water for the Lion Fountain and connected to the water system for the cisterns, fountains and gardens associated with the funerary monuments in Wādī Farasa (Schmid 2002). From Jabal ʻAṭūf, water was distributed to several large cisterns located along the eastern slope of az-Zanṭūr and on to the City Center.[2] The bedrock shelves located immediately south of (above) the pool on az-Zanṭūr created an effective water catchment that directed the flow of rain water to the East Cistern and then the pool (**Fig. 3**).

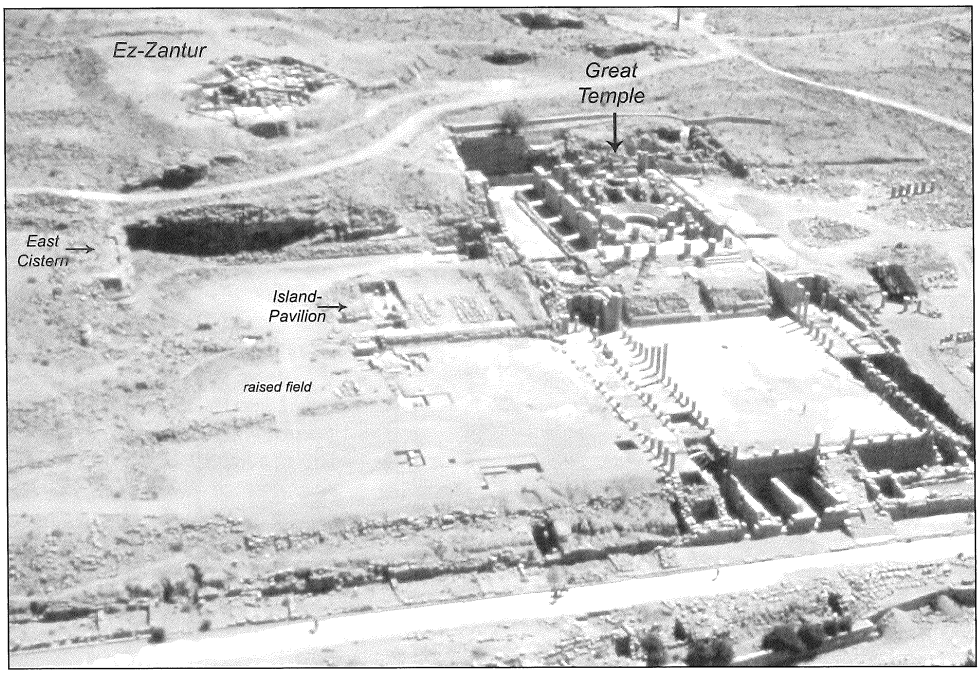
An additional accomplishment in 2003 was the completion by Michael Grealy of the subsurface survey of the garden terrace using ground-penetrating radar (GPR) that had begun in 2001 (Conyers *et al.* 2002a and 2002b). The 2003 GPR results helped to clarify information regarding subsurface features first identified in 2001 and added the southeastern quadrant of the garden terrace that had been inaccessible for analysis in 2001 due to our tea tent being erected on that spot.

Since 2001, the development of a strategy for identifying and excavating planting features and garden soils using the GPR data, soil cores[3] and test pit has been the primary interest of Kathryn Gleason (cf. Gleason 2007) with much support from James Schryver. During the 2004 and 2005 field seasons, excavations in the garden terrace revealed substantial architectural elements along with a gravel path, tree pits, and associated cultivated soils belonging to the Nabataean period garden (Phase II, trenches 5, 9 and 17), as well as fragments of structures of a more domestic nature that predate the construction of the pool and garden terrace (Phase I, trenches 5, 6, 13 and 15). Kathryn Gleason noted the presence of several small perforated vessels found in fill context in the Petra Garden and recommended these possible "flower pots" be examined. In 2005, a study was initiated by Elizabeth Macaulay Lewis, the same season that the first planting pot was discovered in the garden context (**Fig. 12a/b**). An analysis of the stratigraphic sequence down to wadi gravels (trenches 13, 15 and 17) and bedrock (trenches 5, 9, 12 and 18), (including architectural associations), has allowed a preliminary interpretation of the construction of the terrace subsurface and the chronological sequence of the site from the earliest occupation in the late 2nd (?)-1st century BC through the post-Classical/modern era.

The Garden

Ground Penetrating Radar

Remote sensing, in the form of ground-pen-



3. The Petra Garden and Pool Complex (left) and the Great Temple (right), 2004 (photo by S. Karz Reid).

2. See H. Hübl and M. Lindner (1997) for the identification of ʻAyn Brāq as a main source of water to the City Center. Ortloff (2005: 101) describes pipelines that connect from the theater to the Qaṣr al-Bint, with branch lines to separate destinations along the south slope.
3. Soil core studies were conducted by John E. Foss in 2001 (cf. Bedal 2002).

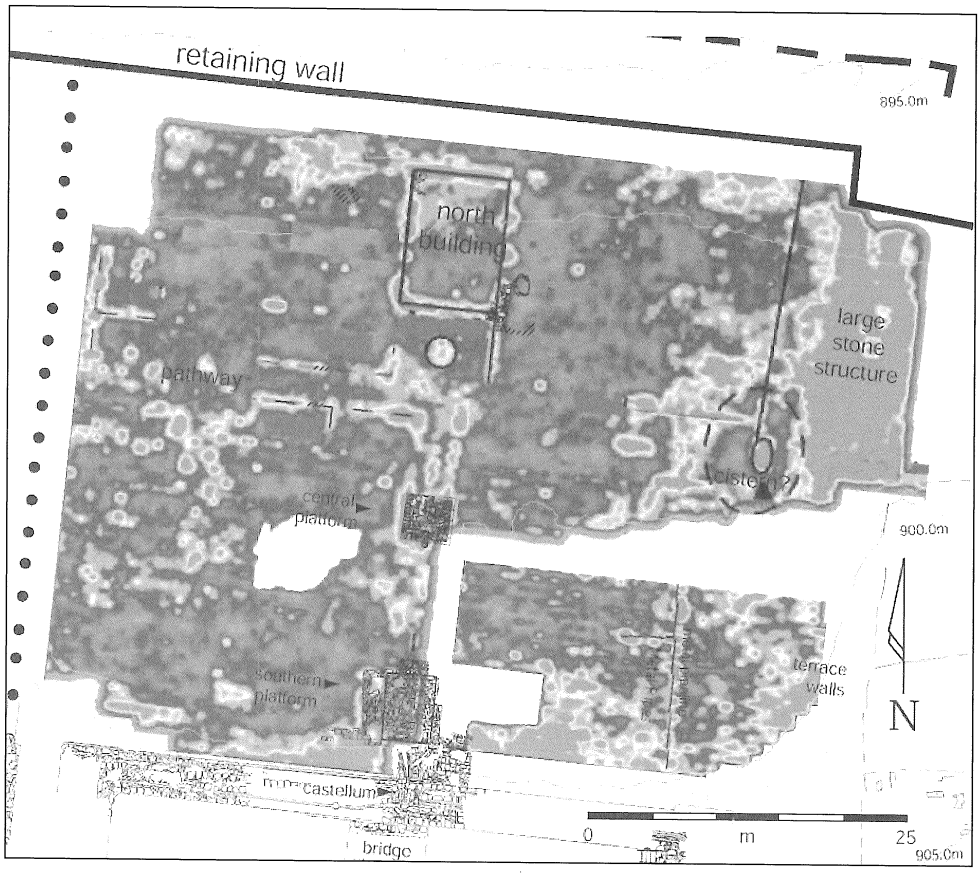
etrating radar (GPR) carried out in 2001 and 2003,[4] was used to obtain a subsurface map of the garden terrace, which measures approximately 68m x 53m (**Fig. 4**). The GPR data showed that the earthen terrace is mostly unbuilt (soil appears as dark gray in GPR plan) with a series of stone structures (light gray-white) laid out along its central north-south axis and another major stone structure in the northeast. A large, deep, ovate feature in the northeast is believed to be a subterranean cistern with pipelines or drains connecting it. A number of smaller, less defined features appear in the data at various locations and depths across the site. In addition to providing a map of the stone structures on the terrace, the GPR indicated areas where there were no structures. These are areas where we might search for remnants of the garden soils for information on the nature of the garden itself.

Excavation Results

With the results of the GPR available, excavation trenches are strategically placed in order to investigate a number of subsurface features that appeared on the GPR map of the garden terrace.

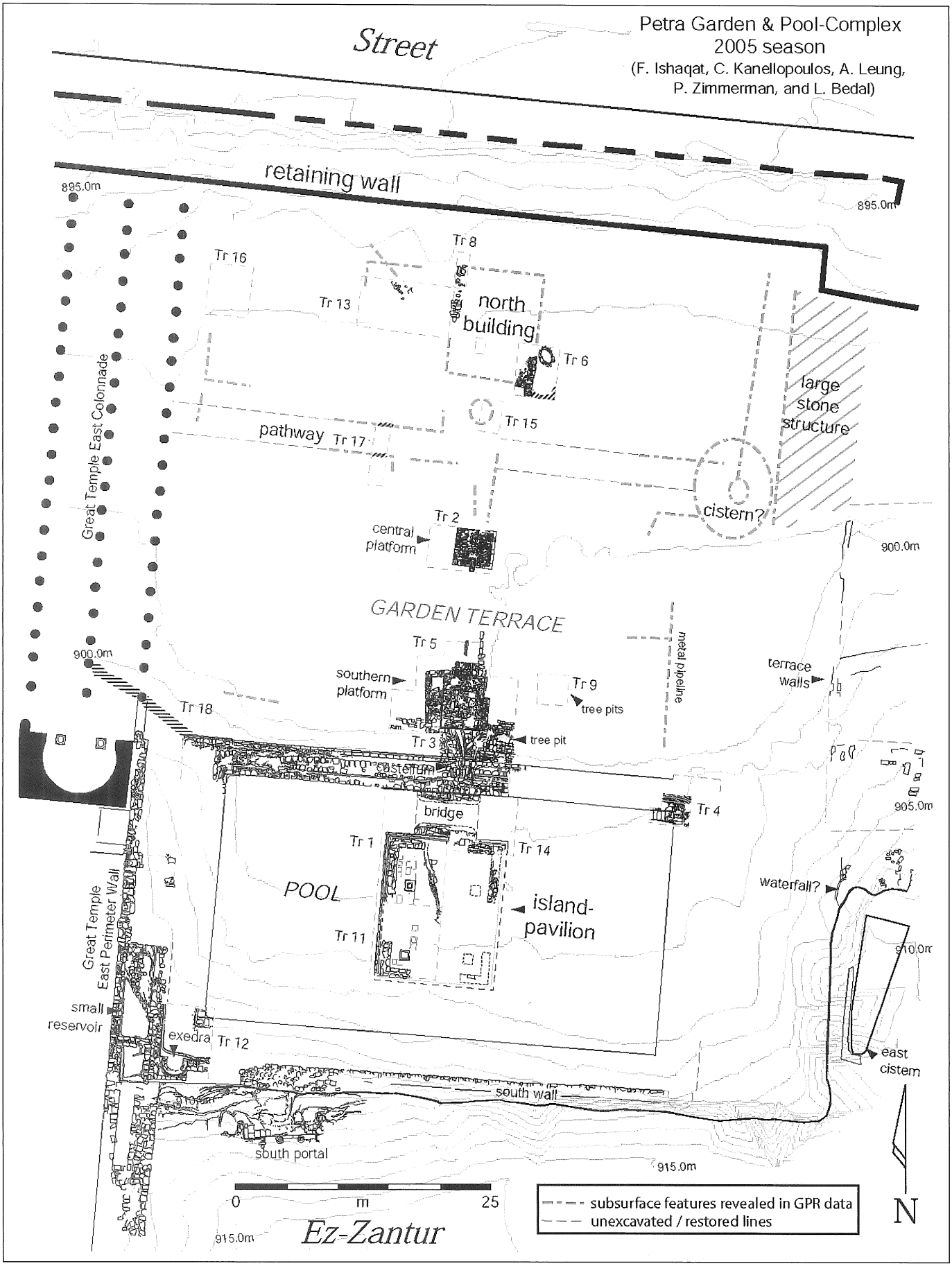
Excavations on the terrace revealed information about the site's pre-garden period (Phase I). Rudimentary walls constructed of unhewn limestone (trenches 5, 6, and 13), a stone-lined cesspit (trench 6) (**Fig. 6**), and an enigmatic earthen basin (trench 15) underlie the more substantial structures composed of sandstone ashlars and their associated cultivated soils of the Nabataean garden (Phase II). An assemblage of broken ceramic vessels and other small finds was discovered in a deposit overlying one of the early walls (trench 13). The assemblage forms a homogeneous group of Nabataean material culture dating from the mid- to late 1st century BC (see Phase I below).

