THE BROWN UNIVERSITY PETRA ARCHAEOLOGICAL PROJECT: REPORT ON THE 2009 EXPLORATION SEASON IN THE "UPPER MARKET"

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Introduction and Research Parameters

In summer 2009, the Joukowsky Institute for Archaeology and the Ancient World (JIAAW) at Brown University launched a new initiative, the Brown University Petra Archaeological Project (BUPAP). The project's initial season was undertaken in collaboration with the Brown University Petra Great Temple project.[1]

The projected research goals of BUPAP are multiple in nature, but can be summarized by an emphasis on diachronic, integrated, and regional perspectives on Petra and its environs. The project intends to explore all phases of Petra's prehistory and history, with special attention to, the sometimes neglected, more recent eras. An integrated approach will ensure not only that individual sectors of the city are considered in connection with other zones, but also that the urban center be placed in a wider regional context of human settlement and movement. To that end, we hope to propose two closely related dimensions to BUPAP's work: regional survey in the Wādī as-Sulaysil to the city center's north (Petra Archaeology Wādī as-Sulaysil, or PAWS), and exploration of the area known in the city center as the "Upper Market" (Petra Upper Market Archaeology, or PUMA).

Our efforts in BUPAP's first season focused on the latter project, with fieldwork conducted in the "Upper Market" during an eight-day period in July 2009. This work involved the opening of a single test trench by the authors, with the assistance of several Bedoul workmen. The surveying was conducted by Fawaz Isaqat. The remainder of this article explains the choice of the "Upper Market" as a focus for attention, and presents the results of this limited, but intriguing, campaign.

PUMA and the "Upper Market"

An elevated terrace extends along the south side of the colonnaded street in Petra, between the east end of the street and the "Temenos Gate" terminus to the west. Situated on this terrace, from east to west, are the areas known as the "Upper Market," the "Middle Market", the Garden and Pool Complex (formerly the "Lower Market"), and the Great Temple precinct (formerly the "Southern Temple"). The orientation for all of these areas aligns them on a perpendicular axis to the colonnaded street. The northern portion of this terrace is largely an artificial construction (Kanellopoulos 2002a: 304; Bedal 2003: 45; Joukowsky 2007).

The "Upper Market" (UM) is a fairly level area that forms an approximate square at the east end of this south terrace. The UM is bounded on the north by a large east-west retaining wall and a set of monumental stairs that once led to the colonnaded street. These stairs and several associated shops were excavated in 1997 as part of the American Center of Oriental Research (ACOR) "Roman Street Project" (RSP), under the direction of Zbigniew Fiema (Fiema 1998). It has also been proposed that a propylaeon existed at the top of these stairs, which gave entry into the UM from the contemporary colonnaded street; the remaining traces of this structure include the Ionic column base surmounted by several drums that can still be seen *in situ* in

1. The JIAAW would like to express its gratitude to Dr. Martha Sharp Joukowsky, the Brown University Petra Great Temple project director, and Dr. Fawwaz al-Khraysheh, Director-General of the Department of Antiquities, for allowing the PUMA project to commence through this collaboration. Future projects in the BUPAP initiative will be under the direction of Dr. Susan E. Alcock, Director of the JIAAW at Brown University.

the UM at the top of the stairs (Kanellopoulos 2002a: 299-301). The UM is bordered on its east and south sides by nearly vertical, rupestral walls quarried from bedrock outcrops.[2] During at least one phase of the UM's history, these cliffs were faced with a masonry wall that was approximately 11.5m in height (Kanellopoulos 2002a: 304); part of this wall remains standing at the west end of the south edge of the precinct. Both the nature and location of the west boundary for the UM remain uncertain; to the west of the UM lies the so-called "Middle Market", but the exact nature of the transition between these two areas remains at present unknown. Given the uncertainty regarding this west boundary, the area of the UM is currently estimated to be ca. 70m east-west by ca. 75m north-south (Kanellopoulos 2002a: 304).

The first literary description of what became known as the "Upper Market" appears to derive from a visit to Petra by the Stephen Olin party in early April 1840. The rarity of this source merits quoting the passage here in full:

"We pitched our tents on a level area, the largest, probably, in the ancient city, and elevated fifteen or twenty feet above the southern embankment of the river. It is situated in the angle of a perpendicular rock nearly twenty feet in height, which has been faced by art, so as to form, as far as it extends, two sides of a square" (Olin 1843, II: 17).

