Aqaba-Ma'an Survey. Lee Jobling, Michael Bannigan, and Richard Morgan, University of Sydney, report:

From 1979 to 1990, the late W.J. Jobling of the University of Sydney directed the 'Aqaba-Ma'an Survey to map, record, and translate the rock art and inscriptions of the southern Jordanian desert, an area of about 2,700 km². These were recorded in more than 10,000 black-and-white, color, and videotape images by Morgan and Bannigan. The survey opened up many new areas for future study (e.g., Wadi Hafir, Wadi Shireh, Hebeib el-Fala, and Um Sahm). It investigated the hydrology, surface structural remains, surface lithics, and rock art of these new sites as well as previously known locations, clarifying the historical geography of the region and the history of human occupation of the area.

Jobling translated many of the rock inscriptions while he was in the field, leaving those that were more difficult to decipher until his return to Sydney, where he could use the photographic images for clarification. From evidence discovered during the survey, he resolved the problems of translation of the Thamudic graphemes *gimel* and *tha*. Another significant discovery was a Greek inscription found at Jebel el Muzeiribat, near Abu Suwwana, which was located near a Nabataean inscription by the same writer de-

scribing the recruitment of the local people into the Roman imperial forces defending this frontier.

In Wadi Shireh, which flows into Wadi Hafir, the survey discovered the remains of the earliest-known mosque in Jordan. Kufic inscriptions coexistent with Thamudic inscriptions at the site dated it and identified it as a mosque. It was located near a series of cascades from the plateau, which would have provided sufficient water for a modest population.

The survey also discovered Stone Age circles around the edge of a prehistoric lake near Mudawwara. Several excellent examples of intact fan scrapers were found in association with these sites. To assist with the chronology of the diverse sites and artifacts found over the years by the survey, experiments were carried out with various dating methods including carbon dating and optically stimulated luminescence.

A test trench was dug at Tell el Kharazah, with the assistance of the late Crystal-M. Bennett, from which a relative chronology for some of the associated rock art was developed and animal bone fragments and some domestic artifacts were taken for examination.

Bill Jobling died suddenly on 4 December 1994, at the age of 53, and his early death leaves his work unfinished. Scholars interested in obtaining a list of publications may contact ACOR.

Survey of the east coast of the Dead Sea. Khairieh 'Amr, Khalil Hamdan, and Luay Mohamadieh, DAJ, and Svend Helms, BIAAH, report:

A master plan for the touristic development of the east coast of the Dead Sea is currently being prepared. Two areas, at Suwaima and Zara, have been chosen as sites for development. As part of the environmental impact study, archaeological surveys were conducted at these areas in late 1995.

Suwaima area. The section proposed for development lies south of the modern town of Suwaima. The survey covered an area of approximately 10 km², extending from the shore up the hillslopes east of the modern highway. Thirteen sites were recorded in this section: 10 cemeteries of probable Chalcolithic to EBA date, two modern extensive campsites, and one modern cemetery. The ancient cemeteries are situated east of the modern highway, on flat areas below steep slopes or rock outcrops. After the presentation of the first archaeological report, a new master plan was prepared for the Suwaima development area, restricting the tourist village to the southern part where no archaeological remains were recorded.

Zara area. The area originally proposed for development in the Zara sector extends from the shore onto the slopes, with an area of over 3 km². The



Fig. 8. Zara 25. Probable Chalcolithic structure disturbed by later burials.

northern 2 km² are dominated by concentrations of thermal springs with lush vegetation and several private farms, while the south is arid. A. Strobel, who had excavated the Roman-period villa in the area, aided the survey by providing an archaeological map. Twenty-seven sites dating from the Chalcolithic to modern period were recorded. Most of the arid southern section is occupied by an extensive site (Zara 25, ca. 1 km east-west × 100–800 m north-south) with various structures and cemeteries (fig. 8). It is obviously a multiperiod site but with predominant Late Chalcolithic and EBA remains. The sites recorded in the northern section give the impression that the situation during the Roman to medieval Islamic periods was similar to the present, where the fertile areas were divided into farms with farmhouses and villas. The special importance during the Roman period is illustrated by the excavated villa, a boundary wall approximately 2.5 km long defining the fertile area on the east, a paved road leading up onto the plateau, and an elaborate harbor. A large structure, almost 100 × 75 m, is strategically located above the villa and harbor and may be the remains of a fort guarding the area. Due to the high concentration of archaeological remains and rich flora in this area, it was designated a natural and archaeological park, and development was moved south to Umm Sidra (South Zara).

Umm Sidra area. The third area surveyed extends up from the shore. Five sites were recorded: a probable Natufian campsite, a Chalcolithic–EBA campsite reused in modern times, and three probable Bronze Age cemeteries. The sites are planned for

excavation and inclusion within archaeological parks in the development.

Ras an-Naqab Survey. Mohammad Waheeb and Abdul Sami Abu-Dayyeh, DAJ, report:

The first season of archaeological work at Ras an-Naqab was conducted from May to October 1995 to clarify the occupational history of the region. Recent investigations had revealed the presence of several sites dating from prehistory to the Late Byzantine era. Excavations at these sites uncovered buildings of different dates and functions from Ras an-Naqab down to the Wadi al-Yutum Aqaba area. The discovery of several phases of occupational history can be summarized as follows: 1) Lower and Middle Palaeolithic, e.g., al-Kasimiyyeh; 2) Pre-Pottery and Pottery Neolithic, e.g., Ayn al-Jammam (1); 3) Nabataean, e.g., Dabbat Hanut (1); 4) Roman, e.g., Khirbat Ayn al-Jammam (2); and 5) Byzantine, e.g., Khirbat al-Hiyayid.

The survey revealed that the area of Ras an-Naqab was well settled after the second century A.D. A favorable environment, with numerous springs and fertile land, sustained settlement in the area, and the location of sites above the surrounding plateau may have made it easier to defend against external threats. The majority of the pottery found during excavation and survey in the area belongs to the period after the third century A.D., apparently a time of great prosperity, when the countryside was covered with farms and villages. Later material is much scarcer. Whether this decline can be tied to the Muslim takeover of 636 or whether other factors played a part still needs investigation.

Gebel Shara Survey. Laurent Tholbecq, IFAPO, reports:

To complete the general archaeological survey of Petra conducted by L. Nehme and its geomorphological study (J. Besançon, *AJA* 100 [1996] 510–11), J.-M. Dentzer's team organized a new campaign in May 1996. Besançon finished his general study of the natural environment of the Nabataean capital, and an extended archaeological survey of the Gebel Shara, especially of the large basin of the Wadi Musa, was initiated.

After preliminary bibliographical research on the Gebel Shara and the documentation of 122 previously known sites on three 1:25,000 maps, the survey was limited to the Wadi Musa basin (from its northern ridge, north of el-Hai to Umm Sawanneh, and the ridge dominating er-Rajif on the south). On the west, the limit of the survey is the natural border between sandstone and limestone. In the classical period, this region was tightly connected with Petra through 'Ain Mussa and the city of Gaia, the focal point of several roads reaching Petra. Moreover, with its relatively high rainfall and numerous springs, the Gebel Shara was a major hinterland and provided substantial agricultural resources to the Nabataean capital.

Several main access routes through various valleys have been surveyed, including a track that comes from the eastern steppe (Udruh) through the intensively settled area of el-Hai and joins the rich plain of Beidha. Several well-preserved posts of the Via Nova Traiana (D. Graf, in *The Roman and Byzantine Near East*, *JRA* Suppl. 14, 1995) have been recorded. Two major Iron Age settlements have been described above 'Ain Mussa. The survey team visited a number of isolated settlements associated with cisterns (probably agricultural cisterns) and villages connected with major springs. Research was based largely on aerial photographs taken in the 1950s, 1970s, and 1990s. A total of 118 sites were visited and described, architectural remains were sketched, and surface sherds were registered. The first computerized map is now in process. A study of the sherds should provide additional understanding of the impact of the annexation of Petra's hinterland and the apparent flowering of the area in the Byzantine period, as indicated in the Petra papyri (see below, Petra Church Project).

Shu'aib/Hisban Project. Kay Prag, Manchester Museum, reports:

Air photography. P. Freeman and K. Prag ground-tested the 1953 Hunting Air Survey photographs in the region east of Suwaima and south of al-Karama in the south Jordan Valley region in the fall of 1995. A large number of features or sites were listed in

the preliminary assessment of the photographs by David Kennedy (University of Western Australia), of which 43 sites widely distributed in the area were selected for checking. Of these, nearly 30 were visited or identified as known sites. The sites were often difficult to locate, and many of those in the alluvial soils of the Ghor had disappeared or were identified as relatively modern structures. The sites varied widely in type and date. In general, it can be said that the major sites in the foothills are visible on the aerial photographs, and that those sites over 15 m in size and with some color contrast showed up best under the photographic conditions (i.e., high altitude, with poor relief).

The larger monuments can be readily identified and plans can even be drawn from the photographs. Dolmens and smaller features are visible only as dots. The preliminary identifications were generally accurate. The aerial photographs from 1953 are a valuable resource, predating more recent agricultural development, and will repay further detailed and expert assessment. They do not, however, show the fine details visible on the ground, such as the ancient wall patterns, which are visible at closer range on the surface at Tell Iktanu.

Survey. A complex of forts above the mouth of the Wadi Kafraïn has been mapped by K. Prag and H. Barnes, with the assistance of S. Hadidi, providing evidence for past systems of strategic organization in the area (*Levant* 28 [1996] 41–61). One fort, of Iron Age II date, square with an impressive two-chambered gate tower and a strong central keep or tower, still stands on the plateau south of the wadi to a height of over 2 m above the modern surface. A pair of forts of Roman and Byzantine date stand in the foothills on either side of the mouth of the Wadi Kafraïn. Habbasa, on the south side of the wadi, overlooked the warm springs at Tell al-Hammam, which were particularly visited in the Byzantine period. It had an upper citadel (1,200 m²), and a large lower enclosure (4,150 m²). The latter contained five large cisterns fed by an aqueduct and channel. The plan is well preserved and has many features in common with a slightly smaller sister-fort at Barakat on the opposite side of the wadi, which has not previously been described. This also had an upper citadel (1,200 m²) and a lower enclosure (2,763 m²), with apparently a cistern and aqueduct system similar to those observed at Habbasa. The origin of these fortresses may lie in the Herodian complex defending the Perea; they have many similarities to the contemporary fortresses at Cypros above Jericho, to Herodium near Bethlehem, and to Machaerus on the southern border of Perea. Habbasa may possibly

be identified with Herod's Arabian Herodium, as suggested by A. Mallon. The relationship of these fortresses (and of others dating to the EB, Iron Age, Persian, and Roman periods, known from ground survey) to the contemporary settlements, roads, and irrigated fields in the Jordan Valley is important for understanding the past in this region.

The integration of information from the air and ground surveys will augment the data from the excavations at Iktanu and Tell al-Hammam and from the analysis of ethnographic and environmental data in the region.

PREHISTORIC

OSL dating at Disi. R. Neil Munro reports:

The first use of optically stimulated luminescence (OSL) dating in Jordan provides a preliminary time framework for the deposition of aeolian sand-sheets in the Disi area of southern Jordan. The use of OSL dating in Jordan was initiated by the late W.J. Jobling of the University of Sydney (*AJA* 97 [1993] 514-16). Field studies were conducted during 1990-1992 (see *Studies in the History and Archaeology of Jordan* VI, in press), while the author was attached to the National Soil Map and Land Use Project (see *The Soils of Jordan, Level 1 Reconnaissance Soil Survey 2: Main Report*, Ministry of Agriculture, Amman 1993).