In trench 5, the southernmost of the two large stone platforms or plinths aligned along the terrace's central axis (originally discovered with GPR in 2001) was fully excavated and determined to have been built in three phases (Phases

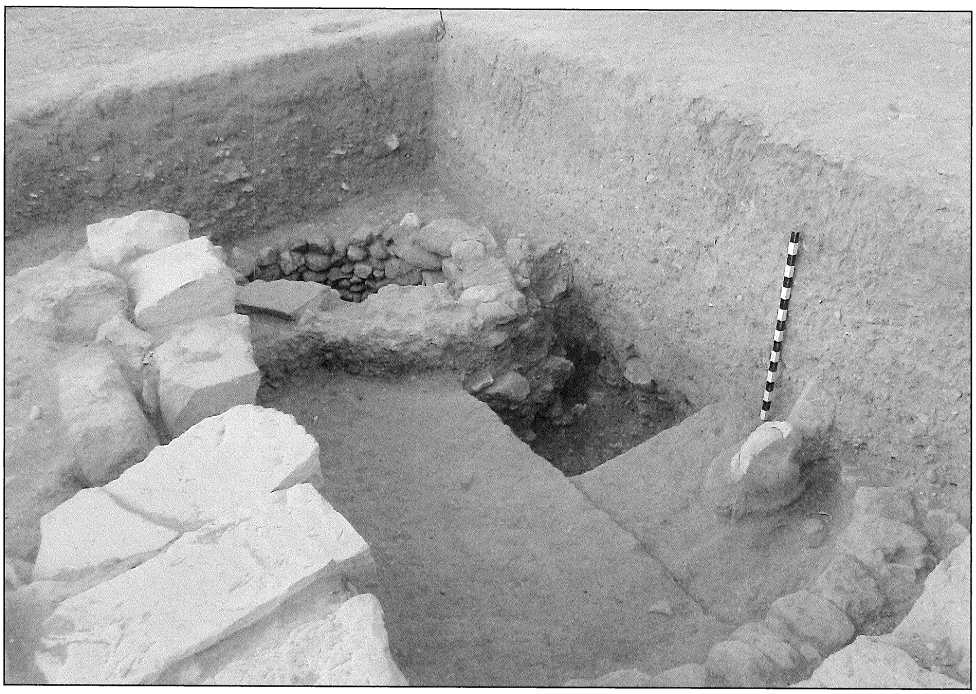


4. Plan of the garden terrace combined with a GPR horizontal amplitude slice showing the location of subsurface features at the depth of 48-72cm. (GPR: L. B. Conyers, E. G. Ernenwein and M. H. Grealy; surveying/mapping: F. Ishakat, C. Kanellopoulos, A. Leung, and P. Zimmerman).

4. The 2001 GPR team headed by Larry Conyers (Denver University) employed a Geophysical Survey Systems Inc (GSSI) Subsurface Interface Radar (SIR)-2000 system with 400 mhz antenna to control radar propagation in the ground and record the resulting reflections. In 2003, Conyers' student, Michael Grealy, added a 900 mhz antenna to obtain a more detailed subsurface map.


Petra Garden & Pool-Complex
2005 season
(F. Ishaqat, C. Kanellopoulos, A. Leung,
P. Zimmerman, and L. Bedal)
Street
retaining wall
895.0m
895.0m
Tr 16
Tr 8
Tr 13
north building
Tr 6
large stone structure
Great Temple East Colonnade
pathway Tr 17
Tr 15
cistern?
central platform
Tr 2
900.0m
GARDEN TERRACE
Tr 5
metal pipeline
900.0m
southern platform
Tr 9
tree pits
terrace walls
Tr 18
Tr 3
tree pit
eastern
bridge
Tr 4
905.0m
Tr 1
Tr 14
POOL
island-pavilion
waterfall?
Great Temple East Perimeter Wall
Tr 11
910.0m
small reservoir
exedra
Tr 12
east cistern
south wall
south portal
915.0m
0
m
25
915.0m
Ez-Zantur
subsurface features revealed in GPR data
unexcavated / restored lines
N

5. Site plan.

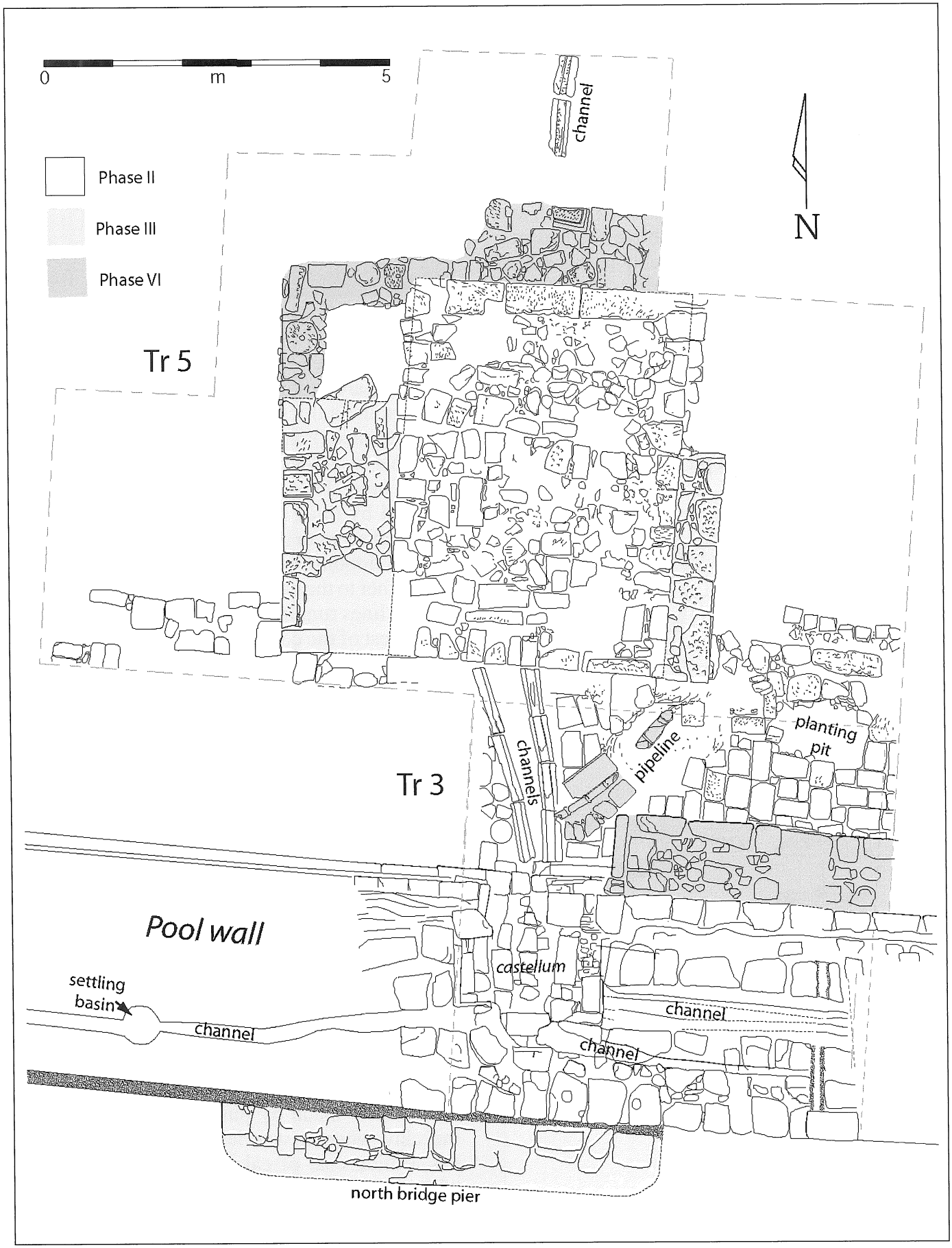


6. Trench 6. Phase I cesspit and wall (lower right). Foundation of North Building (Phase II) on left.

II, III, and VI) (**Figs. 7** and **8**). The space between the southern platform and the *castellum divisorium* was excavated, revealing the stone channels that link the *castellum* (incorporated into the pool's north façade wall) and the southern platform. The channels terminate at holes built into the platform's foundation. An additional section of stone channel was discovered north of the platform, leading toward the central platform. Also revealed was evidence of the reuse of the Nabataean hydraulic features and the installation of a plaster-lined basin in the Late Roman-Byzantine period (Phase VI). A planting pit was discovered in an opening in the pavement to the east of the platform. A deep sounding in the northeast corner of trench 5 penetrated the alternating fine strata of wadi gravels and clay deposits to bedrock (elev. 896.6-897.8).

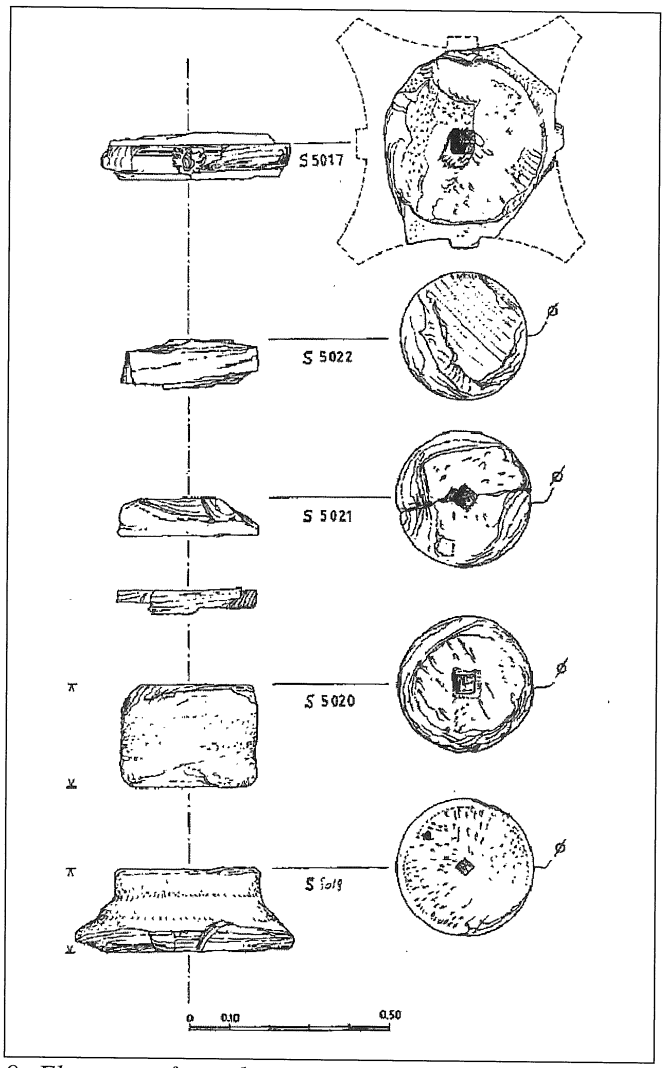
James Schryver proposed an excavation to the east of trench 5, in the area of the raised field (southeast quadrant of the terrace) where soil tests carried out in 2001 indicate the strata