No further definite mentions of the UM area have yet been found in other 19th century travel accounts. The next reference appears in the foundational volumes by R. Brünnow and A. von Domaszewski recording their survey work in the region between 1897-1898. They do not provide any description or discussion of the UM, but one of the features they record on their plan appears to be the extant remnant of the facing wall, visible on the cliffs bordering the south edge of the area (Brünnow and von Domaszewski 1904, I: #411 Bauwerk: 317 and 320).

The next German exploration mission, led by Walter Bachmann, Carl Watzinger, and Theodor Wiegand (in 1916-1917), was the first to scientifically record many of the remaining non-rupestral architectural features still visible in the ancient city center. It was this work that assigned names to the areas on the south terrace, including the "Upper Market". This mission provided the first measurements, plans, and architectural descriptions of both the UM and the RSP areas (Bachmann *et al*. 1921: 37-45), and these would remain essentially definitive in subsequent literature until the excavations led by Zbigniew Fiema (1998) and the architectural studies conducted by Chrysanthos Kanellopoulos (2001, 2002a).

The work of Kanellopoulos has produced the most data at present to inform us about the UM. His examinations of the architectural elements recovered from the RSP project, and those that remain *in situ* at the north edge of the UM, demonstrate a high probability for the existence of a propylaeon that was contemporary with the installation of the stairs and colonnaded street in the early second century AD (Kanellopoulos 2002a: 299-303). Kanellopoulos also found that the configuration of extant wall sections along the north side suggests that the propylaeon was flanked east and west by a small, contemporary, interior colonnade. In addition, he noted a row of beam sockets carved into the face of the rock wall along the east boundary, and suggested that these may have been intended to support roofing beams for another section of the interior colonnade. These two sources of evidence lead him to hypothesize the existence of a square colonnade inside the UM (**Fig. 1**),[3] although direct evidence is lacking at present from the south and west sides (Kanellopoulos 2001: 19-22, 2002a: 303-306; Kanellopoulos and Akasheh 2001).

Despite the advances made by Kanellopoulos in furthering our architectural understanding of the UM, particularly during the period of annexation, many questions about this central area in the city center remain to be answered. Just a few

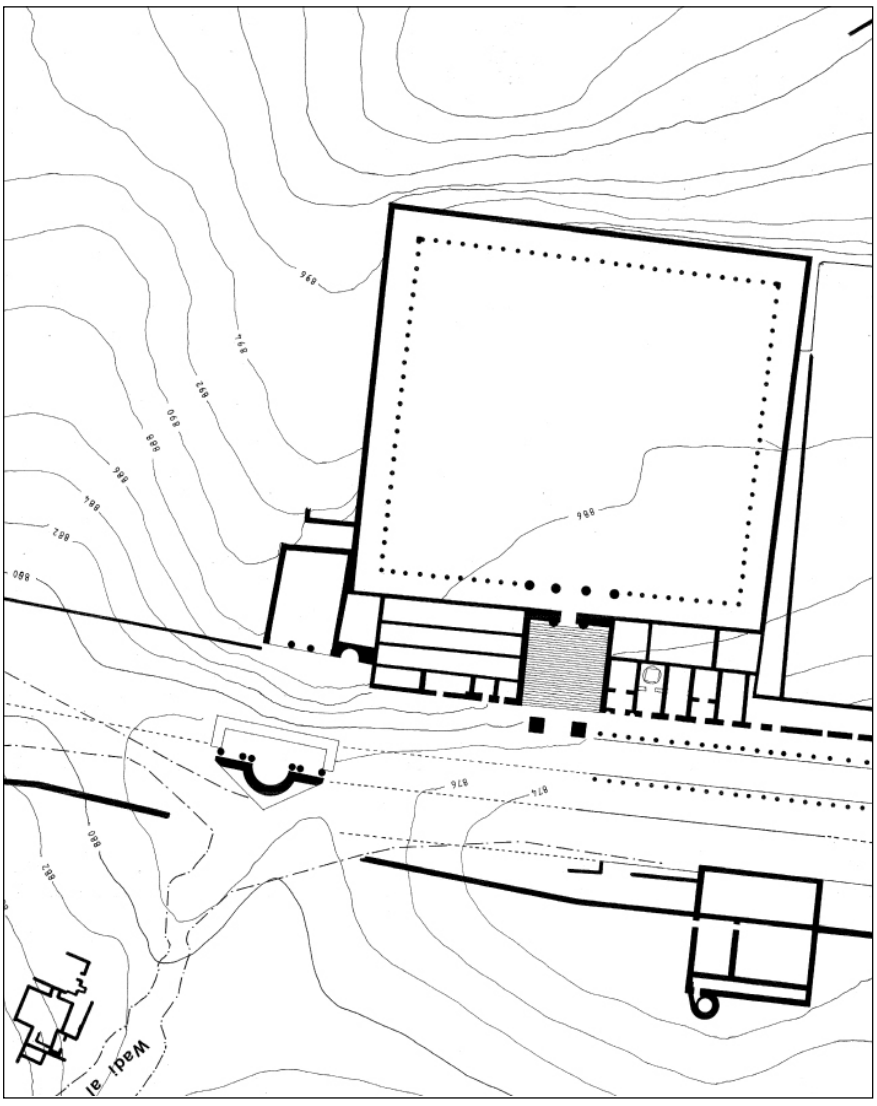
2. It has been suggested that the quarrying of these escarpments may have yielded some of the raw materials used for the constructions and modifications made in the city center during the second century AD. This may have included the creation or modification of the UM itself (Bedal 2001 and 2003; Kanellopoulos 2001 and 2002a). This is one of the many questions that the PUMA project hopes to help elucidate in future seasons.