Results. Six sand samples were taken from a section at Qa' ad Disa in a yellowish-red sand, of the Ishrin Soil Association, with calcite (CaCO_3) concretions common in the deeper subsoil. The OSL dating gave the following results: yellowish-red sand, 15 cm: 6100 B.P. \pm 4100; 35 cm: 23,800 B.P. \pm 10,400; 48 cm: 72,100 B.P. \pm 17,000; 60 cm: 74,000 B.P. \pm 15,900; 80 cm (with calcite concretions): 88,100 B.P. \pm 68,900; and 100 cm (with calcite concretions) 198,100 B.P. \pm 39,800.

The validity of the optical dates for the Disi samples is considered to be within the range of OSL dating. The rather large range of uncertainty of several samples is probably due to a high scatter in OSL signals from different quartz host rocks around Disi.

Discussion. The section lies on a stabilized aeolian palaeo-sand sheet at the edge of Qa' ad Disa playa and is associated with a gravelly to loamy alluvial terrace (+5 to +10 m) and aeolian-colluvial sandy to bouldery slope mantles in adjacent areas. Down-slope are deep alluvial silts of Qa' ad Disa playa. The OSL dates suggest that a long period of aeolian deposition took place during part of the Middle and Late Quaternary (Middle Palaeolithic) in the Disi area. The dates suggest four phases of deposition: at ca. 200,000 B.P.; at 75,000 B.P.; around 23,800 B.P.; and during the Holocene.

The OSL dates strengthen the view gained from soil features that the landscape around Disi at 200,000 B.P. was arid, not unlike the present. Formation of calcite concretions in the red sands is thought to have occurred no later than 23,800 B.P.

Based on the observations made during fieldwork throughout Jordan, various soil and depositional features are considered to lend themselves to OSL dating in Jordan. These include aeolian sheets; alluvial fills and aeolian-colluvial slope mantles; lacustrine deposits; infills of polygonal, gypsiferous crusts; paleosol and loess sequences; landslip deposits; and sterile, sandy infills at archaeological sites, agricultural terraces, and ancient dams. The employment of OSL dating appears to be particularly useful when examining geoarchaeological sites in conjunction with other dating methods.

This research has provided an additional framework for dating Pleistocene and Holocene sand accumulation in southern Jordan. Further use of OSL dating could assist in linking studies of cultural history, landscape, land degradation, erosion, and climate change in the region.

Dana-Faynan Epipalaeolithic Project. Steven Mithen, University of Reading, reports:

The Dana-Faynan (southern Jordan) Epipalaeolithic Project (DFEP) is a joint project of Edinburgh and Reading Universities, and an integral part of the Wadi Faynan Project of the BIAAH. The first field season of the project is planned for September 1997. This report describes a brief reconnaissance survey of Epipalaeolithic sites undertaken in April 1996 to enhance information gathered by fieldwork conducted by the Centre for Field Archaeology of Edinburgh University (CFA) in the Dana Nature Reserve, sponsored by the Royal Society for the Conservation of Nature (RSCN).

The reconnaissance survey was undertaken by walking as much of the landscape in the Dana-Faynan area as possible and by inspecting likely locations for Epipalaeolithic sites. The survey identified three previously unknown sites that are possibly Epipalaeolithic in date, located at approximately 300, 600, and 1200 masl, in the Wadi Faynan, Wadi Dana, and on Jebel Rumalla, respectively.

Wadi Faynan. Team members walked two areas within this wadi. The first comprised the terraces and some side wadis along the north of the Faynan. Within this area, small lithic scatters were located, adding to those previously discovered by the CFA. The second area comprised the land between the Wadi Ghuwer and Wadi Shegar, with some additional slopes to the south of the Faynan and north of the Ghuwer. No artifacts were found over the majority

of this area, but lithic scatters were located on three knolls on the south side of the Ghuwer. The central knoll, approximately 200 m west of the PPN site, had a dense concentration of bladelets together with several small querns and a number of circular and semi-circular platforms, each with revetted upslope faces. The site was designated WF16.

Wadi Dana. Only one dense lithic concentration was located within the Wadi Dana, approximately 9 km from Faynan, at 600 masl, on the south side of the wadi on a gently sloping natural terrace, directly opposite a rock shelter on the north side of the wadi. The artifacts were similar to those from WF16, with numerous bladelets and microliths. All the material was fresh and unrolled.

Jebel Rumalla. Survey work on Jebel Rumalla had previously been undertaken by CFA. The 1996 team revisited one of the artifact scatters located earlier (Dana, site 47) to collect a sample of artifacts and extend the site survey. Four transects were walked across the site, producing a collection of 580 artifacts, heavily dominated by bladelets. A collapsed rock shelter was found close to the artifact scatter.

Recovery from landslides in Wadi Ziqlab. John Field, Western Washington University, reports:

Over 250 landslides in Wadi Ziqlab were generated by record levels of precipitation in February 1992. A detailed description of these slides was made in the summer of 1992 as part of the Wadi Ziqlab Project, and their impact on the wadi's archaeology described (*AJA* 98 [1994] 523–24). A return trip was made in 1995 to rephotograph the landslides and assess hillslope recovery.

The scars left on the hillslopes after the 1992 landslides were still evident three years after the event. In general, areas where landslide deposits accumulated (both on the hillslopes and wadi bottom) were faster to recover, and vegetation there had taken hold. Where the landslides had stripped the soil mantle from the hillside and exposed bedrock, vegetation had not returned, and the landslide scars were still evident.

The fact that very little recovery has taken place, coupled with the fact that there were no similar hillslope scars seen prior to 1992, suggests that the landslide event of 1992 was an infrequent occurrence. Colluvial deposits in the wadi bottom are over 5 m thick in places, however, and could not have accumulated to such depths unless landslide events occurred more frequently in the past. Climatic conditions must have been moister and cooler during the Late Neolithic occupation of the wadi for the frequency of landslides to have been greater. Future geological research in the wadi will focus on securing additional

evidence for ameliorated climatic conditions during Late Neolithic times.

Pre-Pottery Neolithic stone rings from Basta.

Maria Thais Crepaldi Affonso and Ernst Pernicka, Max-Planck-Institut für Kernphysik, report:

Thirteen fragments of flat stone rings from the Early Neolithic settlement of Basta, about 200 km south of Amman, have been studied to identify the nature of their raw material (see Crepaldi Affonso and Pernicka, in H.J. Nissen et al. eds., *Basta I: The Human Ecology*, Yarmouk, in press). This type of ring, thought to have been used as an adornment, is rather common in the Late Pre-Pottery Neolithic (LPPN) of the Levant, though specimens made of a material originally classified as a "plaster-like material" have been found only at Basta. Mineralogical analysis of polished thin sections, using petrographic and scanning electron microscopy, demonstrated that these were actually made of a naturally occurring sedimentary rock called oil shale. This material consists of a bituminous, chalky marl containing mainly planctonic foraminifers and minor fish debris as well as fine-grained phosphatic inclusions. The bituminous material occurs disseminated in the matrix, filling its pores and cracks. In some cases, it replaces calcite as the filling material of the foraminifer shells. The rock has a dark brown color on fresh fractures, showing a typical bluish-white, thin weathering layer.

The oil shale deposits in Jordan belong to the marine chalk-marl unit of the Upper Maastrichtian. Many deposits of this rock occur in Jordan, mainly along the Desert Highway from Amman to Aqaba, east of the Jordan Valley. Most of these are below the surface, however, and could not have served as sources of raw material for the Neolithic stone industry of Basta. The fact that Basta is the only settlement where rings of oil shale have been found may indicate that a small outcrop of this rock existed in the vicinity of the site. The only known occurrences of outcrops are at Nabi Musa in Israel and at el-Lajjun in Jordan. The latter is located about 100 km north of Basta.

To identify the source of the raw material, samples of el-Lajjun oil shale and samples from the rings were analyzed by instrumental neutron activation analysis (see Crepaldi Affonso and Pernicka, in H.G. Gebel et al. eds., *The Prehistory of Jordan II*, Berlin, in press). The results show that the trace-element patterns of the rings are quite similar to those of the el-Lajjun samples, indicating that they were made of oil shale from the same geological occurrence. There is also a chemical similarity between the rings and the material from el-Lajjun, further suggesting this deposit as the most likely source (fig. 9). This conclusion is

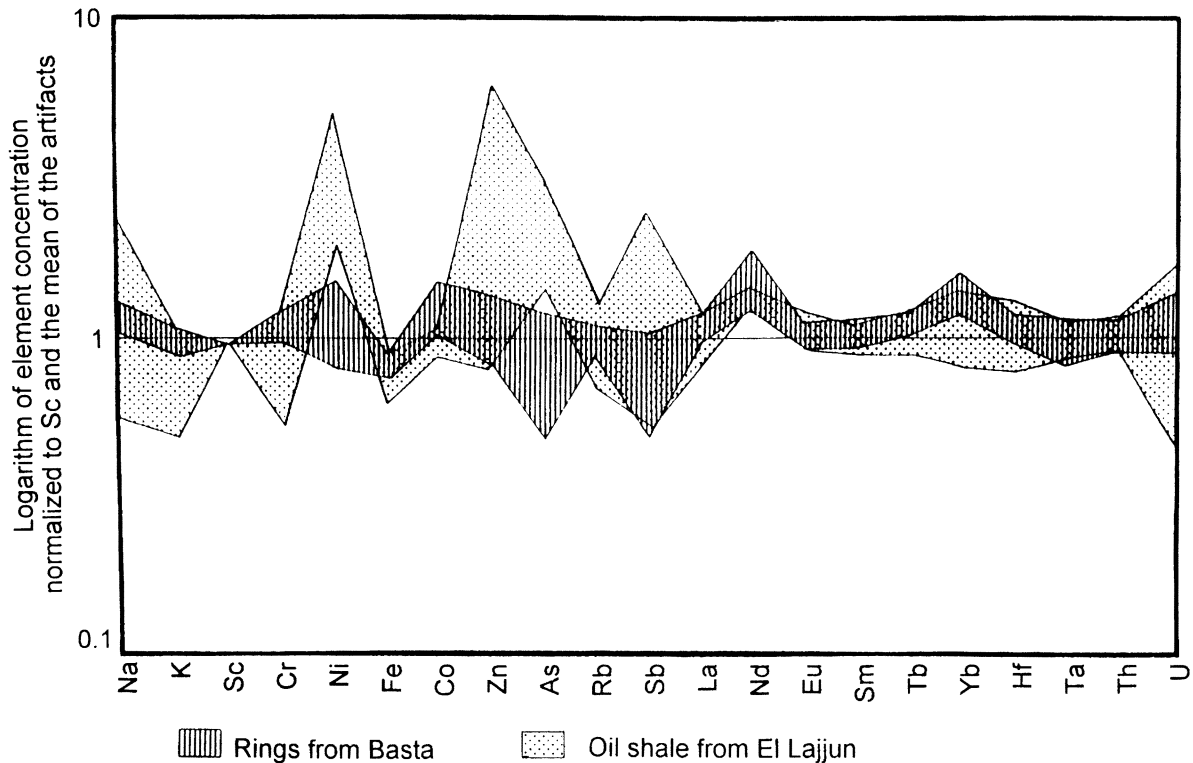


Fig. 9. Trace-element patterns of stone ring fragments from Basta and of oil shale samples from el-Lajjun

supported by the fact that el-Lajjun is the only known occurrence of oil shale east of the Jordan Valley that is exposed to the surface, and the material of the artifacts contains foraminifers filled with a hard bituminous material, a feature so far only observed at this deposit. As yet, no samples from Nabi Musa have been obtained; thus, Nabi Musa remains a possible alternative source for the stone industry of Basta, although it is more distant.

