

A PARADEISOS IN PETRA: NEW LIGHT ON THE 'LOWER MARKET'

by

Leigh-Ann Bedal

Introduction

Despite decades of excavation in and around Petra, archaeologists continue to grapple with the issues of chronological development and the organization of the city as a center of political and economic importance. Contributing to the incomplete nature of our understanding of Petra is the fact that significant pieces of the puzzle have managed to elude archaeological investigation. One of these is a large, open area located in the center of the city, south of and overlooking the colonnaded shop-lined street, amidst the temples and other civic structures that make up the city's core. Its central location, monumental scale and labor-intensive construction, cut deep into the side of a rocky slope and perched on a large stone-built platform, suggest that this area was part of the ceremonial, economic and political center of the city, and therefore must have had an important role in the organization and life of Petra.

In the early part of this century, the area in question was labeled the *Unterer Markt*, or 'Lower Market', the westernmost section of a larger marketplace divided into three distinct and relatively equal parts—'Upper Market', 'Middle Market', and 'Lower Market' (Bachmann *et al.* 1921:37-41). Although its designation as a market suggests

some empirical knowledge of the function of the area, the truth is that the identification was based purely on the expectation that a major entrepot such as Petra required a large centralized marketplace. The *raison d'être* of Petra was its role as a caravan city located on the axis of a network of ancient trade routes, particularly those devoted to the trade in frankincense and myrrh, linking Arabia with the Mediterranean and much of the ancient world (cf. Miller 1969; Van Beek 1969; Groom 1981). Despite its international economic importance during the Hellenistic and Roman periods, little is known about the organization of Petra's economy, its trade and commerce. Arguably, the identification and systematic study of a marketplace in Petra would provide valuable information about economic activities within the city.

During a two-month field season in the summer of 1998 (Bedal 1998; 1999), a survey and excavation was conducted in the 'Lower Market' in order to determine its function, historical development, and its relationship to the adjoining Great Temple and other monuments in the city's civic center.¹ Work began with the creation of an accurate map of the 'Lower Market', which measures roughly 6,150 m² (75x82 m), using the same Electronic Digital Mapping system (EDM) as is used by the Great Temple project, in or-

1. The Petra Lower Market Survey, directed by the author (L. Bedal), was made possible with an ACOR Near and Middle East Research and Training Act Pre-doctoral Fellowship, a National Science Foundation Doctoral Dissertation Improvement Award, and the generous collaborative efforts of Martha Sharp Joukowsky, director of the Brown University excavations of the Great Temple at Petra. The survey and excavation project was carried out with the cooperation of the Department of Antiquities of Jordan, in particular Dr Ghazi Bisheh, then Director-General, and the on-site representative Muhammed Abdul-Azziz. A special

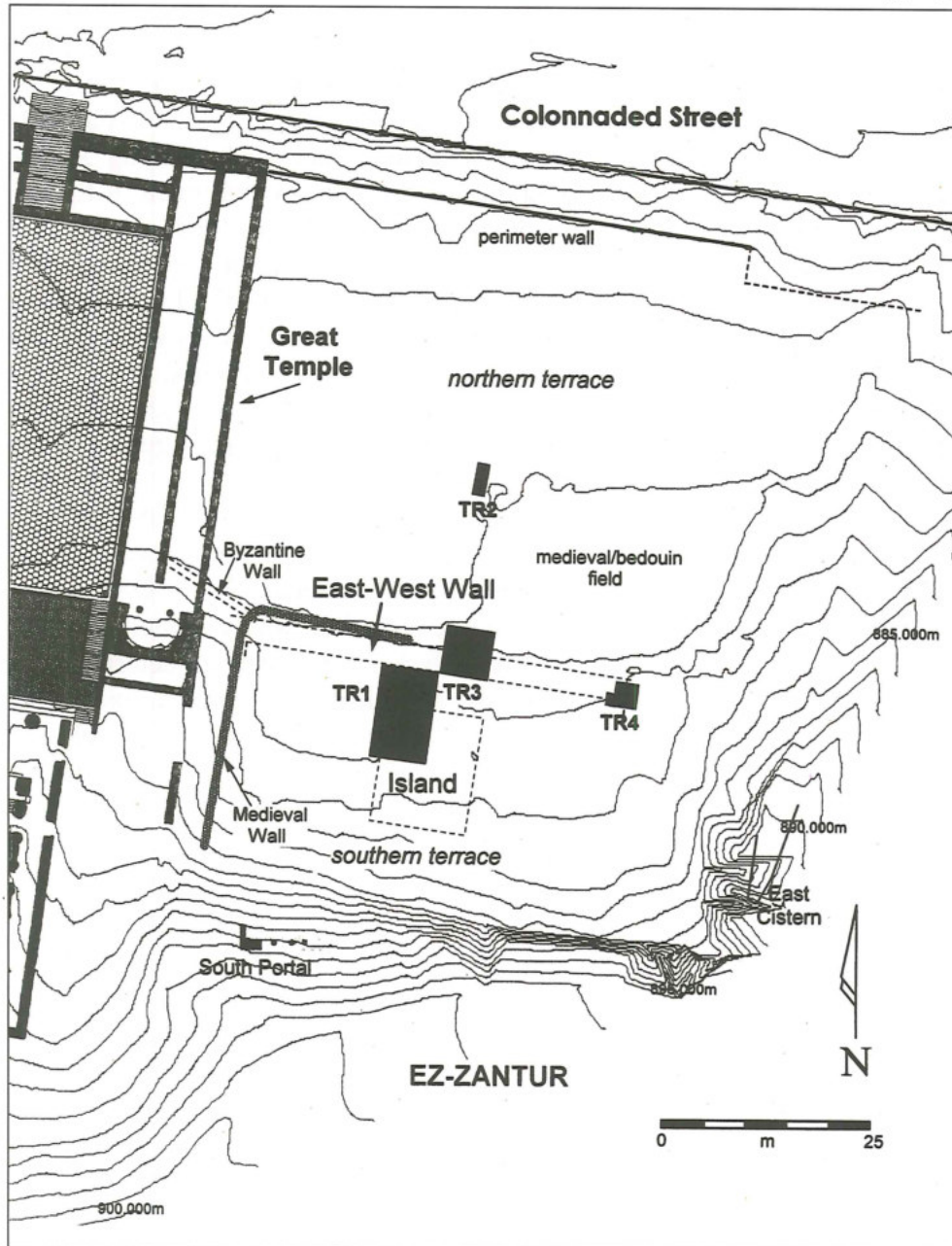
thank you goes to Elizabeth Najjar, Paul Zimmerman, Yelena Rakic, James Roger, Dakhillalah Koblan, and an exceptionally hard-working Bedouin team for their invaluable assistance in the field. In addition, I would like to thank the entire staff of the American Center for Oriental Research, especially Fatma Marii, for their help during my post-season residency in Amman, and to express my gratitude to Drs. Yvonne Gerber, Andrea Vanni Desideri, and Zbigniew Fiema for their kind assistance. All plans and photos are by the author unless otherwise indicated.