3. Originally published in Kanellopoulos 2002a. The image is based on the survey data collected by the Petra Map Project, conducted jointly by the Hashemite University and the American Center of Oriental Research (ACOR), under the direction of Dr. Talal Akasheh. This is an enhanced detail from the Petra City Center map previously published in Kanellopoulos and Akasheh 2001 and Kanellopoulos 2002b.

of these questions include: Did the area exist during the period of the Nabataean kingdom? If so, how did its configuration differ from the hypothesized reconstruction for the annexation period? What features might the UM have housed and what purposes might the area have served during the Nabataean, Roman, and subsequent periods? And even more importantly, what was the relationship, if any, between the UM and the other structures/precincts on the artificial, elevated southern terrace? And how did the UM area relate to the more general surrounding city environs?[4]

The PUMA Project

Brown University's Petra "Upper Market" Archaeology (PUMA) Project was conceived as an attempt to try and answer some of the many questions that remain regarding this important area. The short 2009 field season was conducted in order to gather initial data for use in developing a research strategy for future seasons. The specific goals defined for the test trench were: (1) to determine the depth of soil deposits, (2) to see if a paved floor may have existed, (3) to explore the possibility for the existence of the hypothesized western colonnade, and (4) to try



1. A hypothetical reconstruction of the "Upper Market" showing the proposed upper tetrastyle of the propylaeon and interior colonnade. The bottom of the image is north (C. Kanellopoulos).

4. This question needs to be emphasized in particular due to the discovery by Kanellopoulos of a unifying characteristic for the constructions on the southern terrace and elsewhere in the city center. He has demonstrated that the Roman *pes* was the measuring unit employed in the building of the UM staircase, propylaeon, and hypothesized interior colonnade, the Garden and Pool Complex, and the Great Temple, as well as the Small Temple and the later Petra Church (Kanellopoulos 2003).