‘Ain Ghazal. Gary Rollefson, Friends of ‘Ain Ghazal, and Zeidan Kafafi, Yarmouk University, report:

Excavations were conducted at ‘Ain Ghazal from June to August 1996. More than 400 m² of various parts of the settlement were investigated. The most dramatic results of the season related to the increasingly elaborate ritual aspects of Neolithic society in the Levant. For example, in the North Field, a second LPPNB circular “family shrine,” identical to the one excavated in 1993, was uncovered. In the East Field, across the Zarqa River from the main site, in addition to normal domestic LPPNB architecture were two buildings that could only have been used as temples.

Architectural techniques, including the use of dressed stones and corners with oblique angles, suggest that one of the temples is LPPNB in date (fig. 10). Located high up the slope near the center of the East Field, the building measures 4 m north–

south and minimally 5 m east–west, although the western part was destroyed by erosion. The structure consisted of a single room with a dirt floor; both features are very uncharacteristic of the PPNB. In the center was a north–south line of three “standing stones” (although the center stone had fallen down). At the southern end of this group was a floor-level platform enclosed by two limestone blocks and irregular limestone slabs; between these stones was a 3-cm layer of clay that had been burned to the color and texture of fired pottery. In the floor between the standing stones and the eastern wall was a roughly square hearth (ca. 50 cm on a side) made of lime plaster and painted red, surrounded by seven small limestone slabs. An orthostat of brilliant white limestone that stood about 80 cm high and 40 cm thick was erected as part of the eastern wall; at the top of this large stone is a small knob that lends an anthropomorphic character to the object.

The second temple is situated about 100 m to the south and far down the hillside (fig. 11). The building once had two rooms, but the western room has been largely destroyed by erosion. The well-preserved eastern room is 6.5 m long (north–south) × 3.5 m wide (east–west); the eastern wall still stands about 1.8 m high. The floor of the east room is made of a yellowish clay obtained when the builders excavated a storage room outside the building; the clay was



Fig. 10. 'Ain Ghazal. View to the east of LPPNB temple. In the foreground is a burned clay platform (altar?); to the left are three "standing stones." Immediately behind the stones is a red-painted plaster hearth, and in the center of the eastern wall is an orthostat. (Photo B. Dughaidi and Y. Zobi)

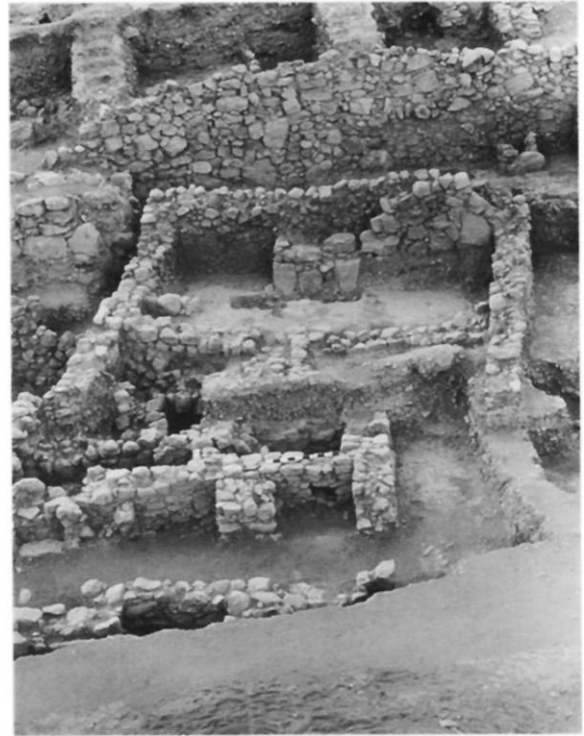


Fig. 11. 'Ain Ghazal. View to the east of PPNC temple. In the foreground is an earlier (LPPNB) domestic structure. Against the center of the east wall is an altar. A massive terrace wall behind the temple protected it from erosion. (Photo B. Dughaidi and Y. Zobi)

not used for the floor of the western room. Against the center of the east wall is an altar (1.5 × 0.5 m) of thick limestone slabs that rests on three pairs of upright supports ca. 60 cm high. In front is a hearth of unpainted lime plaster surrounded by seven limestone slabs. The doorway in the western wall has a narrow screen-wall to the south that leads into the western room for about 50 cm before making a right-angle turn toward the north, effectively blocking the view of the hearth and altar in the eastern "holy of holies" from anyone outside. Based on the use of undressed fieldstones, this temple probably dates to the early PPNC period.

The temples suggest a new dimension of religion in the Neolithic Levant. Notably, neither temple indicated any association with ancestor cult, which appears to have decreased in importance by the end of the seventh millennium.

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

A 14-cm-high PPNC stone statuette from 'Ain Ghazal of a pregnant woman (fig. 12) was studied in 1995. Its most striking feature is the intensity of

expression of the sculpture, which powerfully conveys childbearing. The female form is manipulated in many ways in order to showcase the bulging abdomen. The body is simplified to the utmost, eliminating neck, armpits, nipples, elbows, hands, fingers, navel, and genitalia. On the other hand, the stomach, fat rolls, thighs, and upper arms are exaggerated. Body masses are shifted, and the switch between breasts and arms is, perhaps, the most remarkable. The breasts are flat, but the upper arms bulge, round and voluptuous. Finally, proportions are skewed in order to underscore the abdomen. The enormous arms taper to minuscule limbs when reaching over the stomach. The torso is lengthened to the size of the legs so that the belly occupies the center of the figurine.

Nothing in the figure is rendered by chance or in imitation of nature. Instead, lines and curves combine to create geometric patterns. The semicircle of the shoulders mirrors that of the fat rolls enclosing the torso in a circle. Triangles are a leitmotif. The breasts, lower arms, and thighs form three triangles with differing orientations. The two upper arms and the tip of the stomach form the three angles of yet



Fig. 12. 'Ain Ghazal. PPNC stone statuette, ca. 6500 B.C. The woman cradling her pregnant stomach features a subtle arrangement of triangles and diamond shapes.

another harmonious triangle. The lozenge, however, appears to be the ultimate shape. The triangles formed by the breasts and abdomen form a diamond that repeats the general lozenge shape of the figurine.

The statuette holds an important place in the evolution of female images; it is the earliest known example to associate triangles and diamond shapes with the female. The geometric shapes were not only aesthetic, but also symbolic. As the triangles and lozenge outline respectively the breasts and abdomen, the symbols are likely to refer to female procreation. Because these motifs were repeated on later representations of women, and because triangles and lozenges pervade Near Eastern prehistoric art, there may be a link, distant but distinct, between the lozenge-shaped 'Ain Ghazal figure and Ki, the earliest Mesopotamian deity, the Earth goddess, progenitor of vegetation, who was designated by a diamond-shaped logogram. Likewise, the 'Ain Ghazal figure probably evoked a mythical female, a metaphor of creation carved in stone.

Teleilat Ghassul site survey. Sandra Scham reports: During March and April 1996, a survey of the pe-

rimeter of Teleilat Ghassul—a Chalcolithic site about 4 km northeast of the Dead Sea—and of the Wadi Adjrafa seasonal drainage system, south of Ghassul, was undertaken to identify hamlets and pastoral camps associated with the site. Teleilat Ghassul has been recognized since its discovery in 1929 as the exemplar site of the Palestinian Chalcolithic period (ca. 4500–3500 B.C.). The objective of the survey was to uncover evidence, if such existed, that Ghassul operated as a regional cultic, and perhaps even political, center.

The survey included systematic surface collection from a representative sample of a 14-km² area. All ceramic and lithic material found in the specific areas designated for random sampling was collected, and almost all of the artifacts proved to be Chalcolithic. The pottery demonstrated clear Ghassulian characteristics in both fabric and decoration. The stone tools, flakes, and cores—with the exception of some Acheulian handaxes and reworked Neolithic projectile points—were of Ghassulian manufacture. As a result of the survey, 11 satellite settlements were discovered extending along the wadi from 0.5 to 7.0 km away from Ghassul. Additionally, the abundance of surface scatters over an area extending up to 0.5 km from the currently known boundaries of the site shows a northern and eastern expansion of the town itself.

The second phase of the project involved an analysis of the material recovered from earlier excavations of Ghassul by the Pontifical Biblical Institute in Jerusalem (PBIJ). Drawing on field reports and artifact catalogues at the PBIJ museum, a collection of surface finds from those excavations was compared to the surface material from the recent survey. The surface material almost uniformly dates from the later phases of the site's occupation, and there is little variation in styles or materials. Insofar as diagnosis can be made, much of the surface pottery appears to be from large storage jars. These thick-walled, coarse-textured pots, of course, are more durable than some of the finer vessels, but an adequate number of sherds from the latter were found to create a representative grouping of Late Ghassulian wares.

Although Teleilat Ghassul was the first Chalcolithic site to be discovered in the Levant, it continues to stand in marked contrast to other sites from the period found subsequently. The strong evidence for craft specialization and complex ritual practices represented by the enigmatic wall paintings found at Ghassul (unique to this site) indicates that the site had a special role in Chalcolithic social organization and religion. Taken together with the information about the site obtained from the earlier excavations,

the survey evidence suggests that Ghassul may have been a pilgrimage destination for seminomadic sheep- and goat-herders, and the Ghassulian artifacts associated with sedentary agriculture (grinding stones, hoes, storage jars, and querns) found at a number of locations along the wadi further suggest that Ghassul operated as a central resource distribution area and meeting place for farmers as well as pastoralists.

BRONZE AGE AND IRON AGE

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

Two areas were investigated in the sixth and seventh seasons of excavation at Tell Abu al-Kharaz in the northern Jordan Valley (fall 1995 and spring 1996). Area 1 in the western part of the upper plateau, where excavations were begun in 1989, was extended, and a new area, area 10, was opened on the summit of the tell.

Area 1. Early Bronze Age IB/III. Excavations provided additional information from the second part of the EB I and the EB II periods. In the northeastern part of area 1, parts of an apsidal building were exposed that contained a stone-built hearth in the apse. A grain silo approximately 1 m in diameter was built against the building to the west. It seems that the apsidal building was used in more than one phase. A room with at least 15 complete vessels, some of them containing a considerable amount of grain, was excavated in the southern part of the area. It was covered by a fallen roof of straw and wood, and a layer of thick ash. Some of the vessels and parts of the mudbrick walls had been vitrified by heat. A hearth was placed in the middle of the room, and a mudbrick wall from a destroyed house belonging to the previous phase had been reused as a bench on which small vessels were placed. A bronze chisel lay just below the bench. To the north, another house contained an intact room with pottery and tools found where they had been placed before the wooden roof collapsed. The pottery included Metallic Burnished ware ("Abydos" shapes) and storage jars of Grain Wash-Band Slip ware. A wooden sickle with flint blades attached was also found in the room. Architectural remains from the earliest phase were scanty, but some complete objects were recovered: a red pattern-burnished jug, some juglets, and a copper ax. A new pottery shape represented by two lid-bowls was identified, and an animal figurine with a long tail was also among the finds. There was again no evidence that the site's earliest architectural phase came to a violent end, but heavy destruction occurred during EB II.