der to maintain consistency in the recording of the two adjoining areas.² Relevant surface features and architectural components revealed through subsequent excavations were surveyed in and added to the overall site plan (Fig. 1).

The Northern Terrace

The northern (lower) terrace is laid out on

a platform rising more than six meters above the Colonnaded Street. It is likely that the platform is constructed of a series of supporting walls and arches similar to that of the Great Temple's lower temenos (Joukowsky 1999) which is level with the northern terrace of the 'Lower Market' (Fig. 2). The most visible feature on the northern terrace is a field occupying the southeast quadrant



1. 1998 site plan with trenches and major architectural features (for the complete plan of the Great Temple see Joukowsky 1999). [P. Zimmerman and L. Bedal].

2. The Electronic Digital Mapping System (EDM) used by the project was provided by the Museum's Applied Science Center for Archeology

(MASCA) of the University of Pennsylvania, and operated by Paul Zimmerman of the University of Pennsylvania.

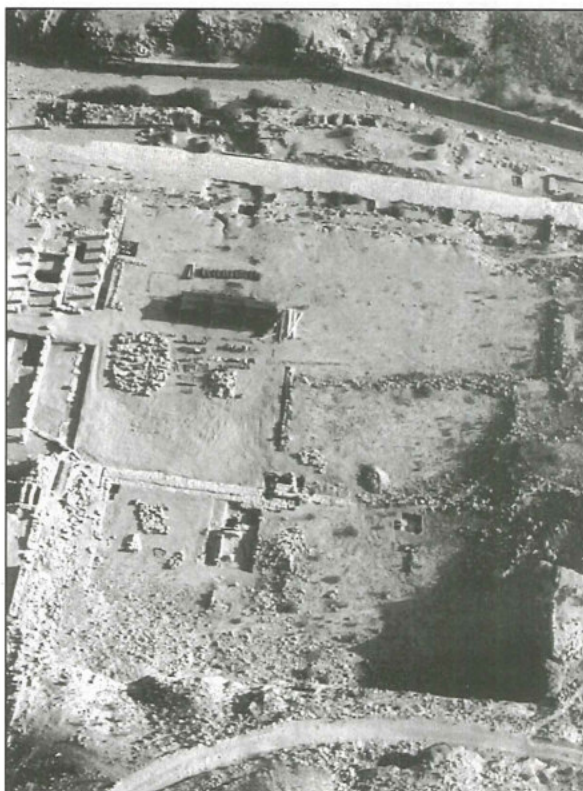


2. Aerial view of the 'Lower Market' as it appeared in 1996, looking southwest. The Great Temple complex is in the foreground.

(Fig. 3), an artifact of agricultural activity in the 'Lower Market' that continued well into this century. A variety of architectural elements - capitals, column drums, fragments of decorative moulding - originating from nearby monuments, are lined up to form the northern and western borders of the field. The northeast corner of the field border is founded on a small section of wall located near the center of the northern terrace - the only architectural feature visible on the large expanse of the northern terrace (75x52 m). Limited exposure in Trench 2 revealed that this wall is 3.6 m long (north-south) and stands one course above a cobbled surface built up to its western face (Fig. 4). The close proximity of Trench 2 to the excavation's tool yard and tent, however, limited the extent of exposure of these features during the 1998 season.