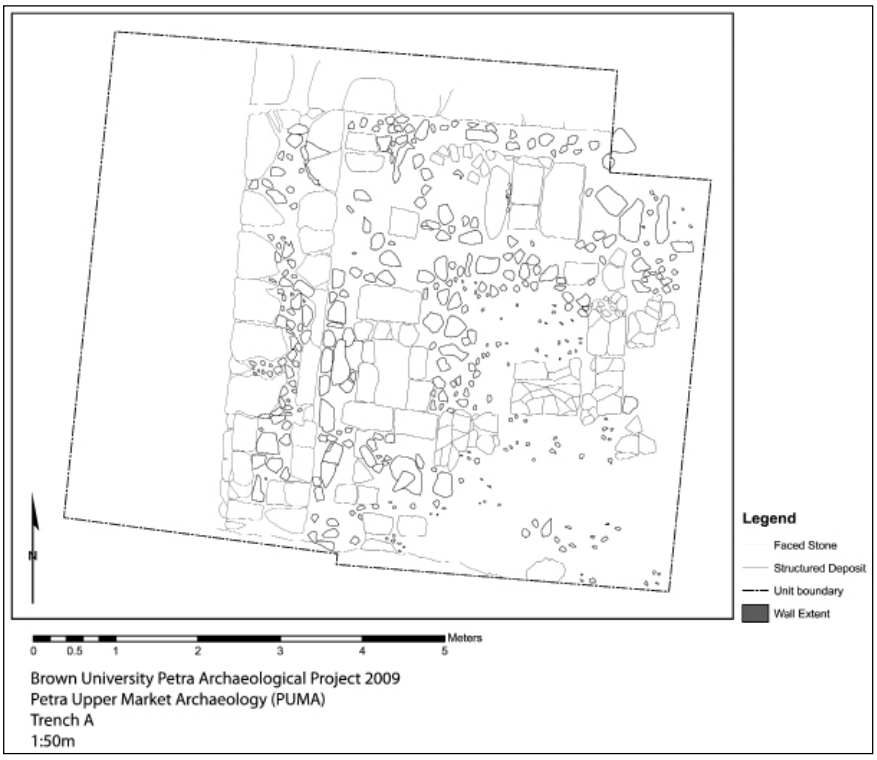
and locate the west boundary of the precinct. We were also interested in the contemporary and ethnohistorical reuse of this particular part of the Petra city center. Observation of the area's taphonomy (notably a collection of small stone piles) suggested that it was used, in relatively recent times, for agricultural purposes; this was confirmed by members of the local community.

A single 5 x 5m exploratory trench was laid out in the theorized northwest corner of the UM, the surface elevation of which is approximately 906 masl at this point. The north edge of the trench bordered the interior face of the east-west wall that serves as the north border of the UM, which was interpreted by Kanellopoulos as possibly having supported a stylobate for columns in the proposed propylaeon (2002a: 304-306). The east edge was located 21.7m west of the Ionic base of the *in situ* propylaeon column at the top of the UM stairway. The west edge was defined by the interior face of a partially-visible, north-south wall that appeared to bond with the east-west wall of the north boundary to form a corner (**Fig. 2**). Surface finds were then collected and examined before commencing the excavation.

The trench was initially divided into two north-south sections, and excavation began in the eastern half. All of the removed soil from this section was screened in an attempt to obtain an accurate sampling of the material culture extant in the topsoil deposit. The work was stopped in this half of the trench when remnants of extant floor pavers were uncovered. The west half of the trench was then excavated to the same level, with approximately one-fourth of the soil being screened to augment the sampling of artifacts recovered from the eastern half of the trench.

The depth of the trench varied, as the soil deposit had a gradual slope from south to north (approximately 0.37m at south to 0.04m at north). The removed soil derived from a single matrix. The deposit was tightly compacted and consisted of a mixture of granular sizes, including silt, sand, pebbles and cobble-sized stones. The soil had a generally fine texture and was fairly uniform in color (5 YR 6/3 Light Reddish Brown). The deposit appears to have been formed by a combination of aeolian and fluvial processes, which is consistent with other topsoil strata examined elsewhere on the southern terrace.

All of the extant floor pavers uncovered are broken. They are rectangular sandstone slabs,



2. Top Plan of the 2009 PUMA test trench (M.L. Berenfeld; T. Sandiford).

with average dimensions of .80 x .40 x .04m. Based on the arrangement of the two best-preserved examples in the trench (**Fig. 3**), it appears that the pavers were laid in a configuration of alternating squares consisting of four slabs each (2 lengthwise by 2 widthwise). As no traces of mortar bedding were detected, neither *in situ* nor in the overlying soil matrix, it would also appear that the floor was dry laid.

A second architectural feature uncovered in this season is a north-south wall extending along the west edge of the trench (**Fig. 4**). Excavation in the initial trench exposed a shallow portion of the east face of this wall and demonstrated that it bonds with the east-west wall along the north edge of the UM. In order to determine the dimensions of the wall, the test trench was extended an additional 2.5m to the west. This uncovered the complete top surface along a 5m stretch of the north-south wall. The exposed portion of the wall was built using hewn, undressed sandstone blocks of various sizes. The wall appears to have been built using a casemate-like construction technique. The outer faces (E and W) were laid using an irregular header–stretcher arrangement, and the center was then filled using a mixture of rubble and some placed, hewn blocks. The width of the top surface of the wall is almost exactly 1m. The preserved height of the wall was not determined during the short field season, but this will be investigated by future excavations.