Late Bronze Age III and Iron Age. Both LB periods are represented by scanty and disturbed remains as a result of Iron Age activities. The former period produced Chocolate-on-White ware. A handle with an attached double snake, resembling an incense burner from Beth Shan, and part of a kernos also date from the Iron Age. A gate leading to a house, of which parts of two rooms were exposed, belongs to the second part of the Iron Age.

Area 10. On the summit of the tell, a building approximately 10 × 10 m was exposed during the spring 1996 season. Its walls are 1.5 m thick, and it is partly constructed of ashlar masonry, covered with white lime mortar, which gives it quite an impressive appearance. An ostrakon with a possible Aramaic inscription was found in one of the rooms. The building may represent part of a palace, a fortress, and/or an administrative building complex. Its date is problematic. The inscription points to a date within the first millennium B.C. Finds from the Late Roman period were discovered everywhere around the building, however, which may indicate that the building, or at least its foundation, was reused in Roman times.

Tell Madaba. Timothy P. Harrison, University of Chicago, and Stephen H. Savage, Kutztown University, report:

In the modern Middle East, with its long history of urbanism, the consequences of urban continuity present a daunting challenge to archaeological research. The city of Madaba, located 30 km southwest of Amman on the fertile, rolling plains of the Central Jordan Plateau, is a case in point. Continuing an urban tradition of some 5,000 years, the modern town engulfs the ancient settlement, preserved in the form of a large low-lying tell and acropolis (ca. 16 ha in area at the base and 9 ha at the summit) that still forms a visible rise in the town center.

In 1995, the Tell Madaba Archaeological Project (TMAP) was initiated with the goal of pursuing this investigation. The project constitutes part of a larger, ongoing study of the social, economic, and political institutions developed by Bronze and Iron Age communities in the Madaba Plains region. Focusing on the central site of Madaba, the project expands an emerging regional database that will permit detailed analysis of the changing economic and sociopolitical organization of communities on a regional level, thereby enhancing our ability to chart the development of social complexity in the region. The primary goals of the 1996 field season were to establish a stratigraphic profile of the Bronze and Iron Age levels on the tell and to assess the feasibility of conducting further, long-term excavations at the site.

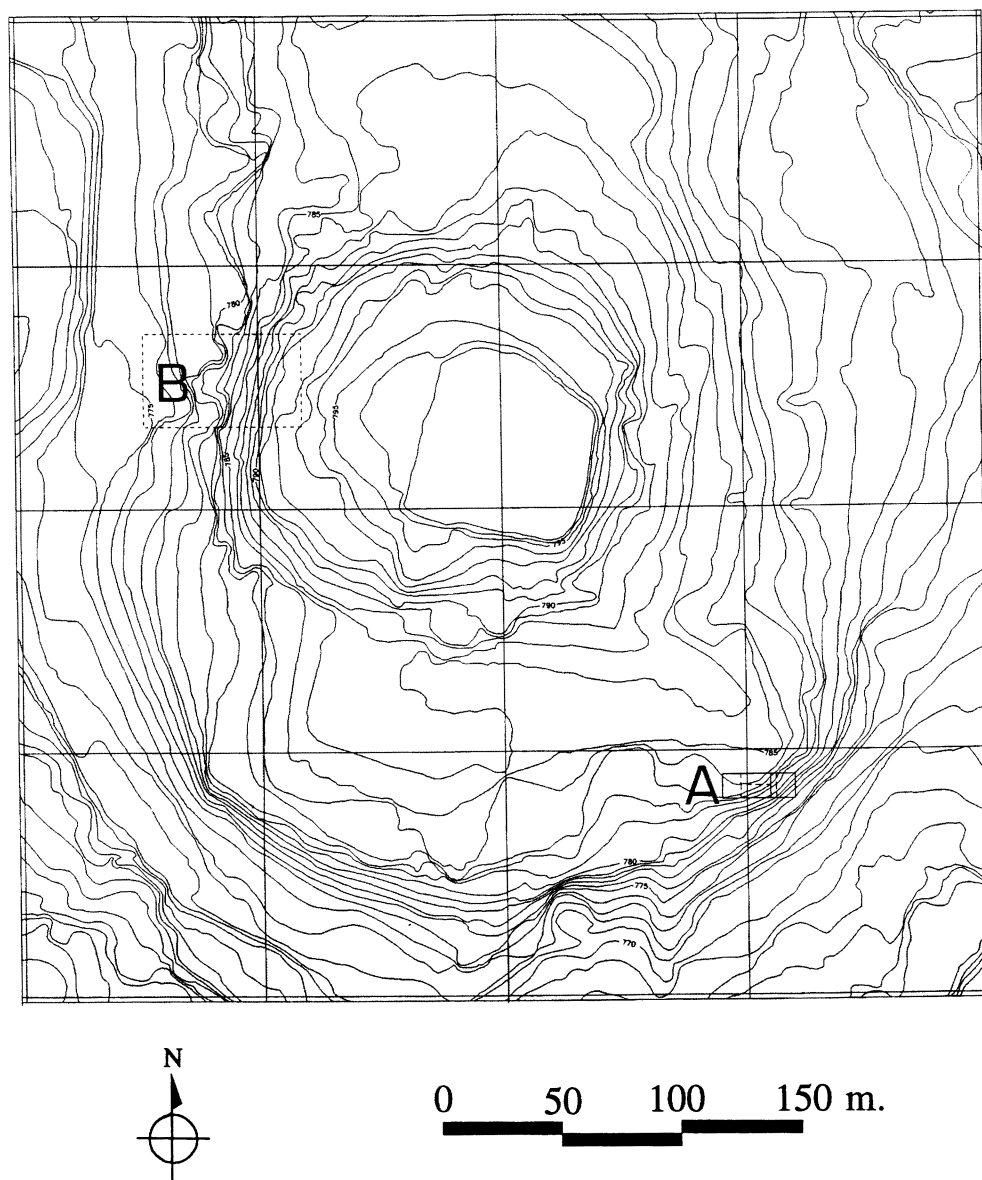


Fig. 13. Tell Madaba. Topographic base map, 1-m contour intervals. A) Excavations on the southeastern slope; B) area mapped on western edge of acropolis. (Topographic data provided by the Royal Jordanian Geographic Center)

An important accomplishment of the 1996 season was the creation of a computerized topographic base map (at 1:1250 scale) of the tell, utilizing geographic data gathered during a survey of Madaba in 1993 (fig. 13). Use of this GIS technology will enable future discoveries to be integrated in a single, computerized database for the entire site.

Excavations on the southeastern slope of the tell (field A) resulted in an 8-m vertical profile of the existing stratigraphy of the lower tell, extending from the summit down to bedrock. The earliest occupational levels reached in field A revealed a settlement history that began in the Early Bronze Age, with the

first settlement established during the late EB I/II period (ca. 3100 B.C.). Although field A produced a lengthy occupational gap, extending for the better part of the third and second millennia B.C., ceramic evidence recovered from Iron Age midden deposits above the EBA levels indicates that human activity occurred on the tell during much of this time. The evidence uncovered in field A suggests that the settlement was confined further to the west and north during these periods. The field A excavations also revealed some of the richness of the Iron Age levels at Madaba. Preserved in the secondary context of the rubbish (or midden) deposits was a wealth of ceramic,

botanical, faunal, and metallurgical material, as well as jewelry, a number of seals and seal impressions, and other small finds.

In addition to the excavations in field A, a mapping survey was conducted on the western edge of the acropolis, or upper tell (field B). Visible architectural remains, including a possible Iron Age fortification wall, and a series of vaulted structures (probably classical in date), were mapped and positioned on the computerized base map. The west acropolis survey substantiated the long-standing view that this area of the upper tell contains some of the best-preserved evidence of the pre-classical town and therefore holds the greatest potential for further archaeological research into the Bronze and Iron Age history of ancient Madaba.

Madaba Plains Project. Douglas R. Clark, Walla Walla College; Lawrence T. Geraty, La Sierra University; Larry G. Herr, Canadian Union College; and Øystein S. LaBianca and Randall W. Younker, Andrews University, report:

Tall Hisban survey and restoration. Adding to our earlier surveys of the Hisban region, the Madaba Plains Project carried out a random-square survey within a 5-km radius of the tell. Fifty of 100 randomly selected 200 × 200 m squares were examined, resulting in the discovery of 20 new sites. Iron II and Byzantine remains predominated, many other sites and periods being poorly represented in the plains region due to intensive land use.

In addition, nearly two decades after excavations there, the initial phase of restoration at Tall Hisban was undertaken. In addition to making a small probe at the location of a Hellenistic tower, workers cleared away accumulated rubble and installed signs, pathways, steps, a parking space, and interpretive platforms.

Environmental survey. The most important discovery in 1996 by the environmental team was the location of a Palaeolithic (and later Stone Age) site at Azraq. In the quest for pollen core samples, the team recovered 500 pieces of worked stone and faunal material from one of the newly exposed, dry lake bottoms. Stone implements at what appears to have been a butchering site included bifaces, unifacial flake tools, blades, points, and debitage.

Subsurface mapping at Tall al-ʿUmayri and Tall Jalul. The subsurface mapping team carried out investigations using ground penetrating radar (GPR) at ʿUmayri and seismic refraction (SR) at Jalul. With a 400-MHz transceiver at ʿUmayri, the team completed a GPR survey of the southern and northern perimeters of the tell to clarify, if possible, the Iron I wall system and to determine if the “casemate” or “protocasemate” wall on the western escarpment

could be traced further around the town. A 40 × 55 m topographical depression between 2 and 3 m below the surrounding terrain on the eastern portion of Jalul was the subject of SR research. The depression may indicate the presence of a large water system. Analysis of results from both subsurface mapping techniques is in process.

Bronze Age: Tall al-ʿUmayri. The earliest settlement at ʿUmayri dates to EB I, around 3000 B.C., when a dolmen was constructed at the southeastern base of the site. While over 20 burials were found in earlier investigations, this season’s excavations focused on the area immediately outside the dolmen itself. Seven floors, one on top of the other, appeared just west of the dolmen and also date to EB I, indicating that the people living at the site celebrated funerary rites at the dolmen long after the first burials.

Iron Age: Tall al-ʿUmayri and Tall Jalul. Two Iron Age settlements at ʿUmayri continue to receive attention: a well-fortified Early Iron I town and a Late Iron II/Persian Ammonite administrative center. The former represents one of the best-preserved sites from the Early Iron Age (ca. 1200 B.C.) found anywhere in the region. More of the western defensive wall and adjacent housing was excavated in 1996, showing an extent of wall 30 m long. At its southern end, the wall curves into the site, suggesting a possible gate. Final exposure of a “pillared building,” resembling the floor plan of a “four-room house” from the hill country of western Palestine, probably reflects architectural ties with that region. At ʿUmayri, however, the broad room of the building was part of the “casemate” or “protocasemate” western wall. Cultural finds indicate local tribal groups, with a limited repertoire of pottery and objects. Eighteen large jars containing grape and olive seeds were found in a later storeroom dating to the 11th century.

A large complex of buildings from the time of the Late Ammonite kingdom, about 550 B.C., administered scores of nearby rural sites dedicated to wine production in the hills around the tell. This season, the largest room of the administrative center was uncovered, complete with three levels of plastered floors. Architectural and cultural remains argue against a private, domestic function for the building.