Southern Terrace

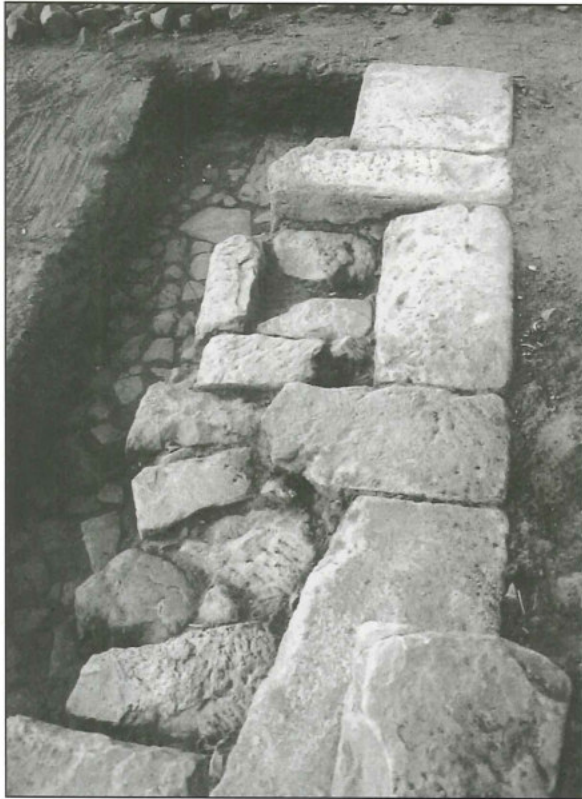
Excavations focused mainly on the south-



3. Aerial view of the 'Lower Market' as it appeared post-season in 1998, looking north.

ern half part of the 'Lower Market' where substantial architectural features were visible on the surface. The East-West Wall bisects the site and as a retaining wall for the southern terrace. This wall was omitted from all maps of Petra's city center despite the fact that it is clearly visible on the ground and from the air prior to excavations (Fig. 2). The omission may be explained by the fact that the Bedouin (the local bedouin tribe and long-time inhabitants of Petra) identified the wall as "bedouin" and described its use in the irrigation of their fields. It is likely that the map makers were satisfied that the prominent East-West Wall post-dated the Nabataean and Roman periods of the site and thus omitted it from their site plans.

The southern terrace is an artificial platform partially created by quarrying into the rocky slope of az-Zanṭūr, which forms the backdrop for the southern half of Petra's civic center. The 'Upper Market' was cut into the mountain in a similar manner further to



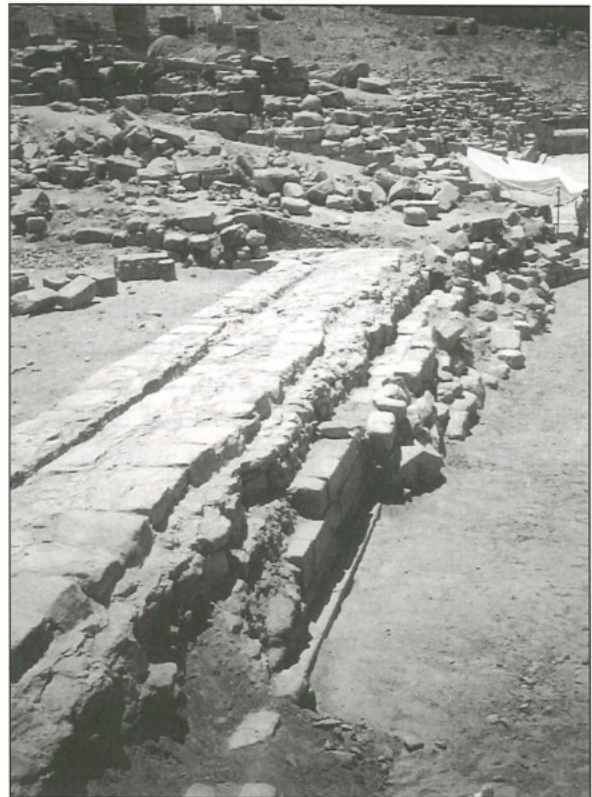
4. Wall and cobbled surface in the center of the northern terrace (Tr 2).

the east. The southern terrace is bounded to the south and east by a vertical rock escarpment sixteen meters in height, and on the west by the Great Temple (see Figs. 2 and 3). At the center of the southern terrace are the ruins of a rectangular stone structure (11.5 x 14 m). A plan of this structure, based on visible surface features, is included on the earliest plans of the city center and virtually every reproduction thereafter (cf. Bachmann, *et al.* 1921:map1; Parr *et al.* 1975:Fig. 1; McKenzie 1990:maps 6-8). In one reconstruction of the 'Lower Market', which shows a large open plaza with small tent-like shops around its perimeter, this building is depicted as a solitary rectangular structure with a gabled roof in the style of a Graeco-Roman temple or shrine (Browning 1973: Fig. 83). Like the plans, there is no indication of the East-West Wall in the reconstruction.