A shallow sondage was excavated in the trench extension to the west of the north-south wall, opposite where it bonds to the east-west wall along the north edge. This work confirmed that the two walls bond at this point, and provided information about the apparent construction technique employed in constructing the north-south wall. This season's excavations did not reveal information to confirm that this wall served as either the west boundary of the UM precinct or for the west portion of the hypothesized interior colonnade. Of particular interest was the fact that the soil matrix in the sondage was notably different from the topsoil removed from the initial trench, east of the north-south wall. The soil fill in the probe lay in the range of 5YR 6/6–6/8 (Reddish Yellow), consisted primarily of silt and sand granular sizes, and was noticeably less compacted.

Also of interest is the fact that the probe (unlike our initial test trench) yielded no material culture, with the exception of a single pottery sherd (**Fig. 5**). Deriving from the rim of a vessel, the sherd is made of a Pinkish White fabric (10YR 8/2). The rim has three irregularly-spaced, impressed notches preserved along the top surface, which are most evident when

3. Shattered sandstone floor pavers found in situ (I.B. Straughn).

4. Top surface of the north-south wall (I.B. Straughn).

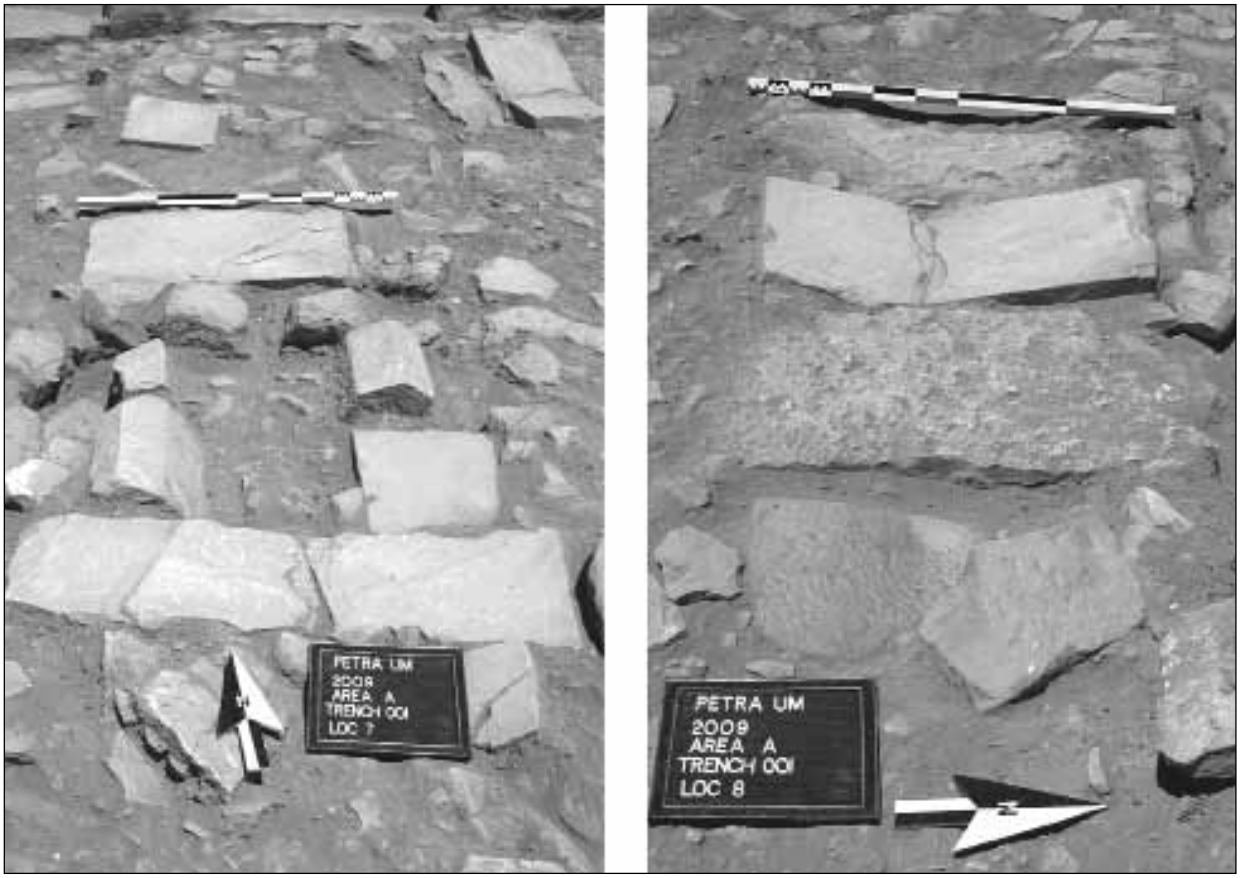
5. Unusual rim sherd with hand-made "rouletted" pattern (I.B. Straughn).