7. Trench 5, looking north. The Southern platform and channels; the castellum is in the foreground.

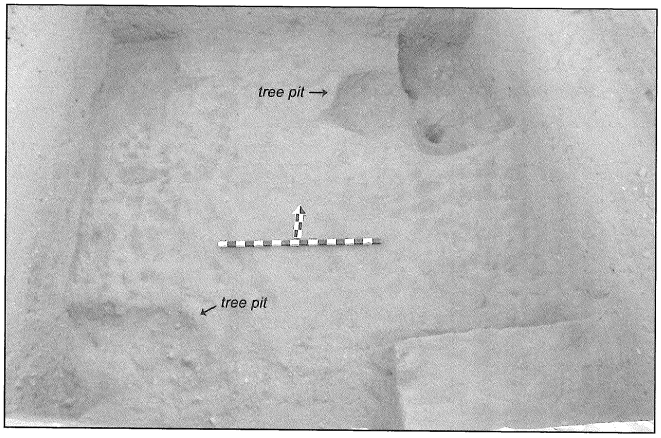


8. Trenches 3 and 5, top plan (Drawn by C. Kanellopoulos and L. Bedal).

are better preserved than elsewhere on the terrace. In addition, GPR indicated that there were no architectural features in this area and so it seemed an ideal location to search for plantings and clear soil stratigraphy away from the architecture where there tends to be a lot of disturbance. The Trench 9 excavations proved this to be true. After a sequence of clear strata, bedrock was reached across the 3m x 3m trench at a depth of 2.2m. Immediately above the bedrock is a series of sand, gravel and clay lenses which is void of archaeological materials. The stratum of yellowish-brown loam that has been identified as the original (Phase I) garden soil is laid directly on top of the uppermost of the virgin deposits. Two tree pits (**Fig. 10**) were cut and aligned diagonally with the tree pit in the pavement in trench 5. There is also a possible alignment with another small pit found in the eastern



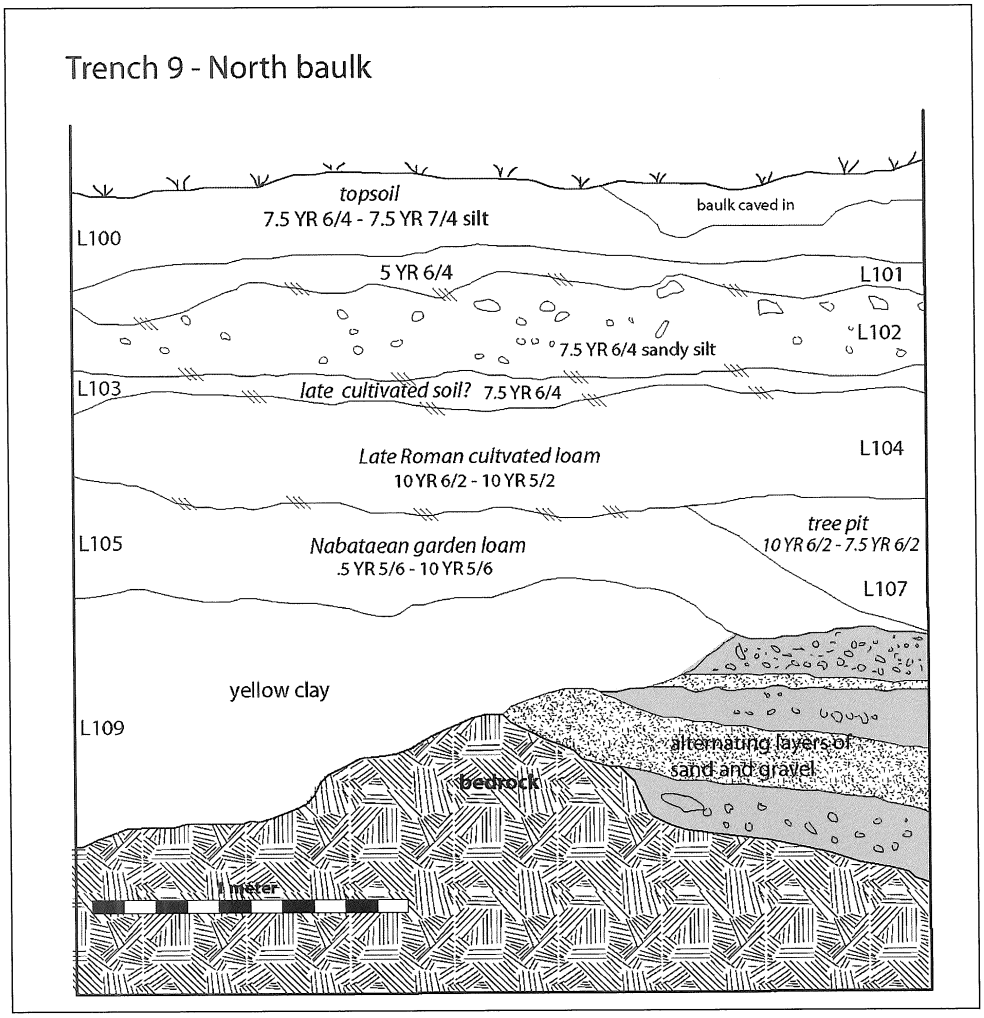
9. Elements of a column and capital used as fill in the Phase III renovations to the southern platform, trench 5 (drawn by C. Kanellopolous).



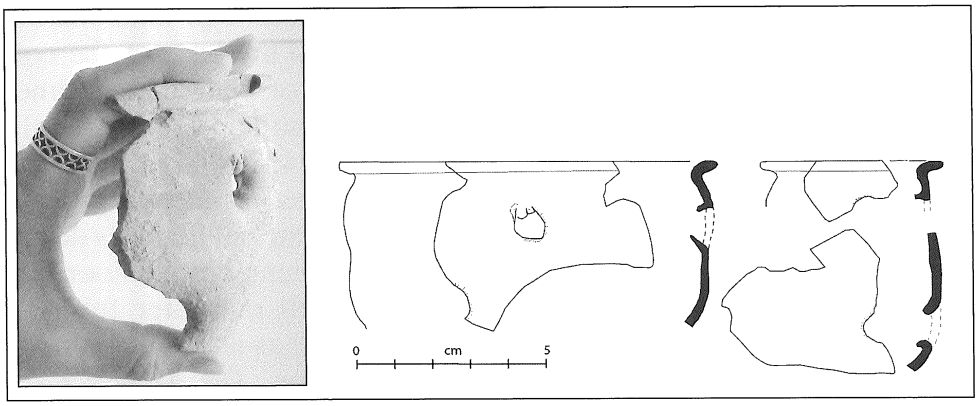
10. Trench 9. Tree pits cut into Phase I (Nabataean) garden loam.

edge of trench 5 further to the north. Above the original garden soil are two more layers of cultivated soils: a thick gray stratum that covers the entire terrace (Phase VI), and a light brown stratum that is associated with the creation of the raised field (Phase VIII). The latter, in turn, is covered by three more strata of reddish-brown soils that seem to be the result of other activities, such as flooding (see **Fig. 11**).

Further to the north, GPR showed two parallel broken lines running east-west across the terrace northwest of the central platform. Trench 17 was opened mid-season in order to find and identify the nature of these features. Immediately below the stratum of gray-colored cultivated soil attributed to the Late Roman period, two parallel rows of stone were discovered set into the surface of a gravel deposit, forming what appears to be a gravel path or walkway 2.5 meters wide. If projected westward, this pathway is aligned with one of the intercolumnations in the East Colonnade of the Great Temple's lower temenos and may be the formal route one would be expected to follow when entering the garden from the west. GPR shows what may be a continuation of the path 20 meters to the east (**Figs. 4** and **5**). To the south of the walkway, fragments of a planting pot or "flower pot" (**Fig. 12a/b**) were found in the gravel, above a lens of reddish soil. The walls of the pot are perforated with several large holes, made by pushing a finger through the clay when it was leather-hard; its interior has a thick coat of calcium deposit. The Petra "flower pot" is similar to the planting pots excavated by Kathryn Gleason in the Winter Palace of Herod the Great in Jericho (Gleason 1987-88) whose perforations allow for water drainage



11. Trench 9. North baulk.



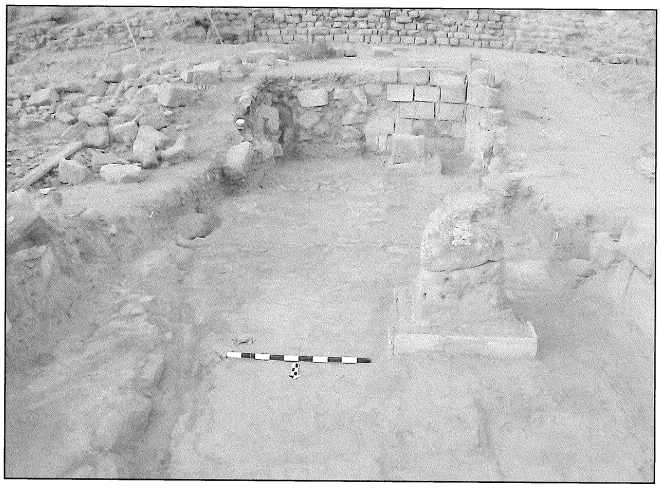
12a. and b. Planting pot fragments (05-P-02), trench 17.

and root growth. This general form of planting pot, *olla perforatae*, is found in ancient garden sites throughout the Roman Empire (Macaulay Lewis 2006: Type B, fig. 3, 2006b).

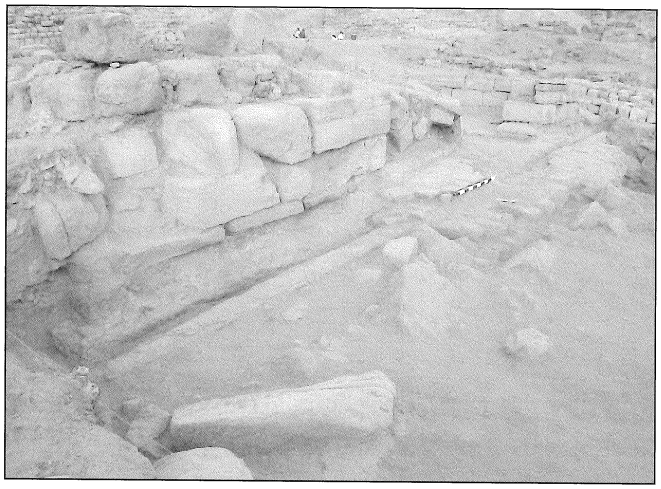
The Pool

Island-pavilion (Cyzicene oecus)

The island-pavilion is built on a stone plinth (10 x 14 x 2.5m) at the center of the monumental pool. Trenches 11 and 14 were excavated in 2004 to expose the southwest quarter of the island-pavilion's interior (the northwest quarter was excavated in 1998) and to fully expose the north façade (**Figs. 13** and **14**). The second of four column pedestals of the pavilion's tetrastyle plan was uncovered in the southwest corner. Like the north doorway, the west lateral doorway, which is centered between the two western column pedestals, measures 4.95m in width and is framed by a triple fasciae. The southern (rear) doorway was partially excavated and is equal in width to the north and west doorways (and pre-



13. Trenches 1 and 14. The pavilion's western interior with the two column pedestals and floor drain (lower left).



14. Trench 14, looking west. The north façade of the island-pavilion with perimeter channel.

sumably the east lateral door which is not yet excavated). Such broad openings allowed air to circulate freely and provided visitors with expansive views of the garden as well as the cool water and majestic architecture that surrounded the pavilion on all sides (**Fig. 17**). Chrysanthos Kanellopoulos has suggested that these characteristics of the island-pavilion — its orientation to the north, its side windows and association with gardens — lead to a plausible identification of the island-pavilion as a Cyzicene *oecus*,[5] a specific form of dining hall described by Vitruvius as follows:

There are also, though not customary in Italy, the oeci which the Greeks call Cyzicene. These are built with a northern exposure and generally command a view of gardens, and have folding doors in the middle. They are also so long and so wide that two sets of dining couches, facing each other, with room to pass round them, can be placed therein. On the right and left they have windows which open like folding doors, so that views of the garden may be had from the dining couches through the opened windows. The height of such rooms is one and one half times their width (*De Architectura*, vi.3.10).