East-West Wall

A major clearing effort was conducted

along the west half of the East-West Wall. By following the top of the wall from east to west and carefully articulating the stones, it became possible to distinguish three walls of different construction and from different time periods: Nabataean-Roman, Byzantine, and post-Classical (Medieval) (Fig. 5). The post-Classical wall was a haphazard construction of piled stones along the western and northern borders of the southern terrace, partially overlapping the two earlier walls. It was built as a barrier to direct the water runoff from az-Zanṭūr down to the field in the southeast quadrant of the northern terrace. A 12th century cooking pot (Fig. 6) found nestled in a hole in the wall indicates that the wall was present as early as Petra's Medieval period (cf Vannini and Desideri 1995: 530, Fig.16; Vannini and Tonghini 1997: 379f, Fig. 16). The 'Lower Market' was ap-



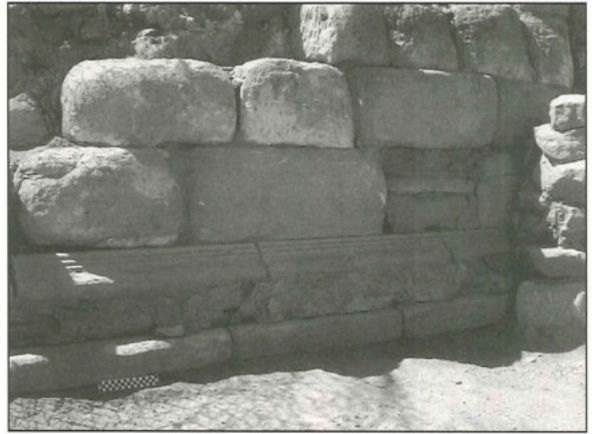
5. West half of the East-West Wall, looking west. A channel transported water across the top of the wall. The Medieval Wall is built up against the north face of the East-West Wall and along the top of the southern terrace's western border. The Great Temple excavations are in the background.

parently cultivated by the crusader and/or bedouin inhabitants of the 12th century, an activity which persisted into the modern era with the continued use of the wall and field terrace by the Bedoul.

After articulating and recording the Medieval Wall, it was partially removed to expose the monumental structure behind it. The East-West Wall, which has been traced up to 50 m across the width of the 'Lower Market', stands 2.5 m high and is 3.5 m wide (Fig. 5). Its solid construction is composed of alternating rows of sandstone blocks and rubble bonded with an impervious white mortar. The north face is constructed of ashlars typical of Nabataean masonry. Running the length of the wall, about one half meter above the base and topped by a stringcourse of moulding is a line of interlocking segments of ceramic pipe. Although much of the pipe is badly broken or missing, most of it is held in place with mortar and stone chinking (Fig. 7). An effort to trace the wall westward to the Great Temple was im-



6. Hand-made coarse ware cooking pot with upturned lug handles (one missing) dated to the 12th century CE.



7. Detail of the north face of the East-West Wall showing the ceramic pipeline installed below a stringcourse of moulding. At right is the south end of the Byzantine Wall where it is built up against the East-West Wall.

paired by a wall dating to the Byzantine period that was built at an oblique angle across the Great Temple's eastern colonnade and abuts the East-West Wall (see Fig. 1). It is presumed that the ceramic pipe in the East-West Wall connects with the system of pipes and gutters that cross the Great Temple's lower temenos and continue westward toward the baths (see Joukowsky this volume). Clarification of the relationship with the Great Temple must wait for a future season

Pool

The most exciting part of the season came when the north half of Trench 1 was excavated to establish the relationship between the building on the southern terrace and the East-West Wall. It was discovered that the two structures were separated by a body of water 2.5 m deep, its walls and floor lined with a thick layer of gravel-tempered hydraulic cement. The monumental scale of this body of water was realized when its northwest corner was located underneath the bend in the Medieval Wall, 23 m to the west of the central north-south axis. It became clear that the construction of the East-West Wall across the site transformed the quarried-out space to the south into a large collective pool (46 x 23 m). Presuming a symmetrical arrangement, Trench 4 was opened

23 m to the east of the central axis in the hopes of locating the corresponding northeast corner. Less than one-half meter below the surface, we came down on the sought-for corner which, like the northwest corner, was lined with hydraulic cement (Fig. 8). Built into the northeast corner is a stone staircase for entrance into the water. Four rectangular pavers (ca.86x35 cms) on the east edge of the pool (Trench 4) are the remnants of a promenade that once encircled the pool's perimeter (Fig. 8).

Pavilion

The identification of the body of water as a pool implies a recreational function as opposed to the purely practical function of a reservoir and is based, in part, on the presence of the island pavilion erected at the center of the pool. Excavations in Trench 1,



8. The northeast corner of the pool with staircase (Tr 4), looking east. At left are channels that transported water across the east half of the East-West Wall.

which exposed the northwest quarter of the island, revealed important information about its structure as well as its decorative elements.

The pavilion is perched on a rectangular pedestal standing 2.5 m in height, a solid foundation of tightly packed sandstone bonded with a white impervious mortar. A great effort was made to prevent water from seeping into the structure through its submerged foundation. The exterior surface of the foundation was lined with a thick coat of hydraulic cement. In addition, a thin layer of white lime plaster covered the foundation's top surface and this was covered with a layer of water-resistant mortar made from a mixture of lime and ash. The interior floor was originally covered with rectangular pavers (ca.16 x 28 cms); these were robbed out in antiquity, leaving their impression in the underlying lime-ash mortar. An interior water channel may be associated with an installation - fountain? libation basin? - located at the rear of the building. This channel cuts diagonally across the interior space and connects with another channel that encircles the exterior of the pavilion (Fig. 9).