Excavations at Tall Jalul have exposed architectural and cultural remains from the Early Iron II, Iron II, and Iron II/Persian periods. From the Early Iron II period (10th–9th centuries), on the eastern part of the tell and atop 1 m of Iron I destruction debris, excavations uncovered a flagstone approach ramp and the foundations of an outer gatehouse, as well as what appears to be the threshold of an inner



Fig. 14. Tell Johfiyeh. View of the site, with fortification walls.

gatehouse. Part of the gateway was rebuilt a century or so later, the original, small outer gatehouse having been replaced by a larger one slightly to the south. The entire gateway system was again reconstructed sometime during the middle of the Late Iron II period (eighth–seventh centuries), the approach ramp following the same line as the original Early Iron II ramp.

Also from this time, a tripartite building on the northern side of the tell was discovered. Although badly damaged from later Persian-period activity, parts of all the walls could be traced. Two parallel rows of stone pillars supporting the roof separated the building into three long rooms, the two side rooms having been paved with flagstones. Along with animal and human figurines, two engraved seals in Ammonite script were found here, suggesting that the border of the Ammonites during the latter part of the Iron Age extended as far south as Madaba.

The Late Iron II/Persian period at Jalul was represented by a large Persian building near the center of the tell, supported by at least two rows of stone pillars. Artifacts found in the ruins included two incense altars, a stone roof-roller, and basalt and iron implements.

Tell Johfiyeh. Roland Lamprichs, Universität Freiburg, reports:

Knowledge of the Iron Age in northern Jordan—ancient Gilead—is still very scanty. Reliable written sources are not available, and only a few relevant excavations have taken place. Little is known about the more than 190 Iron Age sites on the northern pla-

teau that were recorded in the *Tübinger Atlas des Vorderen Orients*. Visits to the site of Tell Johfiyeh in 1995 and early 1996 showed that excavations there may increase our general knowledge of Iron Age culture in northern Jordan. An analysis of surface finds indicated, furthermore, that Tell Johfiyeh may for the first time provide a sequence of Iron Age pottery in this region.

Tell Johfiyeh (fig. 14) is situated some 7.5 km southwest of Irbid on the northern fringe of the modern village of Johfiyeh. Its setting on high ground at 790 masl provides the site with a good view over hilly surroundings, which are now characterized by different kinds of agricultural activity. The site measures about 86×78 m (6,708 m²) at the base and 37×35 m (1,295 m²) at the top. The height of the mound is approximately 6 m, and the slopes are covered with medium to large stones. The general state of preservation is good. Minor destruction and a few robbers' pits are found only at the top of the mound, and erosion is negligible.

Three nearly circular fortification walls surround the top, middle, and bottom ranges of the site. The wall at the foot of the mound, outlining the limits of the tell, still stands up to 2.5 m in height, with a width of more than 1 m. This wall was probably rebuilt by the villagers of Johfiyeh in recent times in the course of farming activities. The same may be true of the smaller structure (1 m high and 0.8 m wide) confining the circular plateau on top of the site. These surface structures and the shape, size, and topographical setting of the mound suggest that the

site contains a small fortified farm or some kind of fortress.

According to Glueck, who visited the site during his extensive explorations in eastern Palestine, Tell Johfiyeh was founded and used mainly during the Iron Age I and II periods (ca. 1200–586 B.C.). In his analysis of surface finds, only a few potsherds dating from Roman to medieval times indicate a later occupation.

Most of the pottery collected during visits to the site in 1995 and 1996 could be dated to the Iron Age as well. The distinction between Iron Age I and II made by Glueck, however, could not be confirmed. The Iron Age pottery collected and analyzed thus far includes several kinds of cooking pots and a characteristic krater with a rilled decoration on the upper part of the vessel. However, cooking pots with an elongated rim, triangular in section, are missing. Typical Iron Age I pots (as known, for example, from Tell Deir Alla), as well as unambiguous pieces dating to the Late Iron Age/Persian period, have also not been identified.

The rest of the pottery dates mainly to the Byzantine, Early Islamic, and Ottoman periods. Small bowls and storage jars are the most common shapes from the Byzantine and Early Islamic periods. The very few sherds from the Ottoman period are most likely Gaza ware.

Khirbet al-Mudayna/Wadi ath-Thamad. Russell Fraser reports:

The Wadi ath-Thamad Archaeological Project, directed by P.M. Michèle Daviau, Wilfrid Laurier University, excavated the remains of the Iron Age site of Khirbet al-Mudayna in summer 1996. The site—a large tell with ruins at the summit—is located along the Wadi ath-Thamad, about 40 km south of Amman near the town of Jiza. A casemate wall nearly 5 m thick surrounds the top of the tell. A “moat” encircles it lower down, although the exact construction of this moat or earthen embankment has not yet been determined. Three areas were selected for excavation during this first season: field A on top of the tell, and fields L and N at the foot of the tell, where the outlines of buildings could be seen.

The ruins of a large Iron Age fortification system—casemate walls, gate, and moat—lie on the northern side of the tell in field A. Outside of this system, a tower about 4 m on a side, with stone foundations and a mudbrick superstructure, probably defended the gateway. The gate, buttressed by a stone pier on the north side, consists of six chambers for a total length of 13.7 m (fig. 15). This style, popular throughout Palestine during the Iron Age II period (ca. 800–

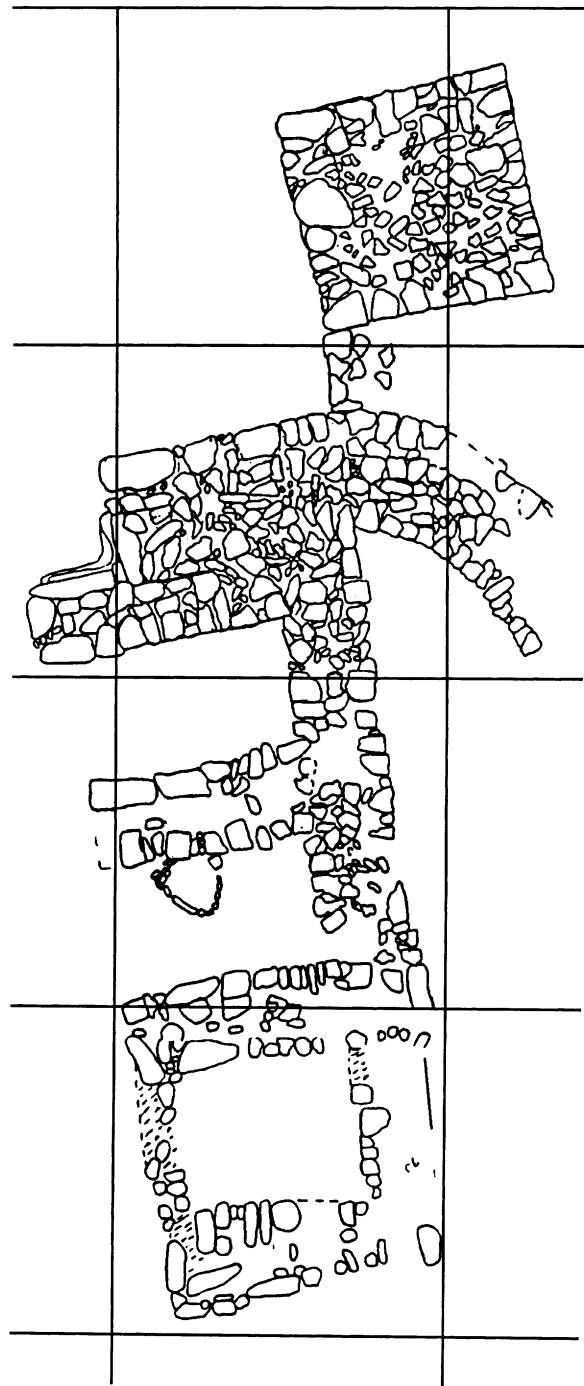


Fig. 15. Khirbet al-Mudayna. Gate area with six chambers, and stone pier to the north.

600 B.C.), is not the strongest fortification style of the period and may indicate functions beyond defense alone. The walls of the gate chambers stand over 2 m high in places. Within the three chambers that were excavated, some industrial installations were found, including a lime kiln, probably a sec-

ondary installation. Pithos sherds from large storage jars over 1 m tall, gaming pieces, a basalt mortar bowl, a zoomorphic figurine fragment—most likely a horse—and a massive stone basin with inscribed designs were also found within the chambers.

A large depression was clearly visible 12 m south of the gate. The mouth of the depression was too large for a cistern and may have been part of a more complex water system. Many stone tools were found around the depression, including mortars, grinders, hammerstones, pounders (spherical stones), and upper loaf-shaped millstones. These implements, along with tabun fragments, charcoal, and ash, suggest that the area was used for food-processing. A huge basalt grinding platform, with its upper millstone, was recovered here and is the largest of its type found in the area. Loomweights and spindle whorls indicate textile manufacture, and several blocks of ashlar masonry that had fallen into the area suggest that a well-constructed and important building may lie just to the south.

Situated on the north slope near the bottom of the tell, field L contains a 10 × 15 m building that may have been a storehouse. Excavation on the eastern side revealed two phases of construction: a Bedouin field wall, and a lower phase—more clearly defined—of Roman boulder-and-chink construction dating to the first century A.D. Because of its location at the bottom of the tell, pot sherds were abundant here. Finds included a Moabite (Iron Age) female figurine, a bulla, and two seal impressions.

In field N, to the north, was a Nabataean building approximately 8 × 9 m, with a stairway turning right at a 90° angle and a total of 10 stairs. A lamp found on the stairway dated the building to the Herodian era. Excavations revealed an additional room on the west measuring 3 × 4 m, which was excavated to floor level. Features included two possible arch supports and a stone-carved drain. An unexcavated perimeter wall surrounds this complex.

A survey was conducted by J. Andrew Dearman, Austin Presbyterian Seminary, of an area approximately 5 × 8 km around Khirbet al-Mudayna. Eighteen sites were located, 14 of which were previously unknown. The new discoveries included one Iron Age shrine and three Nabataean farming communities. One of these communities, Toga, a site along the Wadi Za'faran with evidence for Nabataean, Roman, and Islamic settlement, consists of caves and extensive building ruins. At another site along the Wadi Shabik, caves, cisterns, and dams indicate extensive water management. Hilltop sites and fortified towns were identified in close proximity, suggesting

that in the Iron Age the area was a border region between warring states.

HELLENISTIC–NABATAEAN–ROMAN

Gadara/Umm Qais. Adolf Hoffmann, Brandenburgische Technische Universität Cottbus, reports:

Excavations by the German Archaeological Institute, Berlin, took place in autumn 1995 and spring 1996 to investigate the Hellenistic city wall of the acropolis and the limits of the city in the Roman period. A spacious sanctuary of the Hellenistic and Roman town was identified on the huge terrace north of the acropolis—the first such discovery in Gadara. The dimensions of the walled temenos and its prominent situation indicate that this temple complex could well have been Gadara's main sanctuary.

Hellenistic city wall. Several trenches were opened at the southern side of the acropolis hill to investigate the Early Hellenistic fortifications (fig. 16). It became clear that the pentagonal tower partially excavated in 1993 was part of the system protecting the hill. From the eastern corner tower westward, the wall zigzags twice, each step back marked by a pentagonal tower that protected a small city gate in the angle of the wall and a sally gate on the opposite side. The western gate was fully excavated and measures 2.55 m wide and 2.86 m deep. The second eastern gate, of similar dimensions, was blocked before the wall was destroyed in later periods. The Hellenistic wall was solidly constructed of well-dressed limestone masonry in regular header and stretcher technique. It is about 2.2 m wide and is preserved to a maximum height of about 6 m.