Dining halls are common features in Petra and nearby Sīq al-Bārid. Their most common form is the *triclinium* which ranges in context from domestic to sacred (cf. McKenzie 1990: 108). The recently excavated Egyptian *oecus* in Bayḍa is an example of an elaborate reception/dining hall that the excavators interpret at part of an elite residence (Bikai *et al.* 2007 and 2008). A Cyzicene *oecus* in the PGPC supports the interpretation of the site as primarily secular, a luxury garden associated with an elite or royal complex within Petra's City Center (Schluntz 1999; Bedal 2004: 171-178).[6]

There is no evidence for folding doors in the PGPC Cyzicene *oecus*, although the warmer arid climate in Petra may have negated any need to seal off this space. The pavilion's floor pavers were robbed in antiquity, although some marble facing remains adhered to the base of the column pedestal. Fragments of marble tiles, limestone/marble volutes, dentillated and brightly painted stucco (Bedal 2004: 55-58, figs. 11, 12, pls. XVI,-XVIII) uncovered in the fill provide some indication of the ornate nature of its décor. A drain originating in the center of the floor was possibly intended to catch rainwater from an opening in the roof as well as any spillage from dining activities (Vitruvius *De Architectura*, vii.4.5). The drain extends across the threshold of the north doorway and empties into a channel that circles the exterior perimeter of the island.

Pool Perimeter

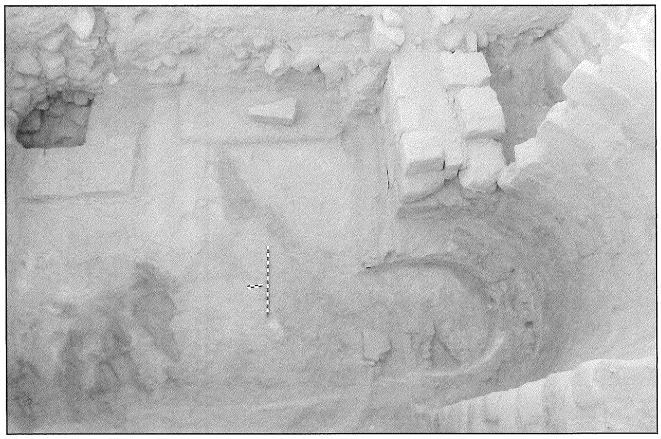
As stated above, a major clearance of heavy overburden is necessary before excavation of much of the pool perimeter is possible. After

5. A detailed study of the architecture of the Petra Cyzicene *oecus* and the comparanda is currently in progress.

6. Glen Bowersock (2003: 24) suggests that the pool might have been used for the celebration of the Maioumas, a popular festival that originated in Syria and involved banqueting, entertainment, and water spectacles. This is a possibility that must be further explored.

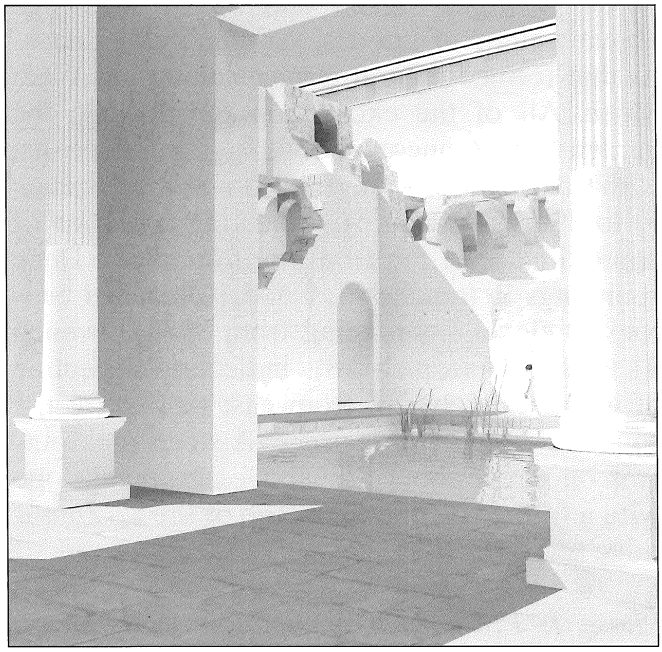
several meters of earth and debris were removed from the top of the slope in 2003, exposing the uppermost courses of major architectural elements in the southwest corner, trench 12 was opened to investigate this architecture and to obtain a stratigraphic sequence for the remaining 5m depth of overburden covering the promenade. The stratigraphy revealed evidence for a long period of abandonment, beginning in (Phase IV) during which earth and debris from the upper slope of az-Zanṭūr washed down and filled the pool and the promenade with two major destruction levels (Phases V and VII). A wall built high on the slope probably functioned as a check dam to prevent erosion and to control water runoff sometime during the post-Classical period.

The excavations in trench 12 revealed the east face of the Great Temple's East Perimeter Wall (H.: 4.40m) which forms the boundary between the Pool and the Great Temple's Upper Temenos which is elevated on a bedrock shelf 3.60m above the pool's promenade. A small reservoir set on the east edge of the upper temenos shelf (elev. 904.71m) occupies the casemate space of the East Perimeter Wall and is connected by channels to the Great Cistern in the Great Temple's upper temenos (Joukowsky 2002: 323-324). At the junction of the East Perimeter Wall and the South Wall is an exedra (3.10 x 2.27 x 1.64m) that is oriented north along the pool's west promenade (**Figs. 15-17**). The top courses of the South Wall have been traced eastward for 49.15m. This wall was apparently built to conceal the quarried rock face of the southern escarpment which forms the backdrop for the pool, similar to the screen wall still standing in the so-called "Upper Market". A niche is built into the face of the South Wall, 3m above floor level, opposite the south doorway of the island-pavilion and aligned with the site's central north-south axis. The east face of the Great Temple's East Perimeter Wall and the South Wall are founded on a quarried bedrock step (elev. 901.10) that forms the promenade around the pool. The original paving stones that covered the promenade were robbed in antiquity, leaving the bedrock exposed. The pool's southwest corner, lined with thick hydraulic mortar, was uncovered in the southeast corner of trench 12 (**Fig. 15**). The discovery of a third pool corner (the northeast and northwest corners were found



15. Trench 12, from the top of the West Wall. Exedra and South Wall on right.; pool's southwest corner with channel in upper left.

16. Trench 12, from northeast. The exedra with the West Wall (right) and the South Wall (left).



17. Reconstructed view of the exedra from within the pavilion (C. Kanellopoulos).

in 1998) finally permits an accurate measurement of the pool's dimensions (43.20 x 23.70 x 2.50m).

Stratigraphy / Phasing:

One primary goal of the 2005 season was to review the stratigraphy and archaeological record of all of the excavated trenches in order to establish a chronological sequence for the site. Based on the current data, it is possible to identify nine distinct phases, described below from earliest to latest.

Topography

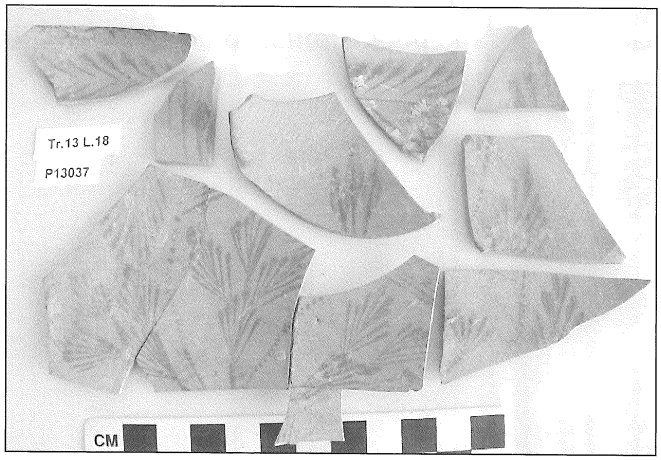
The south slope of the Petra basin was composed of high, rugged outcrop of sandstone above a slope of gravels, sand and clay deposits that formed natural terraces along the Wādī Mūsā. All of the excavation trenches on the garden terrace uncovered wadi gravel deposits, with top elevations ranging from 898.55 (trench 9) to 896.92 (trench 6), indicating a decline of approximately 1.5m from north to south. Deep soundings in trenches 5, 9 and 18 reached bedrock at elevations ranging from 898.00 (trench 9) to 896.03 (trench 18), indicating a decline of approximately 2m from east to west at the southern edge of the terrace. A steep rock outcrop once rose about 12m above the gravel slope with a further incline to the top of the az-Zanṭūr ridge (elev. 937.08).

Phase I: Pre-garden occupation (Nabataean, 1st century BC)

Evidence for an occupation of the wadi terrace prior to the monumental development of the Petra basin is present in the form of sections of walls constructed of unhewn limestone and field stones founded directly on the gravel surface (trenches 5, 6, and 13). In trench 6, a cesspit is dug into the gravel and lined with field stones (**Fig. 6**). Pottery sherds uncovered from the cesspit are coated in a thick residue from the organic-rich fill, (yellow-green in color), are fragmentary and are difficult to identify. However, the recovery of two badly corroded coins of Aretas II (110?-90BC) and a small fragment of black glazed ware indicate a date of 2nd-early 1st century AD for the use of the cesspit. The Phase I walls are similar in construction to domestic structures also founded on the gravel surface of a lower wadi terrace, along the street just north of the garden terrace that have been dated to the 2nd and early 1st century BC (Parr 1970: 360-61 and 2007; Graf *et al.* 2005: 422-424).

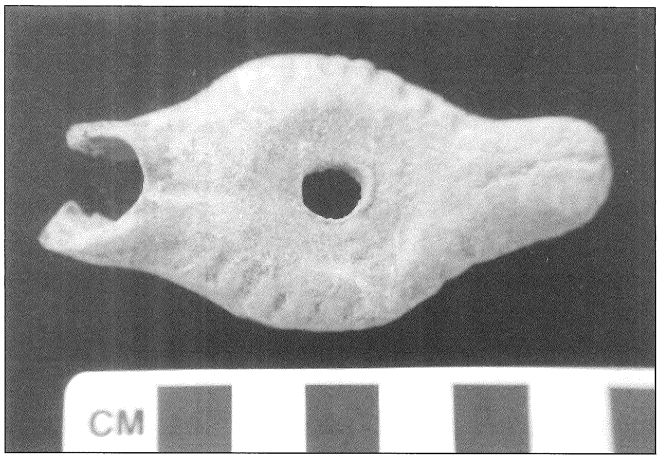
An assemblage of numerous broken ceramic vessels and other small finds was discovered in a deposit overlying one of the early walls (trench 13). The assemblage includes cooking pots, unpainted and painted (phases 1 and 2a/b) Nabataean fine ware (Schmid 2003: 75-79) (**Figs. 18** and **19**), along with an "apprentice" lamp (Barrett 2005: 87; Zanoni 1996: Abb. 900, 924) (**Fig. 20**) and figurine fragments,[7] all dating to the mid-to late 1st century BC. Also found with this assemblage were several ornaments (cowrie shell bead, two dark glass spacer beads, two fragments of polished bone rings), a sherd from

18. Pottery from pit overlying Phase I wall, trench 13 (Locus 17-19).



19. Nabataean painted fine ware (phase 2a) from pit overlying Phase I wall, trench 13 (Locus 17-19).

7. The PGPC figurines are currently under study by Christopher Tuttle (ACOR).



20. Nabataean "apprentice" lamp (PGPC 04-L-04).

a faience vessel with combed decoration and remnants of blue glaze, and a small limestone cup carved with three faces and draped garland (**Fig. 22**). This assemblage and associated stone features underlie the leveling stratum and the more substantial structures that belong to Phase II and thus predate the creation of the garden and pool complex.

The presence of this early material and its stratigraphic context support the theory that the southern slope of Wādī Mūsā was occupied before the initiation of a monumental building program in the end of the 1st century BC under Aretas IV (Parr 2007; Graf *et al.* 2005).

Phase II: Monumental garden and pool complex (Nabataean, end of the 1st century. BC — early 1st century AD)

Sometime early in the reign of Aretas IV (9BC-40AD), efforts began to create a monumental garden and pool complex to adjoin the Great Temple complex which was already under construction immediately to the west. It is logical that the first step was to quarry the rock outcrop to create a bedrock shelf to support the pool. The denser stone would be cut into blocks for use in the local construction projects (Kanellopoulos 2004: 235-238) and the larger rubble was used for fill in walls and terraces. A retaining wall[8] was erected down slope and quarry debris was spread out to create a level surface for the garden terrace (67 x 53m). This leveling stratum is clearly detected in the northern trenches (6, 13, 15), covering the Phase I structures and the wadi gravels. In trench 18, the fill of quarry debris is denser and deeper. It is (1.50m) closer to the quarrying activity where the original gravel surface was located; it is a lower elevation than elsewhere on the site. In addition to mostly non-diagnostic pottery sherds, phase 2 Nabataean ceramics and some coins of Aretas IV have been found in this leveling stratum. In Trench 5, a nearly complete Hellenistic lamp with radial petals and side lugs (**Fig. 21**) was found in the leveling stratum for the pavement.