Open on three sides, the pavilion has a



9. The west half of the north façade of the island pavilion (Tr 1), looking south. A channel in the floor intersects with a second channel that encircles the exterior of the pavilion. In the foreground is the footing for the vaulted bridge that allowed access to the island. The deep probe in the lower right corner was excavated down to the pool's floor 2.5 meters below the surface.

wide front entrance (4.5 m wide) with recessed frame and two side entrances approximately 3.0 m wide. The walls are preserved three courses above floor level in the north and five in the south. They are constructed of two rows of sandstone blocks bonded with the same impervious mortar used in the construction of the foundation and the East-West Wall. A single sandstone pier, preserved 1.14 m in height, stands just inside the west doorway. Its base is faced with white marble and thick plaster is held in place by iron nails imbedded in holes in the sides of the pier. The interior walls were plastered, and several fragments of painted stucco - pompeiiian red, orange, and bright blue - and fragments of stucco moulding with dentils, give some indication of the building's interior decoration. Two marble volutes (Fig. 10), a five-petaled flower (Fig. 11), and numerous fragments of worked marble and other colored stone of non-local origin, testify to the special attention given to the adornment of this unique building. The footing and springers of a vaulted bridge were found, built up against the pool's interior walls between the north face of the island and the East-West wall (Fig. 9). This bridge (6 meters wide and spanning 4 meter), which provided easy access to the island pavilion from the East-West Wall, may have been a later addition to the original pool design as it is not bonded to either the island or the East-West wall and its surfaces have remnants of a sandy gray plaster and not the strong cement that lines the entire pool interior.

Hydraulics

A recurrent theme throughout the 'Lower Market' excavations was water. As the reconstruction plan of the pool in Figure 12 illustrates, water was transported around the northeastern and northwestern corners of the pool in channels and pipelines, part of an elaborate water distribution system incorporated into the construction of the East-

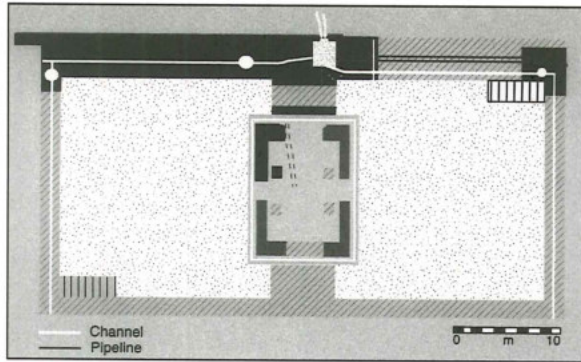


10. Marble volutes from inside the pavilion.



11. Front and side views of a marble flower from inside the pavilion.

West Wall. In addition to its role as a retaining wall for the pool, the East-West Wall functioned as an aqueduct. Narrow channels in the top of the wall (see Fig. 5) transported water that entered the 'Lower Market' from the slopes of az-Zanṭūr; shallow basins along these channels filtered sand and silt from the water as it passed through. In addition to the narrow channel, the east half of



12. Reconstruction plan of the pool and pavilion showing the layout of channels, pipelines, and water tank incorporated into the construction of the East-West Wall. A hypothetical rear (south) entrance to the pavilion and access bridge is included in the reconstruction, as well as a staircase in the pool's southwest corner.

the East-West Wall had two parallel pipelines set into a large channel along the top of the wall. Although no trace of the original ceramic pipes was found, their rounded impressions were preserved in the cement lining of the channel in which they were installed (see Fig. 8). The channels and pipes on the east were probably fed by a cistern that is perched on top of the east escarpment; the walls and floor of the cistern are lined with the same gravel-tempered hydraulic cement as was found lining the pool's interior.

Excavations in Trench 3 exposed the middle section of the East-West Wall where more hydraulic features were uncovered. Built into the wall, immediately east of its center point, is a *castellum divisorium*, a central holding tank (ca.9 m³) in which water was collected and then redistributed into various directions. Channels to the east and west carried water across the relatively horizontal plane of the wall and emptied into the top of the tank. The two pipelines approached the tank from the east at a gradual decline, entering the tank 0.60 m below the top of its east wall (Fig. 13). Three holes in the top of the wall near the southeast corner of the tank possibly held a lever or gate used to control the flow of water into the tank (Fig. 14). That the *castellum* was originally