Stratified material indicates that the wall was constructed soon after the town was conquered by Antiochus III, in the early second century B.C. It was destroyed down to its lower levels only some 100 years later, probably by the Hasmonean Alexander Janinaeus, as reported by Flavius Josephus.

Roman city wall. The wall was rebuilt in early Roman Imperial times, probably as a reaction to the Jewish riots in Palestine after the middle of the first century A.D., which caused internal fighting in Gadara. The building technique of this wall differs from the massive ashlar construction typical of the Hellenistic period. Headers and stretchers were used again, but less accurately, forming shells that were filled with earth and small stones. An intensive survey and a series of test trenches located the entire line of the western city wall, in different states of preservation, over a length of about 1.7 km.

Hellenistic sanctuary. Excavation began north of the acropolis hill on a wide terrace (fig. 17). The



Fig. 16. Gadara. Southern city wall with pentagonal towers from the west, early second century B.C.

majority of the terrace was damaged during use by the military, but in the center, beneath a shallow mound, three vaulted rooms remained nearly undamaged. These are the substructure of a podium that, without doubt, once supported a temple. This central monument was surrounded by a temenos measuring about 100×93 m, delimited by strong walls. The northwestern corner of the temenos court is well defined. The best-preserved part of the surrounding wall is on the northeastern side, where it served as a retaining wall for the courtyard terrace. It measures 2.25 m wide at the bottom and diminishes at the top to 0.8 m. Dimensions and building technique indicate that this served simultaneously as the wall of the temenos and as the city wall.

Temple. The rear of the north-south temple building was set directly onto a step of limestone bedrock. Behind the temple on its northern side, the bedrock rises slightly above the level of the temple's toichobate. The structure measured 19.35×11.20 m and contained three vaulted rooms: one on the south side (6.5×2.7 m) running east-west, and two parallel north-south rooms in the northern part ($2.65\text{--}2.70 \times 9.85$ m). Barrel vaults of limestone vous-

soirs, rising 1.7 m, were erected on the toichobate layer. The entire construction was covered with ashlar masonry up to at least 2.65 m, with a platform for the superstructure on top. At the northern podium wall, a staircase leads down to the vaulted rooms, which are connected by two doors.

The disposition of the substructure indicates a building on the podium with a colonnaded porch at its southern front and a rectangular cella with a staircase at the back. None of this now remains. Architectural elements excavated at the southeastern corner of the podium—a fragment of a fluted column drum, several elements of a triglyph frieze with plain metopes, a corner block of the pediment, and some fragments of lion-head gutters—suggest a building in the Doric order.

Stratified pottery indicates that the temple dates to the late second or, at latest, early first century B.C. The destruction occurred around the middle of the first century A.D., again possibly a result of the Jewish riots in Palestine.

Gadara/Umm Qais water system. Susanne Kerner, Freie Universität Berlin, reports:

Excavations took place in 1995 to study the water



Fig. 17. Gadara. Sanctuary on the northeastern terrace, podium of the temple from the north, late second century B.C.

system and domestic quarters in Gadara/Umm Qais. The water system for ancient Gadara consists of two parallel water tunnels that are about 400 m long in Gadara itself, but over 20 km long between the main water source in the east and the city. Although the actual distance between the spring of 'Ain Turab and Umm Qais is only 11 km, the tunnels follow the contours of the wadis and are considerably longer. Over the final wadi, between modern and Ottoman Umm Qais, the water course was laid on an aqueduct, which carried the water over this last valley into a tunnel under the acropolis. The 11 piers of this aqueduct are still visible.

The older of the two tunnels (areas 39.7 and 39.8, 41.3–13) was probably built in Late Hellenistic to Early Roman times and was constructed in at least three phases, distinguished by differing quality of work. The older tunnel led first along several elaborate systems of pipes and weirs, which allowed the water flow to be directed into side channels. It then passed through a water chamber, where the water flow could be divided in three while ensuring that even small amounts of water would continue into the main channel. This main channel ended at a large weir (area 52.2), just east of the church courtyard. From here several smaller channels distributed the water into the city.

The second channel (area 39.1–2, 5 and 41.1–2) was probably built several centuries later as an ad-

dition to the older channel. It was never finished—perhaps due to financial problems in the third century A.D., which affected many other buildings of that period in Gadara—and ends east of the eastern door of the octagonal church.

Both tunnels were finally abandoned at the end of the Byzantine period, which is clear from the fill. In the case of the later tunnel, the fill seems intentional. The fill of the earlier tunnel contained several broken pieces of a high-quality, third-century A.D. marble sarcophagus.

Domestic quarters—a Late Hellenistic house on the acropolis (area 50.1) and the houses along the southern slope of the city (area 44)—were also excavated. The house on the acropolis is small, with a well-preserved doorway and a small hearth in the adjacent courtyard. It was partially destroyed by a huge Byzantine wall. The house contained large amounts of pottery, including well-made black, Late Hellenistic imported wares.

The southern quarters are much larger, stretching over three levels, using the natural slope of the hill for terracing. Excavations at the lowest level revealed one or two houses, of eight rooms altogether. All of these rooms were built into bedrock, using the terracing wall as their rear wall. Most were decorated with painted plaster, of which little remains, but room D yielded large amounts of fragmented plaster with architectural-style frescoes in ocher, red, white, black, and green.

The uppermost level revealed a large basalt pavement in a clearly domestic structure, which had been rebuilt and altered several times. The oldest parts of the houses date from Late Hellenistic times, again verified by large amounts of imported pottery. The latest use is from the end of the Byzantine to the beginning of the Umayyad period.

Wadi Musa salvage excavation. Khairieh 'Amr, Sami Al-Nawafleh, and Hani Qrarihi, DAJ, report:

The opening of a new road inside the triangle formed by the main roads in the *suq* of Wadi Musa revealed the existence of ancient structures. This new road leads to a hotel under construction, where the building of a sanitation tank revealed the corner of a Nabataean water cistern. Excavations were conducted from February to June 1996 in two areas: area I, including the cistern and area to the south; and area II, 31 m north of area I, at the road cut.

Area I. The outstanding feature in area I is the Nabataean cistern, with internal dimensions of 5.4 m north–south × 2.68 m east–west (the depth was not determined). Four intact arches support roof slabs, and there are steps at the northwest corner. Excavation to the south of the cistern went down



Fig. 18. Wadi Musa. Late first century A.D. mosaic in the Nabataean villa.

5.4 m without reaching virgin soil but revealed complexes of walls from several periods. The earliest excavated deposits date to the turn of the first century B.C./A.D. The area was in continual use up to the Late Byzantine period, then reoccupied in the Ayyubid/Mamluk and Ottoman periods. Area I was backfilled, and another tank archaeologically excavated for the hotel, leaving the cistern intact.

Area II. The northern area was occupied by a large villa, only the southern edge of which could be defined. The northern and eastern parts lie under modern buildings, while the western edge was destroyed by the road, leaving an intact expanse of 30 m north-south \times 8 m east-west. The villa was built and used during the first century A.D., abandoned, then destroyed in the late first to early second century A.D. A retaining wall was later built south of the villa, and its area was used as a municipal dump in the late third to early fourth century A.D.

The entrance in the south leads into a large hall (atrium?) with a flagstone pavement that has a central square of hexagonal paving surrounded by columns. Architectural-style frescoes in bright colors decorated the east wall, where an entrance led to another frescoed room, now left intact under a traditional house. An entrance to the north led into another frescoed room, with lively designs of green grasses, bunches of grapes, and olive branches. To the west of the hall were a latrine and a corridor, in which were found decorated blocks including a relief of Helios-Apollo. A corridor leading north from

the hall opened onto a room to the west, with a mosaic floor of geometric designs in white, black, yellow, and red (fig. 18), then onto a bath complex. Adjacent to the mosaic room was a room leading into the caldarium. Unfortunately, the furnace was destroyed by the road. North of the caldarium, a large room with flagstone paving had a tabun, and a complex drainage system under the pavement connected to the caldarium and areas to the north and east. Fine Nabataean bowls were found on this pavement, as well as a limestone lion-head fountain. A corridor north of this room had several cooking pots smashed in situ. A large hall occupied the northern exposed end. Its southern wall, exposed to a length of 7.5 m east-west, had remains of frescoes on its northern face. The designs in the east were similar to those in the southern hall, while the west edge had designs of free-flowing strokes within a red border. The hall extended for 4.3 m north-south before disappearing under a modern building. Unfortunately, the villa was demolished soon after excavation.

Wadi Ramm. Laurent Tholbecq, IFAPO, reports:

The IFAPO initiated a new project during the summer of 1996 around the major settlement of Wadi Ramm (Hisma), discovered in the early 1930s. The work was carried out in two phases. First, a topographical survey was conducted to produce a general map (1:2500) and various plans (1:20–1:100) of the structures visible on the surface. The team surveyed the Nabataean temple excavated by Horsfield and Savig-



Fig. 19. Wadi Ramm. Nabataean temple after cleaning of the podium.

nac (1934) and Kirkbride (1959), two complexes excavated by the DAJ in 1964, a large portion of the monumental access to the temple, 15 structures called a village for lack of stronger arguments, and part of the hydraulic system leading from 'Ain Shelleh to cisterns constructed in the area. More than 1,000 topographical points were registered, and surface sherds were collected. The team returned in August for the second phase of the project: to clean the temple area and a complex of 20 rooms situated behind it and seemingly connected with it (fig. 19).

The hexagonal pavement in the *antecella* of the square temple and the sandstone flagging around the central shrine are now exposed. The project recorded several fragments of the temple cornice, two typical Nabataean echini of the fallen columns of the facade, and several boulders with plastered decoration. A betyl lying on the podium was returned to its original position, as determined from Savignac's photographs, conserved in the *École biblique et archéologique française* in Jerusalem. Various structures about the temple facade: among them, a rectangular podium reached by three steps, which was probably one of the places where betyls were exposed. The cleaning operation provided arguments to re-evaluate the general phasing proposed by Kirkbride (*RBibl* 67 [1960] 65–92). It is hoped that future work will provide evidence for the dating of the sanctuary, which is still hypothetical. The external rooms

of the temple were badly damaged in the November 1995 earthquake and will be consolidated by the DAJ.

Cleaning was followed by a general record of the various parts of the site. The western complex is built on the same grid as the temple; its function, organization, and date remain unknown. Nevertheless, a limited probe revealed several wall foundations related to the Nabataean period under the visible ruins.

This first campaign provided evidence of the importance of this settlement in Wadi Ramm. Accurate plans, new Thamudic inscriptions, and ceramic evidence will help to produce an accurate chronology and a clearer picture of this settlement on the road between Arabia and the Near East.

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

The Wadi Ramm Recovery Project was undertaken in August 1996 to document the ruins of a Nabataean house and bathhouse (hereafter referred to as the Eastern Complex), which was partially cleared by the DAJ 30 years ago, but for which no records exist.

The project was carried out in collaboration with an examination of Ramm's Nabataean temple complex, directed by Laurent Tholbecq (*supra*). The Eastern Complex is a complicated arrangement of at least 28 rooms. The bathhouse forms one unit in the complex, and the other exposed structures have been tentatively labeled "the villa." Other rooms are vis-

ible around the periphery; these await future excavation and analysis. Detailed top plans were prepared of the exposed walls, and all architecture was measured, described, and photographed. The complex was also cleared of surface tumble, as an additional goal of the project was to prepare the site for tourism.