viewed from the interior side. The exterior of the vessel is decorated with hand-made incisions that appear to imitate a roulette pattern; the pattern consists of a series of diagonal lines which are sectioned into four registers by five horizontal incisions. Indications of directionality in the diagonal lines suggest they were made with downward strokes while the vessel was stationary; in contrast, the evenness and regularity of the horizontal incisions seems to indicate that these were made as the vessel was turned on a wheel. At present the sherd has not been identified and no parallels have yet been found.

During the final stages of cleaning and documentation, some patterning was discerned amongst the stones embedded in the trench. These features have been tentatively identified as possible burials that were inserted into the UM area at a later period (**Fig. 6**). The apparent use of covering slabs (and possibly constructed cists) for the potential burials appears to present an initial similarity to those found in Byzantine cemeteries elsewhere in Jordan (Humbert and Desreumaux 1998: 259 ff.) This possibility will be investigated with the assistance of a physical anthropologist during our projected next season.

Artifactual Material

The surface collection, excavation, and screening of the topsoil deposit yielded a range of material culture remains. In addition to the artifacts presented in this preliminary report, small



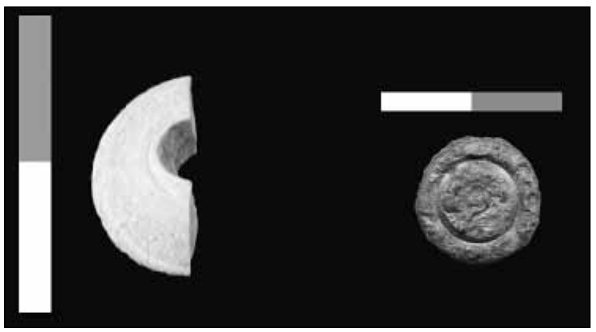
6. The two possible burials found in the UM test trench (I.B. Straughn).

quantities of metal, bone, shell, stone, glass and stucco were also collected; these materials have not yet been examined by specialists and no preliminary discussion can be presented at this time. A number of the special finds recovered during this season, however, can and should be commented upon. Two of these objects are shown here (**Fig. 7**): half of a disk-shaped bead made of an unidentified bluish material that was found during screening, and the decorated head of a copper alloy fixture, which was excavated in proximity to one of the possible burials. Two fragments of coroplastic objects were also discovered in the screening: a fragment from an animal figurine that shows a section of harnessing and an ibex horn, which could derive from either a figurine or a zoomorphic vessel (Tuttle 2009).

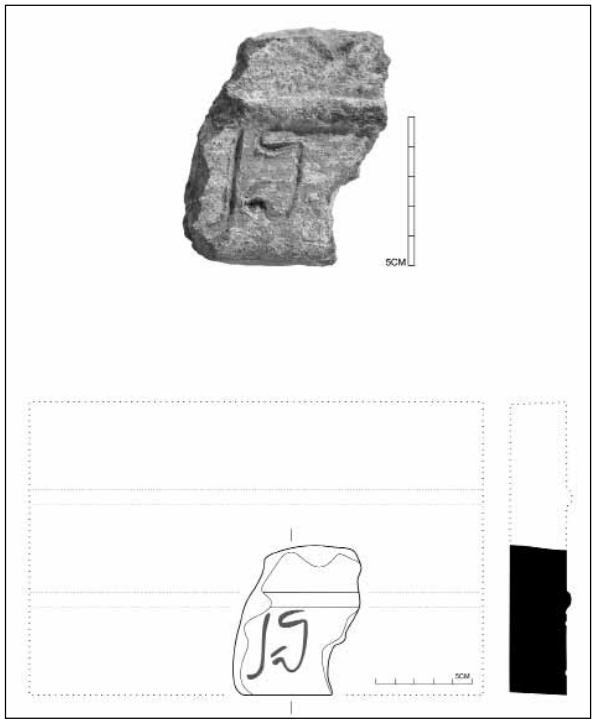
A significant number of roof tile fragments were also recovered, most of which were plain and unremarkable. A few of the tile fragments, however, are particularly notable: two of the tiles show swipes, which may have been made by fingers during the molding process and one has a large lump of mortar adhering to its underside. Little can be said about roof tiles from Petra at present, as no systematic and comprehensive study of their typology or chronology has yet been undertaken (Warry 2006).