13. The water tank (Tr 3), looking east. The large channel at center was originally installed with ceramic pipes.

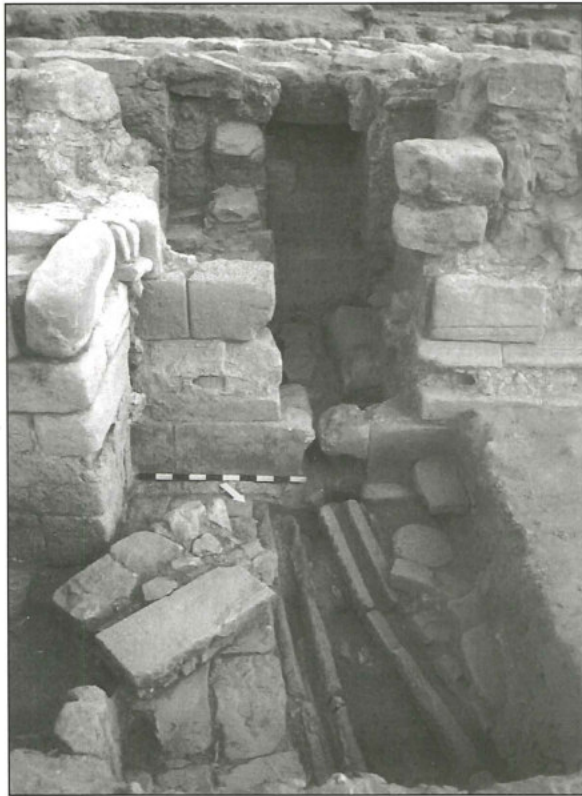
roofed is indicated by the remnants of a supporting arch springer mid-point on its south wall. Immediately to the west of the arch springer is a square opening (60 cm high x 80 cm wide), the opening to a short passage that originally allowed water to pass from the *castellum* directly into the pool. At some point, this passage was sealed, probably at



14. Postholes found in the top of the East-West Wall near the water tank (Tr 3), looking north.

the time of the construction of the bridge which would have blocked off the tunnel on the pool side. A small lead pipe (4 cm dia.) protrudes from the base of the tank's south wall allowing water drainage from the pool to the tank (Fig. 15). This pipe was also apparently blocked with the construction of the bridge.

Water exited the tank through a hole cut into the base of the wall's north face (most of which is robbed out) and fed into several conduits that distributed the water out across the northern terrace (Figs. 15 and 16). Two stone channels carried the water under a stone pavement toward the north and northwest; a large ceramic pipe carried water above the pavement toward the northeast.



15. Water tank and conduits (Tr 3), looking south. Stone channels transported water northward under the pavement, and a ceramic pipeline (with stones built up along either side for protection) transported water northeastward over the pavement. A later wall, at left, is built up against the north face of the East-West Wall; ceramic pipes installed along the face of the walls transported water eastward and westward from the central holding tank.



16. The water tank and conduits, looking north.

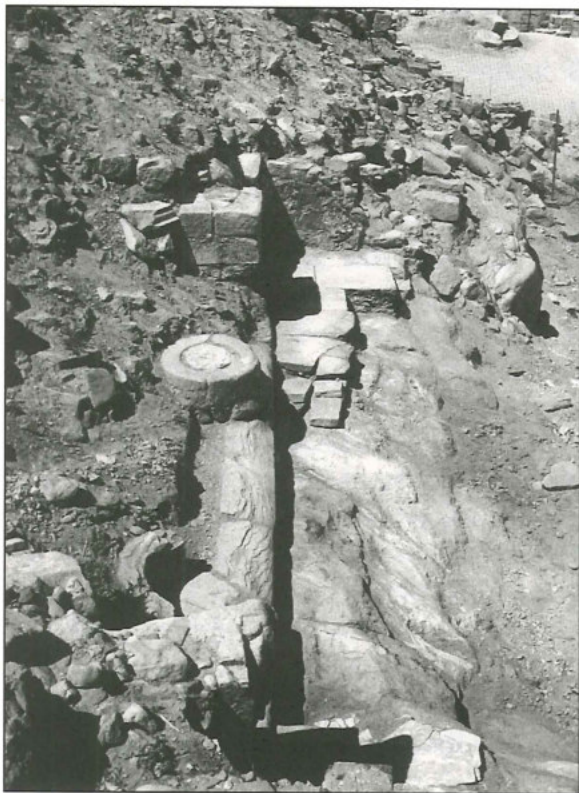
Sometime after the original construction of the East-West Wall and its associated hydraulic features, another wall was constructed east of the water tank, built up against the north face of the East-West Wall and on top of the pavement (a later addition). The ceramic pipeline installed along the north face of the East-West Wall (described above) carried water westward across the Great Temple's lower temenos in the direction of the baths and eastward in the direction of the 'Middle Market'. The fact that the eastern portion of the pipeline is diverted around the later wall (Fig. 15) indicates that the pipeline was a later addition to the original hydraulic system, probably installed at the same time that the bridge was constructed and the passage connecting the pool and the castellum was sealed up.

A Garden in Petra

Based on the results of the 1998 season - the discovery of an ornamental pool with is-

land pavilion associated with an elaborate system of water conduits converging onto the northern terrace - it can be deduced that the area known as the 'Lower Market' was not, in actuality, a marketplace. Instead of being a hub of economic activity, this was apparently a place of refuge, an ornamental garden within the city's civic center. This is a unique discovery in that it is the only example of a formal garden known from Nabataean context, and the only archaeologically known examples of a public garden in the region.