The bathhouse contains five or six central bathing rooms linked by doors, plus another seven service or ancillary rooms. Excavation was carried out in the caldarium and in an unheated, finely constructed, circular room. The caldarium (4.40 × 4.58 m) contained a plaster floor laid in six layers on large stone slabs (ca. 0.13 m thick) that rest on hypocaust pilae made of sandstone. Stone pilae are very rare, and based on Near Eastern parallels (e.g., at Masada, Jericho, and Ramat Hanadiv), this hypocaust should date to the first century B.C. or first century A.D. This date is further supported by the presence of Nabataean dressed stones throughout the bath and within the hypocaust. Currently, this predates any hypocaust bath in Jordan. Other interesting features of the caldarium included a large plastered basin, rectangular flue grooves in the walls, and numerous box flue fragments.

The villa consists of two rectangular structures (16.5 × 7.5 m and 13.8 × 6.8 m), separated by a corridor, and two paved rooms or courtyards. The architecture and finds indicate that the villa was a luxury building, probably serving a public or official function. The eastern rectilinear unit was entered by a large central doorway. On either side of the door, the upper courses of stone are set back from the face, forming ledges that may have carried decorative panels or provided visual interest, thus creating a grand facade. The entrance facade of the western structure is also impressive, though blocked by the eastern structure. The pavements in the two courtyards are of carefully cut and placed sandstone slabs. Access to the courtyards is controlled by corridors. Finds include a bronze statuette and numerous fragments of decorative plaster.

A new campaign is planned for summer 1997 to excavate the remaining central bathing rooms (the suspected frigidarium and sweat room) and to determine the specific function of the villa complex and define its peripheral areas.

Rabba and Qasr Rabba Project. Jacqueline Calzina Gysens, Istituto italiano per l'Africa e l'Oriente (IsIAO), Rome, reports:

The first season of the Rabba and Qasr Rabba Project by the IsIAO began in September 1996 in close collaboration with the DAJ.

Rabba, near Kerak, is situated on a plateau of rich, arable land within the 300 mm isohyet and

presents the extensive ruins of an ancient site generally identified with Rabbatmoba of the Babatha archives, Rabathmoba in Arabia Petraea (Ptolemy 5.16.4), Rabatora on the Tabula Peutingeriana, and a major settlement on the Via Nova Traiana. During the later Roman Empire, its name was apparently changed to Areopolis (Eusebius, *Onom.* 10.17; 36.24; 124.15–17). Despite its impressive appearance and the preservation of architectural remains from different occupational levels, Rabba has received little attention from modern scholars. The archaeological site will be the object of long-term multidisciplinary research and large-scale excavation. Priority will be given to recording its structural deterioration to establish a general program of restoration and conservation. Rabba has also been selected as a field school for M.A. students (Jordanian and others) in architectural restoration and conservation under the direction of Luigi Marino of the University of Florence. The next spring season will see the initial architectural drawing of its structural remains, as well as a topographic survey and mapping of the site.

Qasr Rabba (al-Qasr), a village 5 km north of Rabba, presents the well-preserved ruins of an impressive construction generally considered to be a Nabataean temple, not yet dated by inscriptional data nor known from ancient sources. The site may have been included in the Perea of Rabbath Moab. During the first season of the IsIAO mission in Moab, the team—mainly composed of architects (M. Calia, O. Dinelli, and R. Sabelli)—completed the recording of the temple plan in preparation for future architectural research, clearance, excavation, and restoration.

Humeima Excavation Project. John P. Oleson, University of Victoria, Khairieh 'Amr, DAJ, Rebecca Foote, Harvard University, and Robert Schick report:

The fifth season of the Humeima Excavation Project made particularly clear the remarkable archaeological richness and diversity of this picturesque site. The team excavated structures from the Early Nabataean through the Abbasid periods representing domestic, military, religious, and hydraulic functions (fig. 20).

In field C124, extensive ceramic evidence—including many intact vessels—was found for Early and Middle Nabataean occupation. The remains were not associated with any structures other than a cistern. Given the absence of habitations or tombs, it seems likely that the ceramics were deposited by individuals living in tents in this area, possibly drawing their water from the adjacent cistern, the only domestic-type cistern at the site not associated with a house. The family that owned the cistern may

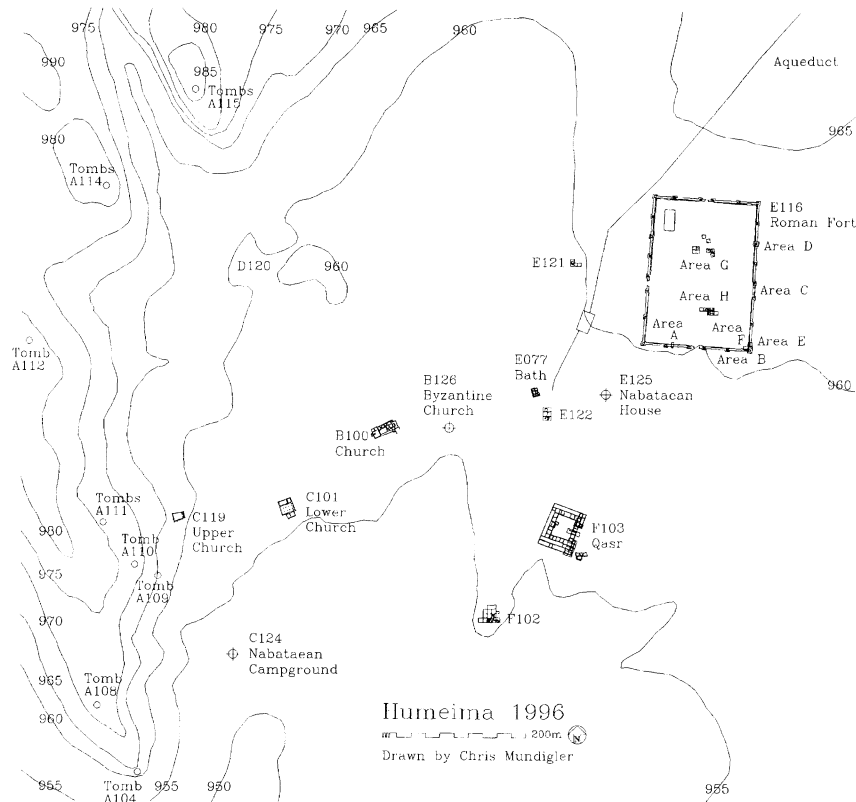


Fig. 20. Humeima. Excavated structures and areas from Early Nabataean through Abbasid periods.

have camped in the field from time to time while participating in activities at Hawar or tending crops in the adjacent fields, which were well watered by the outflow of the wadi that passed through the settlement.

In field E122, excavation was completed of the rubble foundations of a house of the Middle Nabataean period, consisting of a few small rooms around a central court. Careful examination of the adjacent field resulted in the discovery of another Nabataean structure constructed largely of well-preserved mudbrick, but with stone doorjambs (E125), some stone installations, and stone arches to support the roof. Despite the thin cover of surface soil, significant remains of figured fresco were recovered, applied to both the mudbrick walls and the arches. This construction technique suggests that a significant number of such Nabataean structures may lie hidden in the adjacent field.

Continued excavation of the Roman fort revealed the plan of the Principia, the central rooms of which were carefully paved and decorated with brightly colored frescoes with gold-leaf details. A silver drachma minted for Trajan in Bostra was found, reinforcing the early second-century date for the fort

suggested by the ceramics in its foundation and early occupation levels. A long Latin inscription (unfortunately largely illegible) on a large block in the Principia also characterizes the fort as an outpost of western Roman culture. The barracks or workshop area provided extensive evidence for the forging and repair of iron and bronze equipment. The first phase of occupation lasted into the later third century, when the fort was abandoned or reworked. The character of the deposits laid down in the fourth century suggests that the fort was abandoned for several decades and then renovated—possibly for a different purpose—until final abandonment took place in the early fifth century.

A Bedouin house built some time after 1936 was found to conceal the well-preserved single apse and chancel pavement of the fifth Byzantine church to be identified at Humeima (B126). The question of why so many churches were built in such a small community becomes even more urgent with this new discovery.

The plan of the Abbasid qasr was further clarified in 1996, revealing in particular many walls belonging to an Ottoman renovation. The fresco room provided more fragments of fresco and ivory furniture,



Fig. 21. Petra. Aerial view of the Great Temple.

many with new or better-preserved motifs than had been found in previous seasons. Significant remains of the wooden door and its iron lock and key were also recovered.

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

The fourth year of excavations by Brown University at the Great Temple (or Southern Temple) was completed in 1996 (fig. 21). This season produced a wealth of finds, including 60 coins, a Latin inscription, and ceramics—72 lamp fragments—as well as extraordinary revelations about Nabataean temple

architecture. The sculptural program continues to include richly decorated capitals embellished with fruits, flowers, and vines. In addition, 31 elephant-head fragments that once adorned the capitals of the lower temenos were recovered.

The 1996 discovery of triple colonnades on the east and west sides of the lower temenos, with as many as 96 columns—48 on each side—indicates a Nabataean penchant for formal symmetry. (The eastern colonnade, recovered in 1995, was thought to contain only a double row of columns.) Serving as north–south passageways for the lower temenos, these



Fig. 22. Rujm en-Numeira. View of site with terrace walls.

colonnades extend some 50 m and lead to a pair of monumental exedrae of approximately 10 m in width. The 1996 excavations revealed an elegantly apsed, recessed east exedra with interior buttresses, double entry-columns, and double engaged columns on its projecting antae. The east exedra mimics the well-preserved west exedra excavated previously. Next to the west exedra, an 11-m flight of well-preserved stairs was recovered leading up from the hexagonal pavement of the lower temenos to the forecourt of the upper temenos. Bordering the stairs to the east, the western extension of a monumental white sandstone cross-wall, preserved to a height of 1 m, delimits the lower temenos. These lower temenos renovations have tentatively been dated to the mid-second century A.D.

The eastern periphery wall of the precinct was defined and it includes a double-arched passage leading east into the "lower market." In addition, the 1995 trench below the east colonnade was reopened. Here the arch-springer walls extended to a depth of approximately 6 m, placing their lowest levels at the approximate elevation of the colonnaded street.

Excavations inside the temple involved the clearing of the pronaos and the partial (and reversible) reconstruction of its columns. In the northwest part of the temple, the massive interior anta wall was found to be connected to a double engaged column with a well-preserved Attic base, and the founding floor levels of three of the eight western columns were established. Excavation of the east and west vaulted stairwells of the adyton was completed. The

large west vaulted chamber was excavated to some 4 m in depth, where a fragmentary Latin inscription, as well as a large brain coral (!), was unearthed. The central adyton was explored on both the north and south sides of the central vault.

On the southeast side of the temple, the outer east wall, the east temple windowed wall, the intercolumniation with the southeastern double engaged corner column, and the intercolumnar wall were defined. These factors combine to suggest that the southern part of the temple was a three-storied edifice. Of particular interest was the discovery of the upper courses of a major east-west semicircular wall opening into the central cella. Further investigation should identify it as a major architectural component of the temple.

All the temple columns now have been located, and their partial reconstruction is progressing. Plans are underway for the consolidation of architectural elements that have been imperiled by 2,000 years of erosion, as well as by recent excavations.

Ghor en-Numeira. Mohammad Waheeb, DAJ, reports:

A season of excavations was conducted during 1995 at Rujm en-Numeira and at Numeira (4) in Ghor en-Numeira, southern Jordan.