A major feature belonging to Phase II is the monumental pool complex that occupies the south half of the site. A broad wall composed of mortared limestone block was built along the northern edge of the sandstone shelf and faced on the north with ashlar blocks and an S-profile base moulding. Despite its decorative façade, the primary function of this wall was as a dam which transformed the space behind it into a monumental pool calculated to have held nearly 2100 cubic meters (over 2 million liters) of water. The pool's northeast corner (trench 4) has steps to provide easy access for swimming and/or maintenance and the center of the pool holds a massive stone plinth (11.5 x 14.5

21. Hellenistic lamp (PGPC 05-L-03).

8. Wall K in Parr 1970. The Portico Wall that parallels Wall K forms a façade for the intermural rooms or "shops" that open onto the street.

22. Carved limestone cup (PGPC 04-S-08).

x 2.5m) that forms an island supporting the island-pavilion. The interior of the pool and the island's plinth are lined with a thick, heavily pebbled hydraulic mortar, such as is commonly used to line the reservoirs and cisterns found in many Nabataean settlements (Sha'er 2004). The water channels that run the perimeter of the pool (uncovered in trenches 4 and 12, and the length of the pool's north wall), the settling basins and *castellum* that compose the pool's hydraulic system are integral to the construction of the pool. The East Cistern, perched on top of the escarpment that forms the eastern boundary of the pool complex, also belongs to Phase II, the masonry and hydraulic mortar lining are identical to the pool construction. Water channeled down from az-Zanṭūr collected in the cistern and then was transported to the pool and garden below.

The South Wall and the exedra that frame the pool are bonded together and with the Great Temple's East Perimeter Wall, confirming the contemporaneous dating of the Phase II construction of the pool complex and phase IV of the Great Temple which is attributed to the late 1st century BC.[9] Further supporting this date is the discovery of a coin of Aretas IV dated 6 BC-18AD (**Fig. 26b**) underneath the bedding stones in the southwest corner of the promenade, north of the exedra.

On the terrace, the southern and central platforms, constructed of sandstone ashlars with a mortared rubble core (*ca.* 3.5m square) were founded on the surface of wadi gravels. In Phase II stone channels that lead from the *castellum* to the southern platform (part of the irrigation system) were concealed under a pavement (3.5m wide) that forms a walkway along the base of the pool's north wall (trenches 3 and 5) (**Figs. 7 and 8**). The North Building (trenches 6 and 8), founded on the leveling stratum at the northern end of the terrace, is also currently attributed to Phase II due to its stratigraphic context and its position as the northernmost structure in the alignment of features along the central north-south axis. The pathway (trench 17) also may be attributed to Phase II although there is not enough information to verify this at this time. It is possible that the path was installed during the renovations in Phase III.

Once the terrace was leveled and these structures erected, a layer of yellowish-brown loam was spread out across the entire expanse (found in trenches 2, 5, 6, 9, 13 and 15). According to the local Bedouin, this distinctive yellow soil originates from the ash-Sharā mountains to the east and is preferred for garden cultivation. The lack of foundation trenches alongside the platforms and North Building indicates that they were already built at the time this soil was laid down. The tree pits discovered in trench 9 are cut into this stratum of yellow loam and the tops of the tree pits are flush with the loam's surface (**Fig. 11**) and thus it appears that the tree pits belong to the Nabataean phase of the garden terrace. However, a precise date for the cutting of the tree pits is difficult to determine. Now that the presence and location of tree pits is known, future excavations of this stratum of garden soil will attempt to answer this question.

Phase III: Renovations (Roman, early 2nd century AD)

There is surprisingly little data uncovered that represents the Roman period except for some additions and renovations in the island-pavilion

9. Presented by Martha Joukowsky, in "More Surprises at the Petra Great Temple", at the International Conference on the Archaeology and History of Jordan, Washington, D. C. (May 2007).

the hydraulic system. A vaulted stone bridge ; installed to provide access to the island ›ugh its north door (perhaps a wooden bridge ; used in Phase I). This bridge was construct- ›n top of and abutting the pool's mortar lining so is a clear addition to the original design. masonry is bonded with a crumbly gray-col- d lime-ash mortar that is distinctly different n the hard impervious white mortar used in construction of the pool and the island-pa- on. The same gray lime-ash mortar extends ›ss the north threshold and is the floor bed- g for the pavilion interior. The presence of gray mortar is significant to dating its asso- :ed features as it was not used in the Naba- an area before the end of the 1st century AD. gments of Nabataean painted ware of types (ca. 100 and 106/114AD) and type 4 (post- 5/114AD) (Bedal 2004: 74, fig. 18; Schmid)6: 166, 208, abb. 702-704), indicate that the lition of the bridge and floor bedding (appar- ly part of a renovation of the pavilion) must dated to a period following the annexation Petra into the Roman Empire. The same gray rtar is used to secure and seal a ceramic pipe- : installed in the southwest corner of the pool nplex, installed along the base of the South ll and the east face of the East Perimeter Wall **g. 16**), indicating that this pipe may be part of Roman period alterations to the site.

The southern platform was extended to tch the width of the bridge (6m) at this time **gs. 7** and **8**), and the intervening space was ed with rubble and small columns drums (dia. :m) and a corresponding capital with pine- ıe boss (**Fig. 9**) which may have belonged to original Phase II composition. The purpose the addition to the platform remains unclear. a result of the construction of the bridge, the erflow passage to the *castellum* was blocked, ›arently leading to some alteration in the hy- ıulic system, possibly reflecting the transition a more restrictive Roman concept of water ntrol (Oleson 1995: 719). The overflow pas- ge was sealed up and the *castellum*'s holding ›acity was reduced with the construction of erior steps (Bedal 2004: 62, fig.15).

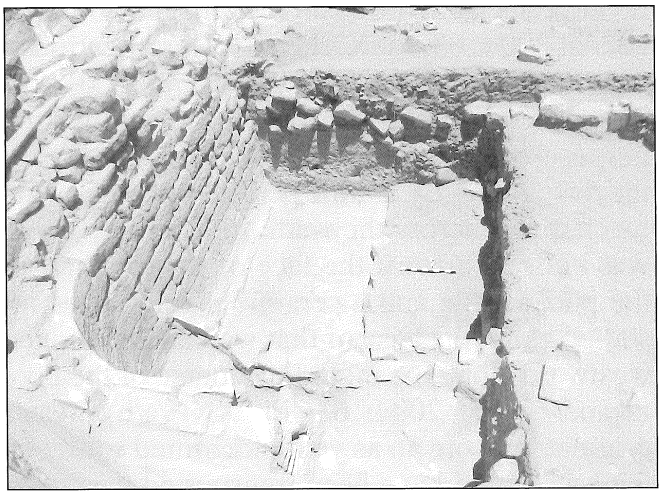
ase IV: Abandonment (Roman, late 2nd?-3rd ntury AD)

As Petra began to decline under Roman rule, proper maintenance of the pool as a luxurious recreational facility ended and it may have been converted to a basic reservoir. A deposit of gray- ish-brown sediment, approximately 0.50m deep, containing a dense concentration of material de- bris and animal bones, was allowed to build up at the bottom of the pool (trench 1). The pot- tery fragments are mixed, dating from the 1st through the 4th century AD (Bedal 2004: 76-78, fig. 19, Pl. XXVIa). It is probably during this time that the paving stones in the island-pavil- ion and those of the pool promenade and exedra were robbed out (trenches 1, 4 and 12) (**Figs. 13** and **15**). An accumulation of fill over the prom- enade bedding in the southwest corner (trench 12) further demonstrates an abandonment of the pool complex for an extensive period of time (**Fig. 23**).

Phase V: Destruction (Late Roman, 363AD)

The architectural elements of the pool com- plex suffered serious damage in the mid-4th century AD, most likely a result of the well- documented earthquake of 363AD. The upper courses of the pavilion walls collapsed into the pool, forming a dense layer of large stone rubble in a reddish-brown sandy matrix overlying the Phase IV fill (trench 1) (**Fig. 24**). In the south- west corner, stones falling from the South Wall and the Great Temple's East Perimeter Wall formed a similar destruction layer (**Fig. 23**).

Phase VI: Squatter farmers (Late Roman-Byz-



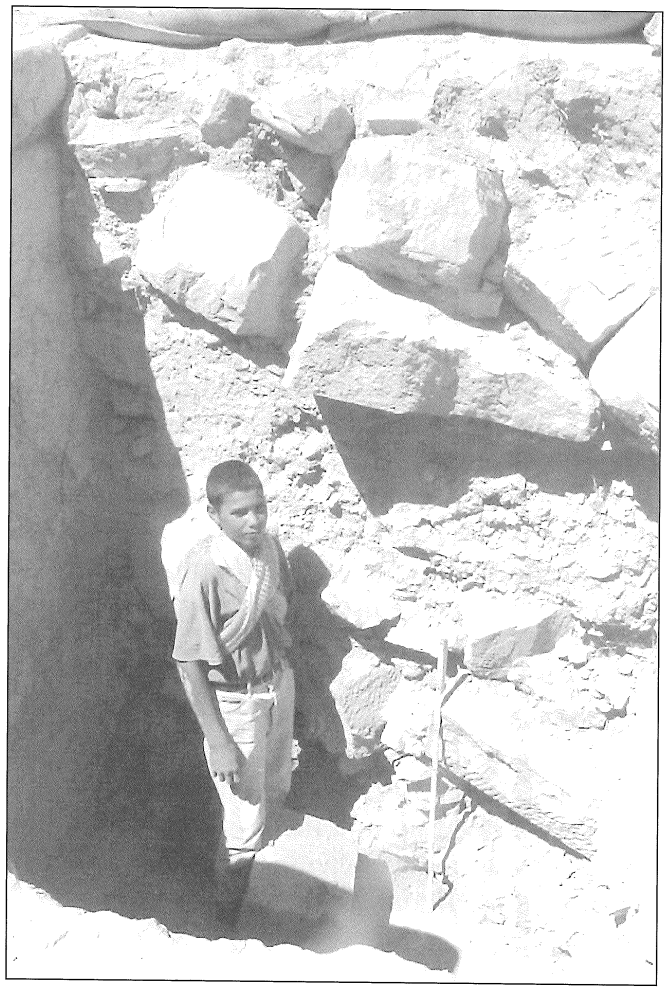
23. Trench 12, from the south. Stones of the Phase V destruction, are clearly visible in the north baulk sandwiched between the Phase IV and Phase VI fills. The Phase VII destruction level is already excavated away at the time of this photo.

antine, 4th-early 5th century AD)

In the period following the destruction, a layer of grayish-brown soil began to accumulate across the site, further filling the pool (trench 1) and covering the promenade (trenches 4 and 12) and the entire expanse of the garden terrace (trenches 2, 3, 5, 6, 8, 9, 13, 15, 17 and 18) up to 0.40m in depth. This grayish-brown stratum has characteristics of a cultivated soil and is rich in material finds ranging in date from the 1st century BC to 5th century AD, including 40 Late Roman coins (4th-5th century AD), among which is a rare *victoria auggg* from Aquileia (**Fig. 26h**) and an early *cross* issue (**Fig. 26j**). To the north of the *castellum*, paving stones were torn out to reveal the stone channels underneath and a coating of white plaster was applied to the south face of the southern platform and along the edge of the disturbed pavement to create a makeshift water basin (**Fig. 7**). A reused column drum, its top surface hollowed out, was positioned inside the plaster basin abutting the *castellum*. The exposed channels in the promenade and the *castellum* tank were reused to direct runoff, and probably water collected in the pool, into this basin. An abundance of bronze fragments, badly corroded coins (mostly illegible, but identified by Bowsher as Late Roman, see below), and pottery fragments discovered in the sediment that filled the basin were deposited there as water runoff continued to flow through the exposed channels even after the basin went out of use. A ceramic pipe, laid directly on the pavement, leads from the basin towards the northeast (Bedal 2004: 63, Pl. XXIVa/b). This attention to water collection and distribution suggests that the terrace continued to be used for cultivation purposes, although now to grow food crops for the developing Byzantine period settlement with its churches across the wadi. In addition, a wall was built up against the face of the east half of the pool façade and a ceramic pipeline was installed along the base of that wall and continued westward along the moulding course of the pool façade (Bedal 2004: 63, Pl. XXIVa/b). Water originating from an as yet unidentified source in the east would have been transported westward through this pipeline toward the lower temenos of the Great Temple complex. It was probably during Phase VI that the northwest corner of the southern platform was extended with a course of stacked unhewn stones and reused small column drums, but the purpose for this addition is not yet clear.