How one entered the garden is still unclear. A break in the perimeter wall near the northeast corner of the northern terrace may be indicative of an entrance off the Colonnaded Street (see Fig.1), and a possible southern entrance was discovered up on the southern escarpment. Two column bases (each composed of two half stone cylinders placed around a stone core) frame an open-



17. South Portal, looking west.

ing in the wall that crowns the rim of the escarpment (Fig. 17). Immediately below this portal, are pavers that may be remnants of a broad staircase leading down to the southern terrace from the residential district on az-Zanṭūr (Bignasca 1996). The main access, however, was probably from the west through the lower temenos and eastern colonnade of the Great Temple complex (Joukowsky 1999).

Ornamental gardens, or *paradeisoi*,³ were introduced to the Mediterranean world following the eastern campaigns of Alexander the Great in the fourth century BCE. The Persian gardens and hunting parks encountered by Alexander and his army, were described by Xenophon (*Oeconomicus* 4.13, 4.20-24) and emulated by the succeeding Hellenistic rulers (cf. Sackville-West 1953:260; Gleason 1996:385). Certain palace complexes, such as those in Alexandria and Antioch, were directly influenced by Persian precursors, and they, in turn, inspired the design of palace complexes throughout the Hellenistic world (cf. Nielsen 1996). The *paradeisos* was an important element in Hellenistic palace complexes, part of the recreational facilities which included pavilions, pools, fountains, promenades, aviaries, zoos, and theaters (Nielsen 1994). In the Roman World, the Hellenistic tradition was further developed with gardens becoming an important element in both the private and public spheres (cf. MacDougall and Jashemski 1981; Farrar 1998). Civic structures such as theaters, temples, markets, and the forum, were often incorporated into beautifully landscaped settings embellished with elaborate waterworks (cf. Farrar 1997:175ff).

Examples of *paradeisoi* dating to the Hellenistic and Roman periods are known archaeologically from Palestine. In the early second century BCE, the vassal king Hircanus the Tobiad built his palace at Tyrus,

3. Xenophon used the Greek version of the Persian word *paradaeza*, which means "enclosure" and re-

fers to smaller formal gardens as well as large hunting parks.

modern 'Irāq al-'Amīr, in Transjordanian (Will 1991). In his description of Hyrcanus' estate, Josephus (*Antiquities* XII:228-234) describes banqueting grottoes and large park-like enclosures. At the center of a large artificial lake was a marble palace or banqueting hall, adorned with carvings of lions and birds, and accessible only by boat. Visitors to the estate could stroll the promenade encircling the lake and climb onto an observation deck for a panoramic view of their surroundings (Netzer 1998).

Later that century, the Hasmonean dynasty of Judea built a winter palace at Jericho. The original palace, which acted as a recreational retreat, was occupied, altered and enlarged by each succeeding ruler. The main palace was set in a large *paradeisos* intermingled with pavilions, banquet halls, enclosed gardens and swimming-pools, watered by aqueducts from nearby springs (Netzer 1996). Following the Roman occupation of Palestine and the enthronement of Herod the Great in Judea (37-4 BCE), an ambitious building campaign was undertaken that included the construction and expansion of several private palaces. Based on the archaeological and historical records, Herod's palace complexes - at Jerusalem, Caesarea, Masada, Jericho, and Herodium - included ornamental gardens and/or parks and, with the exception of the official palace at Jerusalem, all of these had monumental swimming-pools (Netzer 1977; 1987; 1991; 1996; Nielsen 1994:183ff; Gleason 1998). Of particular interest in relation to Petra's garden are Herod's pleasure gardens at Herodium. Situated at the base of the conical mountain fortress is a large terrace (125x105 m) bounded on three sides by colonnaded peristyles. At the center of this garden terrace is a monumental pool (72x46x3 m) with a small round island pavilion that could be reached only by swimming or boating (Netzer 1987:32).

Hammond suggests that Herod's magnificent public works may have contributed

to the rapid urban development of Petra (Hammond 1996:556). The long history of interaction between the Nabataeans and Judeans, and with Herod in particular, lends credence to the idea of cross-cultural exchange; it is possible that the Nabataeans modeled their *paradeisos* on the pleasure gardens that graced Herod's palaces. The Great Temple, with which Petra's *paradeisos* is associated, has been roughly dated to the first century CE (Joukowsky 1999). Fragments of Nabataean fine ware obtained from the pavilion's floor mortar, include a few examples of the distinctive Phase 3b type CE (Bignasca *et al.* 1996:166, Abb.701-703). The pottery evidence suggests a *terminus post quem* for the pavilion-pool at the beginning of the second century, although it is possible that the pool-pavilion was originally built in the first century and then refurbished (and the floors redone) sometime in the early second century, around the time of the Roman annexation (106 CE). Based on the findings from the deep sounding in Trench 1, the pool continued in use into the fourth century CE when the pavilion walls collapsed filling the pool with debris. This destruction was most likely caused by the 363 CE earthquake. One major difference between Herod's gardens and the garden at Petra is that the latter is not associated with a palace nor situated on a private estate. The urban setting of Petra's *paradeisos* corresponds to the concept of public gardens that flourished with the Romans.

A garden would have offered a refreshing retreat from the inevitable hustle and bustle of the city's center. Visitors could lounge by the pool or escape the burning heat of the desert sun by relaxing in the pavilion surrounded by cool water, or stroll through the garden under the shade trees that, presumably, would have been present. Future excavations on the northern terrace will be aimed at uncovering important details about the general layout of the garden and the variety of plants cultivated there.