Rujm en-Numeira. Salvage excavations were undertaken by the DAJ to study remains along the road in the Numeira area (fig. 22). The eastern edge of the site beside the main road was completely excavated and the material analyzed. An architectural unit was uncovered consisting of several walls and

small rooms built on a flat area, with a system of terraces to protect the area from erosion. A preliminary assessment identifies the structure as a watchtower overlooking the eastern coast of the Dead Sea. The structure can be dated to the Nabataean period based on pottery sherds, two lamps, and one Nabataean-type juglet recovered at the site. Quantities of sherds and traces of foundation walls discovered on the surface of the site indicate that a large Byzantine settlement reoccupied the area during the sixth century. A large Byzantine cemetery borders the site on the east and west. Some of the tombs have been disturbed by robbers. Further excavations of the western parts of the site will contribute to an understanding of the whole area.

Numeira (4). A survey of the area along the road northwest of Rujm en-Numeira revealed the presence of an important site called Numeira (4). The site was covered with stones, pebbles, and sand from seasonal erosion in the Wadi en-Numeira area. The project aimed to salvage the site and reduce the immediate threat to the area. Excavations revealed architectural remains of several rooms built of undressed sandstone and limestone. A basin, well water-ducts, and a pottery kiln located at the western side of the site helped identify it as a workshop, and analysis of the material recovered showed that it may have been part of a sugar press. Quantities of sugar-pot fragments and painted pottery sherds found at the site date the workshop to the Ayyubid/Mamluk period.

A survey of the western area along the shore of the Dead Sea revealed collapsed walls and arches in the modern quarry area of the Arab Potash company. Pottery fragments of Byzantine and Ayyubid/Mamluk date were recovered in the area, indicating a relationship with the sugar press. More investigations are suggested to clarify the early history of Wadi en-Numeira.

These salvage activities show the need for an intensive survey of the southern Ghor to identify archaeological sites in areas of possible modern construction. This information, properly evaluated, can allow the DAJ to coordinate intervention and development appropriate for these sites.

Gerasa, Temple of Artemis. Roberto Parapetti, Centro Scavi di Torino, reports:

The Temple of Artemis at Jerash (Gerasa), famous for the exceptional state of preservation of its pronaos colonnade, had undergone only limited archaeological investigation by the American expedition of 1930–1934. On the basis of inscriptions, the sanctuary was dated to the second half of the second century A.D., and the existence of a shrine of the preceding century was also substantiated through inscriptions. The Roman temple was thought to have

been used as a Christian church in the fifth century, with occupation continuing into Late Arabic times, probably concluding with the transformation of the temple cella into a fortress by the Atabeg of Damascus. It was later captured by Baldwin II during the First Crusade.

Excavations begun in 1994 enabled us to confirm these findings and to add considerably to our knowledge of the history of the sanctuary. In 1994 and 1995, under the direction of Massimo Brizzi, the cella (fig. 23) was finally cleared of debris that fell from the upper parts of the building in a series of earthquakes. Clearing of the peristyle is still in progress.

Three steps ascended from the pronaos through a great portal, whose jambs and lintel were probably finished by metal molded sheets, to the temple cella (10.8 × 18.2 m). A series of stairways connected the cella hall with the vaulted chambers in the podium core (an actual crypt) and with the roofing space. The adyton/thalamos, ascribed to Syrian typology, was designed in a tripartite arrangement. Two doors, 0.8 m wide at a distance of 2.5 m from the west wall (for the access to the staircases on this side) flanked a central U-shaped structure without steps at the foot of the niche, about 2 m above the place where the cultic image was located. A chancel, slightly projecting from the wings of the central structure, is visible from traces in the extrados of the podium vaults, indicating a specific function for the space in front of the statue.

No traces of the original flooring were preserved, but it is believed that the floor must have sloped gently toward the entrance. A sudden change in level is apparent in the intrados of the podium vault, but this anomaly can be attributed to a planning review during construction. The entire surface of the inner walls was faced with marble. The distribution of various-sized sockets suggests an order of pilasters between blind windows above a high skirting-board. The name Y(EINOC) inscribed on the capital of the pillar in the southwestern corner of the cella, and a number of monograms Y (on capitals and column drums of the pronaos, can be attributed to the temple builder.

Following the edict of Theodosius in A.D. 386, the temple must have been stripped of its decoration. Byzantine reuse of the cella's inner space is evident from traces of a polychrome mosaic flooring, which despite its poor state of preservation can be dated to the middle of the fourth century. No evidence was found to suggest that the hall was used for religious purposes; a secular use appears more likely, as suggested by the contemporaneous reorganization of the peristyle space. A fire seems to have brought the use of the cella to an end, and the effects of the



Fig. 23. Gerasa. Temple of Artemis, view of the cella after excavation.

burning of the roof trusses—probably still the Roman ones—can be seen on the walls.

After the fire, at least two phases of occupation can be identified in the cella, from the Late Byzantine to the Umayyad/Abbasid period. The cella portal was sealed, and the walled space—now only accessible from the southern side of the peristyle—was reorganized to accommodate isolated rooms along its perimeter. Doors at two levels are apparent in the room at the northeastern corner; the higher door is the result of reconstruction work that followed the earthquake of A.D. 749. Activity in the area of the kilns in front of the temple ceased after the earthquake, when the northeastern column of the pro-naos fell onto the factory.

Below the uppermost collapse level, scant alignments of stones and a few glazed Ayyubid potsherds and other painted ceramics from the Mamluk era identify the last period of occupation within the cella space. However, the existence of an Atabeg fortress within the temple seems improbable.

Remarkable, though out of context, was the discovery of a fragmentary alabaster Nabataean capi-

tal in the filling of the Late Byzantine/Early Islamic room in the northwestern corner of the cella. This capital could be the remains of the canopy of the earlier Artemision, reused in a later period.

Gerasa, Cathedral. B. Brenk, C. Jaggi, and H.R. Meier, University of Basel, report:

After soundings in 1993 and 1994, the 1996 campaign at the Cathedral of Gerasa focused specifically on the relation between the Early Christian cathedral (fig. 24) and its pagan predecessor. Since the British-American excavations of the 1920s, it has been widely accepted that a temple existed on the site of the church in antiquity, but this temple has never been documented archaeologically. Excavations immediately inside the stylobates of the church colonnades—to the level of ca. 588.55 m, i.e., 20–30 cm under the actual church floor—revealed a compact filling of huge stones over a base molding of ocher limestone. The stone quality, profile, and level do not leave any doubt that this molding was part of the same building as that excavated in 1994, about 10 m east of the west wall of the church. Therefore, the position of the west, north, and south walls of

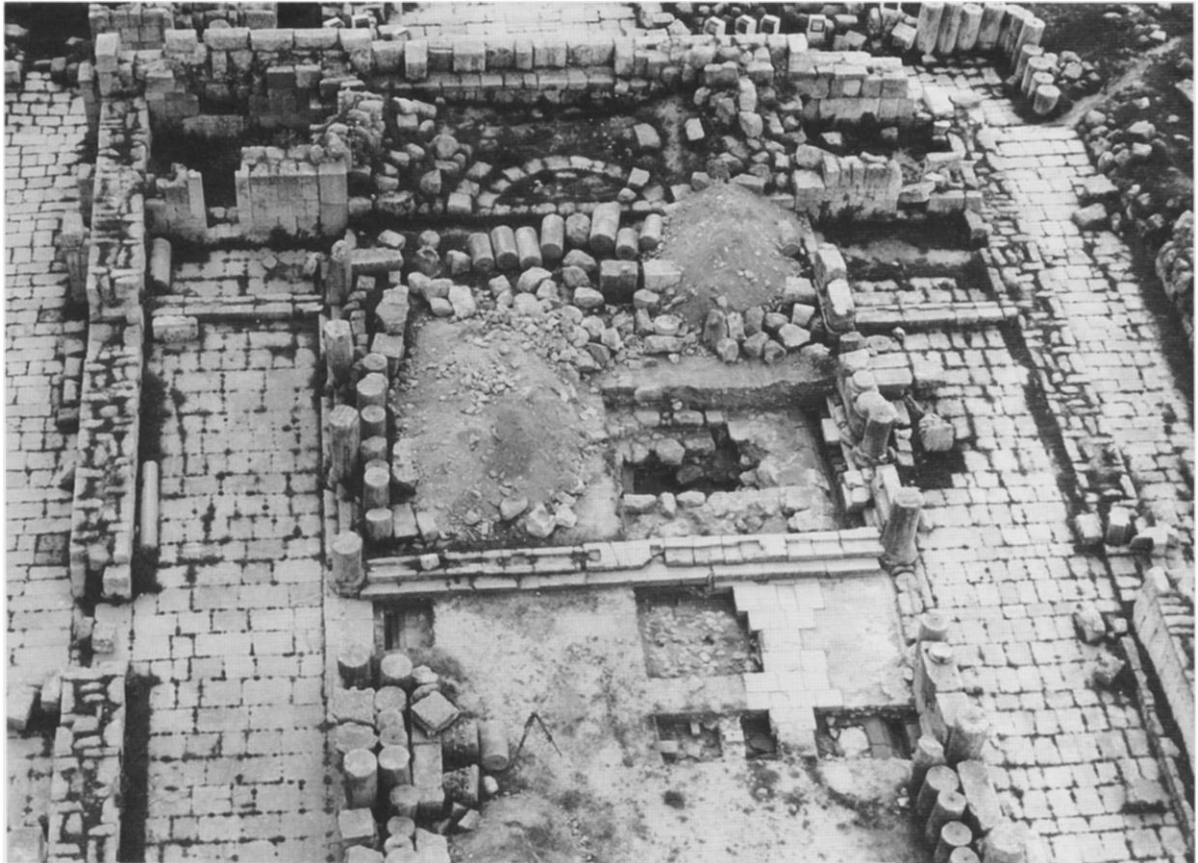


Fig. 24. Gerasa. View from above onto the eastern part of the Early Christian cathedral. (Photo C. Jaggi)

this earlier building are now established. Moreover, 2 m east of the bema steps, a wall was excavated consisting of large pebbles slightly smoothed on one side, marking the eastern boundary of the above-mentioned fill. There can be no doubt that these structures were, in fact, part of a temple, as Crowfoot and Kraeling supposed.

The temple must have consisted of a cella on a podium, like the neighboring Artemision, but it was considerably smaller and, based on the ceramics, some decades older. In the late fourth or early fifth century—in any case after 378 (a *terminus post quem* given by a coin in the church floor bedding)—the temple was dismantled down to the base of the podium by the Christians, who then erected a large church on the site that was probably the Cathedral of Gerasa (fig. 24).

The proportions of the new building were determined by the dimensions of the temple; the stylobates for the colonnades of the nave were set immediately outside the side walls of the podium. The floor level was also based (literally) on that of the temple, since the floor slabs in the nave lay more or less directly on the remains of the podium. The

choir screen was initially set on the line of the later bema steps, but with no difference in floor level between the choir and the nave. A large quantity of fill was required only in the aisles and east and west of the podium.

The walls and apse of the cathedral were decorated with mosaics, at least in their upper sections. A fragment with conspicuous small, incarnadine tesserae of natural stone gives evidence of figurative pictures. This decoration seems to have been heavily damaged by a fire in the late sixth or seventh century. During the ensuing repairs, workers removed the stone pavement of the nave, shortened the church by building a new west wall on the line of the fifth column from the west, and removed the remaining mosaics. They raised the floor level of the choir by filling in masses of debris and replaced the existing choir screen with two bema steps. A mortar floor was installed in the new nave. The excavations revealed disturbances in these layers that indicate later activities in the area.

Regional Petrography Project. Eric C. Lapp, Duke University, reports:

Fragments of clay oil lamps were selected for paste