Phase VII: Destruction (Byzantine, 6th century AD?)

A stratum of large stone debris in a reddish-brown sandy matrix overlying the Phase VI fill in the southern half of the site (trench 1, 3, 4 5, 9, 11, 12, and 14) marks a second major destruction episode causing the further collapse of the walls surrounding the pool complex and the island-pavilion (**Fig. 24**). Elements of the pavilion's architectural décor (marble flower, volutes, capital fragments and painted stucco) and its construction (iron nails, a plaster nail anchor, and charred wood) mark further disintegration of this structure. There is no evidence to specifically link this secondary collapse with the earthquake of 551AD, although that theory cannot be ruled out.



24. Trench 1, deep sounding in pool, west baulk. Two destruction layers are clearly visible in the pool fill.

Phase VIII: Agricultural activity (> Post-Classical/Medieval)

Following the second destruction, a makeshift wall was built across the front of the exedra and the exedra was used as a trash dump, filled with architectural debris that appear to have originated from the Great Temple. Earth continued to wash down from az-Zanṭūr to cover the pool complex forming a steep slope in the southwestern corner. Eventually, a check dam was constructed on the slope to hold the earth in place (**Fig. 3**). On the terrace, a large area (34 x 21m) occupying the southeastern quarter of the terrace was defined with a boundary of large stone rubble and architectural elements (column drums, capital fragments, mouldings, etc.) on the west and north, and the space filled in with a reddish-brown soil to create a raised field. The north end of the western boundary wall overlies the top of the Phase VI wall (trenches 3 and 5). Material finds in the Phase VIII stratum include 42 coins dated to the 4th-5th century AD, including an early *cross* issue (**Fig. 26I**). A wall of piled rubble was built along the western edge of the pool complex, down to the terrace level and then continuing eastward along the face of the pool façade, obscuring the original ashlar face from view. This wall appears to have been built to direct water runoff from the southwest down to the raised field on the terrace (Bedal 2004: 84, Pl. VIIb). A complete Crusader period cooking pot of 12th century date was found nestled inside a hollow in this barrier wall (Bedal 2004 84, fig. 20, Pl. XXVIb).

Phase IX: Modern occupation (Bedouin, > 20th century)

Use of the site for agricultural activity persisted into the modern era with the continued use of the barrier wall and field terrace until recent years by the Bedouin who continued to inhabit Petra. Several of the older men of the local Bedoul tribe recall the use of the terrace for growing wheat and corn well into the 20th century. In addition, they recall the reuse of the post-Classical barrier wall and the pool's channels to direct irrigation water to their fields. The stones used to cap the reused channel were still in place when excavations of the site began in 1998.

Archaeobotanical Remains: A Preliminary Analysis (report by Jennifer H. Ramsay)

Methodology

In 2004, archaeobotanical studies were initiated to attempt to identify the floral species cultivated in the garden, and also to highlight how the botanical material functioned in the economy and environment of this major Nabataean and Roman site. 105 soil samples, ranging from one to two liters in size, were collected from a variety of contexts and represent various periods of occupation (primarily the Nabataean and Roman periods). All samples were processed in the field during the 2004 excavation season. The carbonized plant remains were retrieved from the soil by using the flotation technique. This technique was used since it was the most efficient and cost effective method available for the size of the site and the type of soil matrix. Bucket flotation was used. Given the sample sizes, this was the most efficient method available (related to water conservation). Once the carbonized material was floating at the surface of the water, it was then poured off into nested 250 micron and 1mm mesh sieves and dried.

The dry flotation samples from the 1.0mm sieve were sorted under a Wild Heerbrugg stereoscopic microscope using up to x40 magnification. The carbonized seeds, grains, fruit and all other material that could be identified as plant fragments, except for charcoal, were removed for further identification. Of the 105 samples that were sorted, 82 samples had botanical remains present. The samples also contained charcoal, mollusk shells, bone and egg shell. The identification of the recovered botanical material was accomplished by comparing the morphological characteristics of the carbonized specimens with the modern material from the archaeobotanical reference from the Department of Archaeology at Simon Fraser University. Additionally, drawings and pictures from reference seed atlases were used and colleagues were consulted.

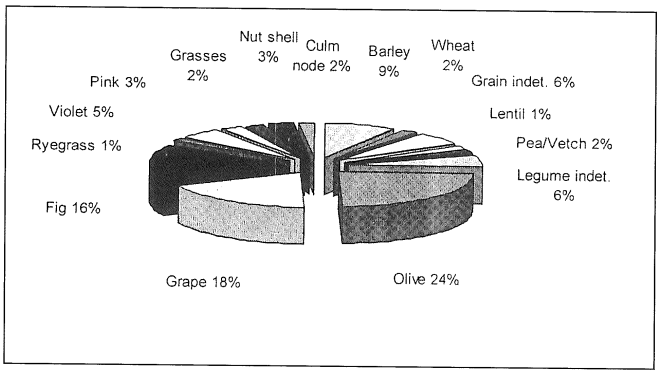
Results

From the analysis of charred botanical remains, 21 plant taxa of either seeds and/or plant parts (chaff, and nut material) have been categorized and include 10 wild species, 2 cereals, 4 legumes and 5 fruit/nut species (**Table 1**). An overwhelming 89 % of remains belonged to do-

Category	Scientific Name	Common Name
Cereals:	*Hordeum vulgare L.*	Barley
	Triticum L. sp.	Wheat
	Triticum compactum Host.	Club Wheat
Legumes:	*Vicia ervilia L.*	Bitter Vetch
	Lens culinaris Medik.	Lentil
	Vicia sativa L.	Common Vetch
	Lathyrus L. sp.	Vetch/Pea
Fruit and Nut:	*Olea europaea L.*	Olive
	Vitis vinifera L.	Grape
	Ficus carica L.	Fig
	Phoenix dactylifera L.	Date
	Juglans regia L.	Walnut
Wild and	*Chenopodium L. sp.*	Fat Hen (*C. album*)
Weed Species:	*Fumaria L. sp.*	Fumitory
	Viola L. sp.	Violet
	Galium L. sp.	Woodruff/Bedstraw
	Alkanna Tausch sp.	Alkanna
	Plantago L. sp.	Plantain
	Lolium temulentum L.	Ryegrass
	Phalaris L. sp.	Canary Grass
	Prunus L. sp.	Prunus
	Dianthus L. sp.	Pink
	Graminaceae	Wild Grasses

Table 1: List of identified taxa from the PGPC.

mesticated species: such as cereals, tree crops, vines, and other fruits (**Fig. 25**). The order of abundance follows: fruit species (olive) is 24 %, grape is 18% and fig is 16%. However, it must be taken into account that each fig fruit can produce anywhere from 10-75 seeds per fruit and each grape can produce anywhere from 2-8 seeds per fruit, which can skew the results to make fig and grape appear to have a greater representation than is warranted. Barley represents 9% and wheat represents 2%, although there are several grain specimens (6%) that could not be identified to a species level. Legumes (lentils, peas, vetch) represent 9% of the total recovered samples. Violets dominated resulting in 5% of the total species present. The grass species and the pink species (both unidentified grasses and ryegrass combined) represent 3% of findings. None of the other wild species present (fat hen, fumitory, alkanet, bedstraw and plantain) signify greater than 1% of the total findings.



25. Percentage of all plant remains from the Petra Garden and Pool Complex that represents more than 1% of the total.

The preservation of botanical material was generally quite good for the crop items, although in most cases identification to species level was unfeasible. For example, in several cases it was not possible to identify the wheat grains recovered to species level. As a result they were grouped in a *Triticum* L. sp. category. However, domesticated barley (*Hordeum vulgare* L.), characterized by being pointed at both the apex end and the embryo end, and by being rounded on the ventral surface and angular on the dorsal surface, was positively identified and appears

definitively in many samples (Nesbitt 2006). Barley dominates the crop seed assemblage (**Fig. 25**). Barley is a drought tolerant species and was locally grown and used for flour, feed and perhaps malted for beer. The very sparse quantities of both wheat grain and the chaff would indicate that wheat was probably not locally grown and was most likely an imported item.

Lentils, peas, vetch and various indeterminate legumes constitute the majority of the pulse species recovered. Several of the legume species, such as bitter vetch, are commonly used as animal fodder, suggesting that animal husbandry was being practiced. Lentils are widely cultivated for both human and animal consumption, which supports the idea of mixed husbandry occurring at Petra. Like the cereals, it does not appear that legumes were being intensively cultivated at Petra due to the small number of specimens recovered, although this may be the result of the contexts being excavated.

The most common and identifiable fruits and nuts at the site were olives (*Olea europaea* L.), grapes (*Vitis vinifera* L.), and figs (*Ficus carica* L.). These are all ubiquitous species in the region and were represented through most of the occupation periods at the site. Grapes would have had to have been irrigated and may have been grown in the garden or perhaps came from the vineyard site discovered at nearby Bayḍa (Bikai 2004). Olives are identified as *Olea europea* L., (the domesticated variety), since they most closely resemble this species in the comparitive collections and the drawings. Olives thrive in woods and scrub in dry rocky places and it is likely that a great quantity of the cultivated species were on hand in Petra (Capper 2006). Figs are also grown locally as they do well in dry environments and are quite drought tolerant, though they may also have been brought in by caravan as they travel well when dried. Small quantities of date and walnut were found but it is not known whether these would have been grown in the region or brought in by the caravans.

Some of the more common wild species identified and their ecological habitats are: *Lolium temulentum* (L.), which appears mainly in fields of cereal crops. *Chenopodium* L. sp., a common weed in tilled and irrigated fields, has been cultivated in the past as a bread plant (its seeds are also used medicinally; they are highly nutritive and possess large amounts of vitamin C). *Phalarus* (L.) sp., appears in fields and as a weed in crop fields. *Fumaria* (L.) sp., is a widespread weed of cultivation and is found on cultivated, fallow or waste ground (Feinbrun-Dothan 1986). It is apparent from the number of weeds that are associated with crops that cultivation was being carried out during several occupation periods (e.g. Nabataean, Roman and Post-Classical) in the surrounding hinterlands. *Alkana* (Tausch.) sp. appears mainly in rocky habitats, waste ground and roadsides. One alkanet species (*Alkana lehmanii* L.) contains a red dye and may have been used in textile production (Feinbrun-Dothan 1978). However, as the reference collection does not contain this species, it is difficult to determine if this species is represented at Petra. There are a couple of the wild species associated with fallow fields, roadsides and waste places such as *Galium* (L.) sp. and *Plantago* (L.) sp. *Viola* (L.) sp., can also be associated with dry, open habitats, fields and gardens or it can be associated with damp and shaded places among the rocks and bushes, depending on the species (Zohary 1972; Feinbrun-Dothan 1978).

Although it is relatively certain that many other plants were grown and being utilized in the Petra Garden, most would not have come in contact with fire and consequently would only have a small chance of being preserved. In contrast, crop species and any weeds that may have been contemporary, could become charred through cooking fires, parching ovens and kitchen waste disposal regimes (Ramsay 2007).

Discussion

From the information collected during the 2004 excavation season at the PGPC a definite flora assemblage has been identified for both the cereal/crop items and wild species. After having studied these remains, it is possible to provide a preliminary hypothesis for the following questions: What plants were growing in the Petra Garden? What crops were being exploited in the region and why? Do wild species provide any evidence for intensive agriculture being carried out in the region during the different periods? Due to the lack of equal representation of samples from the various occupation periods these preliminary theories can only offer indications of general trends.