In addition to its function as a sanctuary at the heart of a teeming metropolis, Petra's garden would have played an equally important role. The presence of a large formal garden, a virtual oasis, in Petra would have made a powerful statement to visitors arriving in the city after a long journey through the harsh desert environment. The Nabataeans were ingenious in devising ways to collect water and channel it into reservoirs and cisterns for use during the dry summer months. The Greek geographer Strabo described Petra as "having springs in abundance, both for domestic purposes and for watering gardens" (*Geography* VII:

16.4.21). Despite their noted accomplishments, few would have imagined that the Nabataeans had excess water, enough to fulfill the demands of a public garden fitted with a monumental pool. Any traveler passing through Petra would have been impressed by the gratuitous display of conspicuous consumption, a symbol of the flourishing status of Petra during its classical era.

Leigh-Ann Bedal
 Anthropology Department
 University of Pennsylvania
 Philadelphia, PA 19143
 USA

Bibliography

- Bachmann, W. *et al.*
 1921 *Petra*. Wissenschaftliche Veröffentlichungen des Deutsch-türkischen Denkmalschutz-Kommandos, 3. Berlin and Leipzig: De Gruyten.
- Bedal, L-A.
 1998 The Petra Lower Market Survey. *ACOR Newsletter* 10.1 (Summer):4-5.
 1999 The Petra Lower Market Survey in V. Egan and P. Bikai (eds), "Archaeology in Jordan", *AJA* 103.
- Bignasca A. *et al.*
 1996 *Petra - Ez Zantur. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen 1988-1992*. Mainz: Verlag Philipp Von Zabern.
- Browning, I.
 1973 *Petra*. Parkridge, NJ: Noyes Press.
- Farrar, L.
 1998 *Ancient Roman Gardens*. Thrupp, Stroud, Gloucestershire : Sutton Publishing.
- Gleason, K. L.
 1996 Gardens. Pp. 383-387 in E. Myers (ed), *The Oxford Encyclopedia of Archaeology in the Near East*. American School of Oriental Research. New York: Oxford University Press.
 1998 "The Promontory Palace at Caesarea Maritima: preliminary evidence for Herod's Praetorium," *Journal of Roman Archaeology* 11:24-52.
- Groom, N.
 1981 *Frankincense and Myrrh: a study of the Arabian incense trade*. London and New York: Longman.
- Hammond, P.
 1996 Petra. Pp. 556-558 in J. Turner (ed), *The Dictionary of Art*. New York: Grove's Dictionaries.

- Joukowsky, M. S.
 1999 *Petra: The Great Temple, Vol. I - Brown University Excavations 1993-1997*. Brown University, Providence, RI: Petra Exploration Fund.
- Macdougall, E.B., and Jashemski W.F. (eds)
 1981 *Ancient Roman Gardens*. Washington, D.C.: Dumbarton Oaks Trustees for Harvard University.
- Mckenzie, J.
 1990 *The Architecture of Petra*. New York: Oxford University.
- Miller, J.I.
 1969 *The Spice Trade of the Roman Empire*. Oxford: Clarendon Press.
- Netzer, E.
 1977 The winter palaces of the Judean kings at Jericho at the end of the Second Temple Period. *BASOR* 228:1-13.
 1987 *Herodium: An Archaeological Guide*. Jerusalem: Cana.
 1991 *Masada III: The Buildings, Stratigraphy and Architecture. The Yigael Yadin Excavations 1963-1965. Final Reports*. Jerusalem: Israel Exploration Society: The Hebrew University of Jerusalem.
 1996 The Hasmonean Palaces in Palaestina. Pp. 203-208 in W. Hoepfner and G. Brands (eds), *Basileia: Die Palaste der hellenistischen Konige*. Mainz: P. von Zabern.
 1998 Floating in the Desert: A Pleasure Palace in Jordan. *Odyssey* 2/1:46-55.
- Nielsen, I.
 1994 *Hellenistic Palaces: Tradition and Renewal*. Studies in Hellenistic Civilization, 5. Aarhus University Press.
 1996 Oriental Models for Hellenistic Palaces. Pp. 209-212 in W. Hoepfner and G. Brands (eds), *Basileia: Die Palaste der hellenistischen Konige*. Mainz: P. von Zabern.
- Parr, P. et al.
 1975 Photogrammetric Work at Petra, 1965-1968, an interim report. *ADAJ* 20:31-45.
- Sackville-West, V.
 1953 *Persian Gardens: The Legacy of Persia*. Oxford: Clarendon Press.
- Van Beek, G.
 1960 Frankincense and Myrrh. *BA* 22:71-94.
- Vannini, G. and Desideri, A. V.
 1995 Archaeological Research on Medieval Petra: A Preliminary Report. *ADAJ* 39:509-540
- Vannini, G. and Tonghini, C.
 1997 Medieval Petra. The Stratigraphic Evidence from Recent Archeological Excavations at al-Wu'ayra. Pp. 371-384 in *SHAJVI*. Amman: Department of Antiquities.
- Will, E.
 1991 *Iraq Al Amir. Le Chateau du Tobiade Hyrcan*. Paris: Bibliotheque Archeologique et Historique 132.