The charred nature of the botanical remains in the PGPC combined with a prevalence of crop and weed species indicates material that was accidentally or intentionally charred in a hearth or parching oven, then cleaned out and deposited on the garden to act as a fertilizer. This is the most plausible explanation for several reasons: first, the preserved material is charred, which implies that it had to come in contact with fire or high temperature, most likely in an oven or hearth. Second, most of the plant remains do not reflect garden plants; therefore they must have come from another place. Third, the incorporation of crop species in the assemblage appears to indicate that the material may have either emanated from a food preparation or processing area, or from the use of dung as a fuel source. Finally, the weed species present in the samples must have been separated from the crop species during processing and been disposed of, possibly by burning in an oven or hearth (Ramsay 2005).

This data, then, can tell us little about the plants growing in the garden at the time of occupation, because unless the garden was intentionally burned, there would not have been any way for the garden plant seeds to carbonize and therefore survive in the archaeological record. Yet it may well be possible to find out about the larger agrarian landscape through the variety of species recovered. Although the quantity of the plant remains is sparse, the remains suggest what was happening in the natural economy of the site and its region.

The cereal crops that were exploited at Petra were barley and wheat. The barley was a reliable drought-tolerant species that was used by humans and as a fodder crop for animals. The wheat species were used as flour for bread production in the region and appear to have also been imported as there is very little indication of local production. There were also various legumes, such as lentils, vetch and peas. Legumes were used as a reliable source of protein for both human and animal consumption. The fruits and nuts at Petra were olives, grapes, figs, dates and walnuts. Most fruits and nuts species were cultivated by this time, but some, (such as walnut), may have been gathered from wild species and imported to the region.

The agricultural techniques being practiced in the region surrounding Petra were almost certainly mixed farming in most periods since there is evidence of both plant and animal husbandry. Without more sampling, it is difficult to determine the scale at which agriculture was being practiced or the extent to which agricultural goods were being imported from the Nabataean (or later) period at Petra. The lack of wild species typically found in wet areas (i.e., sedge and rushes), indicate that intense irrigation of crop species was not being practiced in the immediate area during the periods in question.

Thus, although the preserved botanical evidence tells us little about the plants growing in the garden, they do provide important information about the type of subsistence strategies (diet and economy) practiced by the population and the type of landscape that was present during the different periods of occupation at Petra. This kind of evidence may also be vital in identifying other aspects (culture, economic exchange and natural environment) of the societies that once occupied the region

Additional recovery and analysis of samples from periods not well represented and from areas of the site not well sampled will be necessary to further address important questions about the garden. Further study can broaden our knowledge of the economy and environment of the site through its various occupations. Likewise, analysis from other sites of this period would undoubtedly aid in our understanding of the economic and ecological changes that occurred through time.

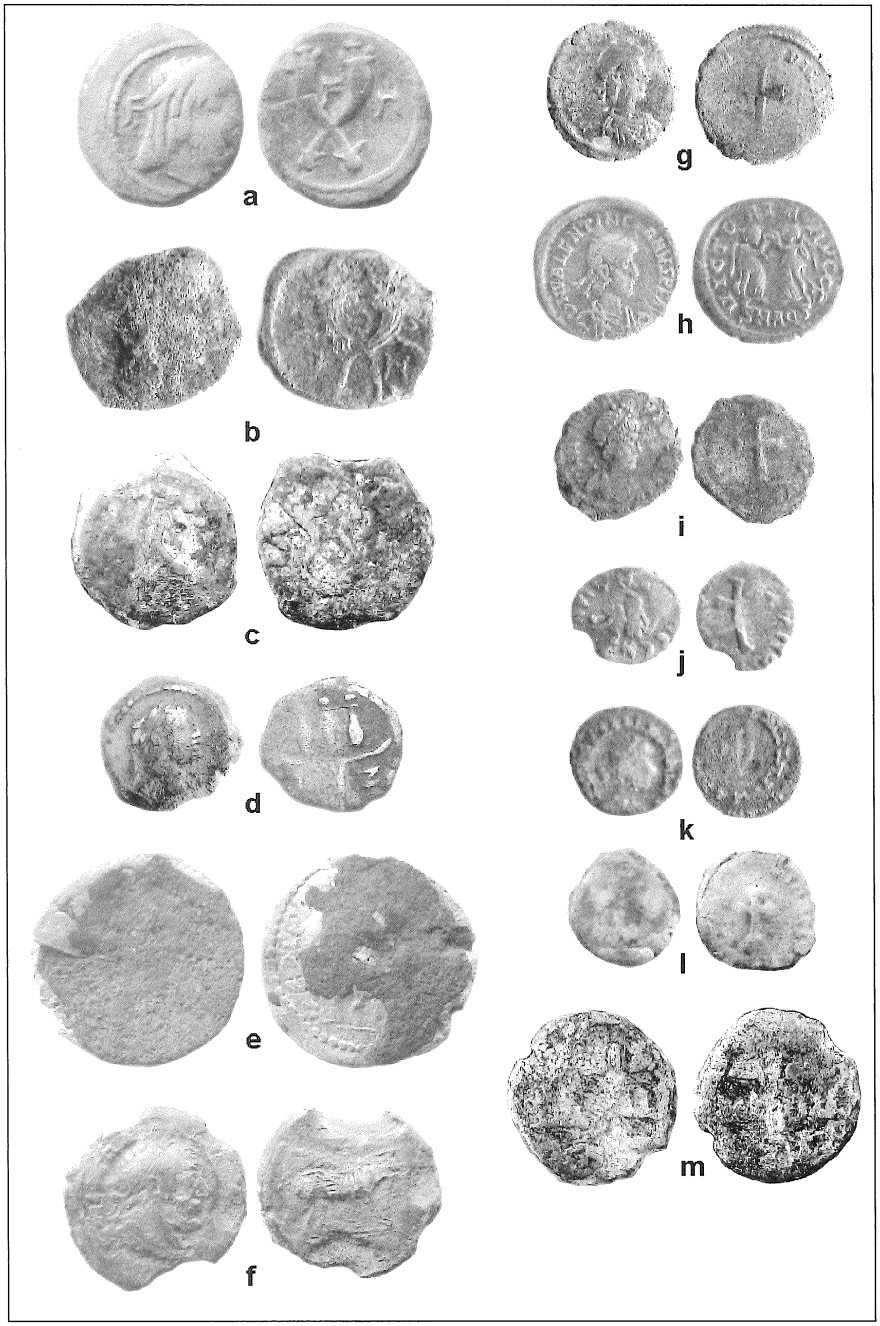
The Coins: Some Observations (report by Julian Bowsher)

To date, archaeological excavations at the PGPC have provided 162 coins. The coins are generally in a poor condition, and many are not fully cleaned. However, most could be identified. Most of the illegible coins could be roughly assigned on the basis of traces of design and fabric. "Illegible Nabataean" and (in greater numbers) "illegible Late Roman" coins were found.

Of the 162 finds, 39 (24%) are Nabataean issues and complement finds from other places in Petra. Most are from post-Nabataean deposits although it is uncertain how many might have continued to circulate into the 2nd and 3rd centuries. Aretas II coins are, (as is often the case),

in poor condition, offering confirmation to suggestions that they had a lengthy circulation within the Nabataean economy. However, undecided whether the coins were produced over many years.

Another similarity to other excavations at Petra is the paucity of 1st century BC issues. Certainly many types of coins are known (cf. Meshorer 1975) but circulation must have been limited. Coins of Syllaeus (9BC) are also moderately uncommon; only one has been found in the PGPC (**Fig. 26a**). Only from the last decade of the 1st century BC do the well known 'quarters' of Aretas IV appear, though these also seem to have had a lengthy period of production. It might be interesting to note that the issues of Aretas IV comprise only fractions rather than the well known whole units. This is not very surprising because these coins must have continued to circulate as small change because Aretas' successors produced very few fractions. Nevertheless, the evidence of this collection is unique. The fabric and shape of one surface find suggests that it is a Nabataean whole unit, though it remains illegible. There are two whole units of Malichus II (40-70AD) which are fairly common. Another difference with other recent assemblages is the complete absence of any coins



26. Select coins from the PGPC excavations. Scale 1.5:1.

of Rabb'el II (71-106AD) which are common elsewhere. It is often assumed that Nabataean issues continued to circulate into the 2nd century AD though the stratigraphic analysis has yet to fully prove this.

A single coin of Herod (42-44BC) (**Fig. 26c**), found in the Phase X fill, is of a type that was produced in great numbers throughout his reign and was very common west of the Jordan Valley. Surprisingly, however, very few of these coins are found east of the Jordan Valley and this is the first (to my knowledge) from Petra.

As is common from Petra and other nearby sites, there are very few coins dated to the 2nd-3rd century AD. The earliest are Trajanic issues whose appearance has been noted in Petra before. The imperial quadrans (**Fig. 26f**) should be rare in the east though others have been found in Petra and elsewhere. The Alexandrian issue (**Fig. 26d**) proves that there might be a military connection; funds arrived with imperial forces from Egypt during the consolidation of the new province (Bowsher 1987).

There are seven Roman Provincial coins (4%) from the 2nd and 3rd century AD, (including an Alexandrian issue), but were all found in poor condition. Only two might have been from Petra. One of these is almost certainly a Petran issue of Caracalla, Geta or Elagabalus, these are all very common in recent coin finds from the city. The countermark B is common on Petran issues. The fabric of the other coins suggests local mints.

Of interest is a badly corroded denarius (**Fig. 26e**) from Emesa (193-196AD) which provides interesting information on the circulation of silver.

The bulk of the pieces here, (as with most other assemblages), 110 (67.9%) are of Late Roman Imperial date. This is an interesting range. Of the identifiable pieces (54), the greatest amount date to the second half of 4th century AD (**Table 2**). The coins are well known types, although the paucity of *fel temp reparatio* issues (348-361 and 351-55AD) is interestingly low (3). Conversely, the numbers of *spes reipublicae* (355-361AD), though indeed common issues, are moderately high (10). The dominance of *securitas reipublicae* (10) over the contemporary *gloria romanorum* (3) (364-378AD) is attested to elsewhere in Jordan and Syria. The later 4th century AD (378-495) pieces are fairly common with *salus reipublicae* showing dominance (7). It might be noted that this type was also produced in the 5th century AD. Although in poor condition, these coins appear to have the leaner earlier figures. The *victoria auggg* from Aquileia (**Fig. 26h**) is a moderately rare find in the east. Interestingly, most *cross* issues found in this area are usually from the later 425-450AD period. Tthe identifiable pieces here (**Figs. 26g, i-l**) are distinctly earlier, although the date (ca. 378-83AD?) is not entirely clear.

Very few mints are identified though the meagre information provided; this does not upset any known trends. Rome is only dominant in the earlier and later periods. The only other

Table 2: Distribution of coins of Late Roman, 4th-5th century AD, date.

City													Total
Rome		1		1				2			1		5
Aquil									1				1
Thess	1												1
Herac							1		1				2
Const			1	1									2
Nico									1				1
Cyz				1					1				2
Ant			1	1					1				3
Alex					1			2		1			4
Unkn				3	1	1	9	9	8	1		1	33
Total	1	1	2	7	2	1	10	13	13	2	1	1	54
DATES	**316-317**	**324-330**	**330-337**	**347-348**	**348-361**	**351-355**	**355-361**	**364-378**	**378-395**	**404-406**	**425-435**	**404-450**	

western mint of note is Aquileia. Otherwise, the mints are eastern with Antioch and Alexandria predominating.

There are few identifiable copies, as seems to be the case from other Petran assemblages. Two possible 5th century AD copies are not those types identified as coming from North Africa, but are more like the crude issues emanating from perhaps coastal Palestine. Two thin silver coins, however, are cast and are therefore perhaps (poor) copies of late Roman siliquae.

As is common in other assemblages, there is a large proportion of Late Roman illegible coins. The rough dating is based on fabric and size. Only a few designs, (such as heads), are visible. Most coins date to the later 4th century AD although some may be from the early 5th century AD.

There are no Byzantine coins; very few have been found in the centre of the ancient city, as settlements may have been farther a field. The pattern of early Islamic settlement within Petra is, at present, poorly understood. Nevertheless, a post-reform Umayyad piece (**Fig. 26m**) came from a hillwash deposit.

Catalogue of select coins (**Fig. 26**)

NABATAEAN

a) Cat: PGPC 04-C-32
Syllaeus, 9BC
Diad head r v on l.
Two crossed cornucopiae v above, H on r
ae, 16mm, 3.89g, 12.
Meshorer 1975, no 43

b) Cat: PGPC 05-C-04
Aretas IV, BC6 - 18AD, quarter unit
Head r
Two crossed cornucopiae, o between, h to l, h to r.
ae, 13mm, 2.14g, 12
Meshorer 1975 no 73A

HERODIAN

c) Cat: PGPC 04-C-02
37-4BC, Herod, Jerusalem, double prutah
[HRWDOU BAC] ILEWC + surrounded by an open diadem
t.o. table with three curved legs
ae, 15mm, 1.86g, 7
cf Meshorer 2001, 215-6, type 49

ROMAN PROVINCIAL

d) Cat: PGPC 03-C-09
112/113, Trajan, Alexandria
bust r.
corn crown of Isis, l. L r. Iv
ae, 12mm, 1.05g, 11
Dattari 1901, no.1097

e) Cat: PGPC 04-C-45
193-196, Julia Domna, Emesa, denarius
[IVLIA]DO[MNAAVG] bust r
VENER[Venus resting on column
ar, 19mm, 2.61g, 12. severe corrosion on surfaces
RIC IV, Pt 1, p.177, cf nos 332, 333, 33A

ROMAN IMPERIAL

f) Cat: PGPC 04-C-37
104-117, Trajan, Rome, quadrans
IMPCAESTRAIANA[VGGERM] Head of Hercules r
Boar stdg r, ex [S C]
ae, 16mm, 2.06g, 7. very corroded
RIC II, 294 no 702; Bowsher 1987

LATE ROMAN IMPERIAL

g) Cat: PGPC 98-C-05
c 378-383, Theodosius I
DNTHEO[bust r
CONCO]R DIAAVG[?? cross
ae, 12mm, 0.99g, 6

h) Cat: PGPC 05-C-01
383-387, Valentinian II, Aquileia
DNVALENTINI ANVPFAVG laur bust r
VICTORIA AVGGG two victories facing each other holding wreaths ex SMAQS
ae. 13mm, 1.13g, 2
cf LRBC II.1091

i) Cat: PGPC 98-C-06
404-406, Arcadius, Alexandria
DNAR[bust r
CONCOR DIAAVG, cross, ex. //E/
ae, 11mm, 0.92g, 12
cf RIC X, 249, nos 111-113

j) Cat: PGPC 98-C-15
c 404-406

Crude bust r, - restruck obverse
]DIAAVG, cross
ae, 9mm, 0.44g, 12

k) Cat: PGPC 98-C-12
425-435, Valentinian III, Rome
]VALENTINIANVS[bust r
SALVS REI]PVBLICE cross, ex RM
ae, 9mm, 0.45g, 4
RIC X, 276, no 2110

l) Cat: PGPC 04-C-13
c 404-450
DN[t.o. bust
]DIA AVG[? cross
ae, 10mm, 0.56g, 2

ISLAMIC
m) Cat: 04-C-05
Post Reform Umayyad, late 7th-early 8th century
ae, 15mm, 3.24g, 6
(Walker 1956: 281, no. 587ff; Ilisch 1993, pl. 1, no. 4ff)
Cat: PGPC 04-C-05

Conclusions

The archaeological investigation of the PGPC continues. The next phase will focus first on the pool complex, to expose and document the remains of the unique island Cyzicene *oecus* and imposing peripheral architecture. The goal is conservation and restoration. The relatively pristine state of preservation and unique context of the garden makes this an ideal site for testing methods of garden archaeology and developing theories on meaning and function. The combination of geophysical mapping and strategically placed archaeological testing has prevented the waste of a tremendous amount of time and expense that would have been otherwise devoted to random testing. The valuable GPR maps of the garden terrace's subsurface will continue to be used in further field seasons to investigate unexplored features. Strategically placed trenches help investigate key architectural and hydraulic features on the site. Also, the horizontal exposure of a large area of the Nabataean period garden surface, (visible on the GPR map) should provide valuable information about the plan and design of the garden's plantings (planting pits and flower pots) and their irrigation.

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FROM BATHHOUSE TO CONGREGATIONAL MOSQUE: FURTHER DISCOVERIES ON THE URBAN HISTORY OF ISLAMIC JARASH

Louise Blanke, Kristoffer Damgaard, Ian Simpson and Alan Walmsley

Introduction (LB)

Following the report on the Islamic Jarash Project in *ADAJ* 50 (Barnes *et al.* 2006), this article accounts for the two seasons of the project conducted during the summers of 2005 and 2006.

The Islamic Jarash Project was begun in 2002 with the primary objective of locating and excavating a large congregational mosque in the centre of Jarash, and thereby cementing the size and importance of the Islamic city. During the seasons, the project has expanded to involve an examination of the adjacent Islamic period administrative area; an excavation of the contemporary shops that lined the *cardo*, and documentation of the Late Antique period bathhouse that occupied the area before it was redeveloped for use as a mosque. Lastly, the project entails a thorough survey of the southern *decumanus*, the *cardo* and the *tetrakionial* piazza, recording the use and development of the Roman-founded streets through time.

The last two seasons of excavation have progressively increased our understanding of the development and history of the Late Antique and Islamic period buildings. The primary foci of the project have been to gain a complete understanding of the use of the mosque through excavation and examination of the prayer hall and the recovered finds. The studies have particularly focused on the units MO/14 and MO/15 (**Fig. 1**), in which evidence for a prolonged use of the building is documented. Furthermore, excavations have been conducted in the supposedly administrative area GO adjacent to the mosque, with very interesting results. The excavation of the line of shops has continued and finally, the complete layout of the pre-mosque bathing facility has been established. Investigations have proven that this building was much more substantial in both posture and time than had previously been assumed.

All is reported in great detail below. It is presented in chronological order beginning with the Late Antique bathhouse and ending with a presentation of the results from the area GO. Also included is a thorough study of selected coins recovered from various parts of the excavation throughout the previous five seasons, providing significant support for the interpretation of both the activity and chronological development of the area through time.

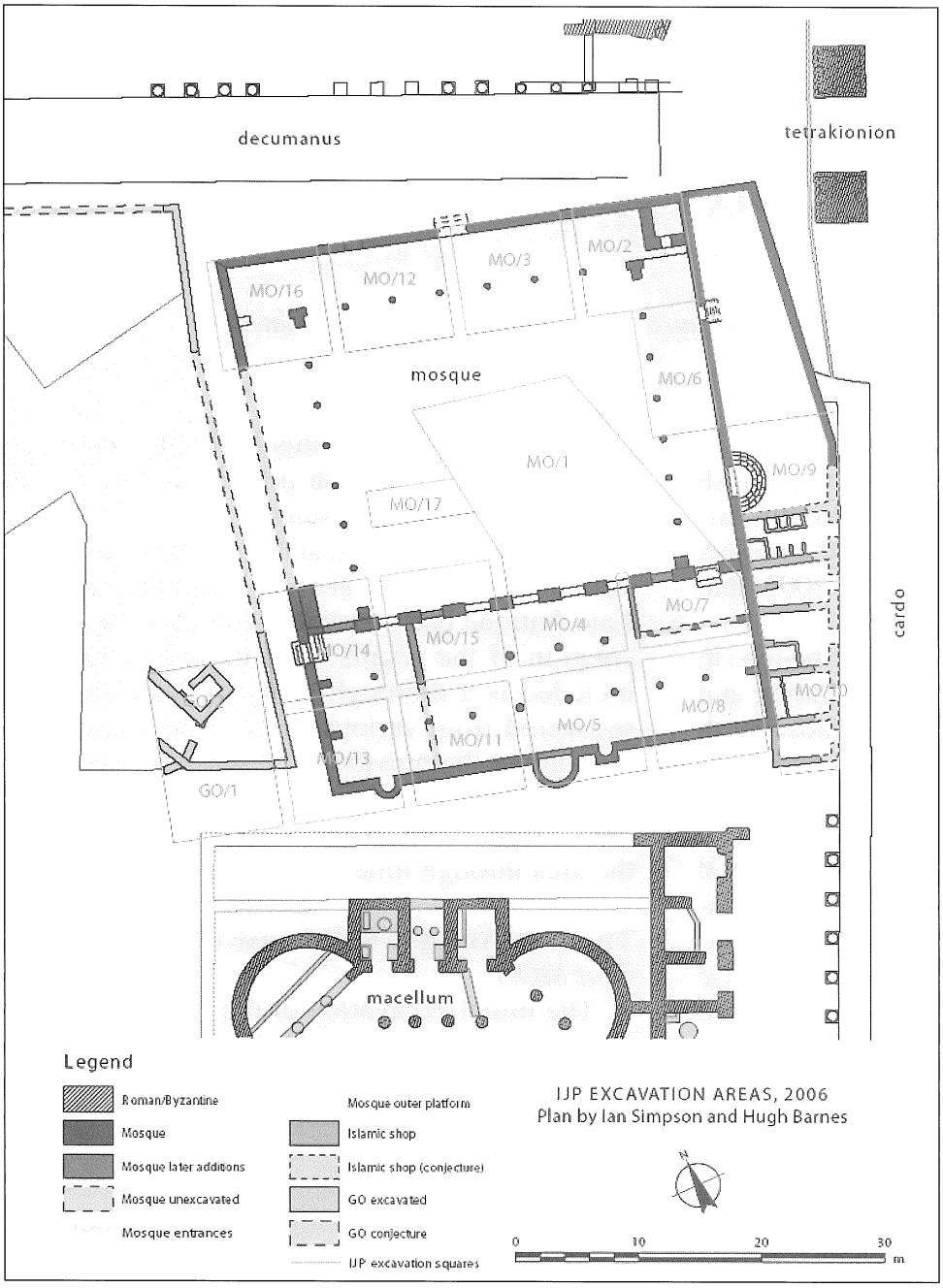
The Late Antique Bathhouse (LB)

Unit MO/1

The initial excavation of the bathhouse, conducted during the 2002 and 2004 seasons and reported in a previous issue of *ADAJ* 50 (Barnes *et al.* 2006), saw the complete excavation of the buildings hypocaust system. A sewer running east towards the *cardo* and one draining towards the north were exposed together with a room below ground level, located east of the *hypocaust* system (**Fig. 2G**).

Based on archaeological data from the previous seasons it was evident that the *hypocaust* system was heated by just one furnace located south of *hypocaust* room A (**Fig. 2**). Comparisons with layouts of similarly sized bathhouses in the region (Lauffray 1991; Yegul 1995) suggest that the service area was located south of the furnace in the direction of the *macellum,* and that the *frigidarium* was situated in the northern part of the area towards the southern *decumanus*, a layout that would facilitate the exploitation of the sun in the heated part of the bathhouse.

The 2005 and 2006 seasons were aimed towards achieving a general understanding of the



1. IJP Excavation area in 2006.

parts of the bathhouse that previous had been neglected. The objectives were:-

- locate and excavate the furnace;
- achieve a general understanding of the layout of the service area;
- excavate a selected part of the *frigidarium*,
- excavate a trench towards the west from unit MO/1 in order to determine the size of the bathhouse in this direction (**Fig. 1**).

In the previous seasons the excavation had been restricted to unit MO/1. The objectives of the 2005 and 2006 seasons took the examination of the bathhouse south into unit MO/4 in order to excavate the furnace, and west into MO/17 to examine the extent of the bathhouse in this direction (**Fig. 1**).

Unit MO/4

The Furnace

As stated above, the location of the furnace was believed to be directly south of *hypocaust* room A, below the area that became part of the mosque prayer hall. Therefore the 2005 season included the excavation of a limited section in unit MO/4. Aside from locating the furnace, the objectives were to examine the building material and technique applied in its construction, and to collect material from the furnace that might in-