One of the roof tiles, recovered from the screening process, represents a rare find in Petra. This fragment preserves two letters of a Nabataean inscription (**Fig. 8**). Initially thought by the excavation team to be unique, we now know that at least two unpublished Nabataean-inscribed roof tiles were previously recovered in the excavation of the Temple of the Winged Lions.[5] The PUMA roof tile was briefly examined by Dr. Fawzi Zayadine during the preparation of this preliminary report. He has identified the two letters (from right to left) as a *mīm* (two strokes) and a *lām*, and suggests that they may represent part of the word *malik*, or 'king'. If this is the case, it is possible that this roof tile was produced for use on a structure that was specific to the monarchy, and that the word *malik* was inscribed as a tallying device. It is also possible that the word may have been part of a phrase (e.g., *mālik* [name]) or even a specific name (e.g., Malichus?). At the moment, however, all of these interpretations must remain speculative. An effort is underway to locate the unpublished Winged Lions roof tiles so that all three artifacts can be properly studied by epigraphers.

Three coins were retrieved from the screening of the excavated soils (**Fig. 9**). All of the

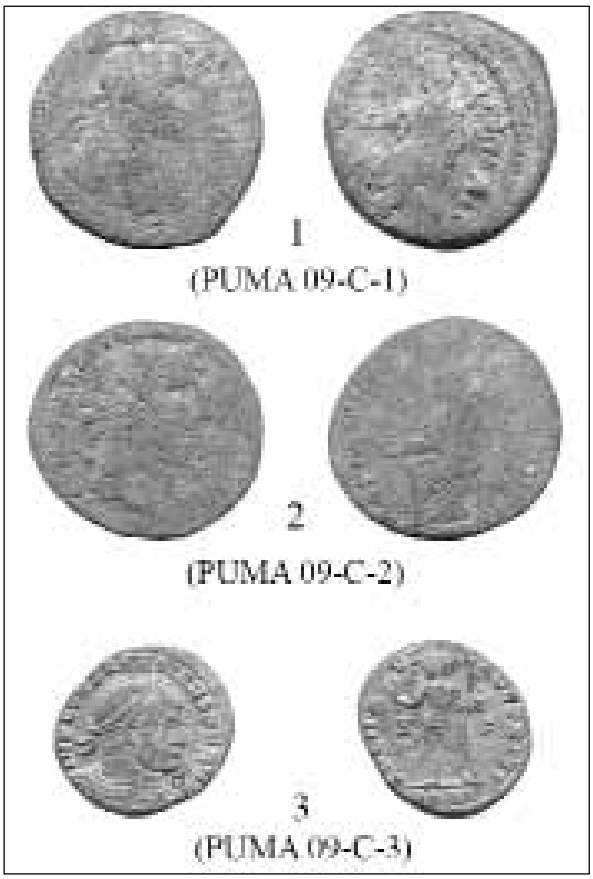


7. Blue bead (I.B. Straughn) and copper alloy fixture head (C.A. Tuttle).



8. Inscribed roof tile: the reconstructed size of the tile is hypothetical (Q. Tweissi).

5. This discovery was made by Tali Erickson-Gini and Christopher A. Tuttle during their recent review of the artifact registries from the excavation archives of the American Expedition to Petra (AEP) directed by the late Dr. Philip C. Hammond. The work on the AEP archives is part of the Petra Temple of the Winged Lions Cultural Resource Management Initiative, a joint project of the Department of Antiquities of Jordan and the American Center of Oriental Research.



9. Coins from the 2009 PUMA trench (C.A. Tuttle).

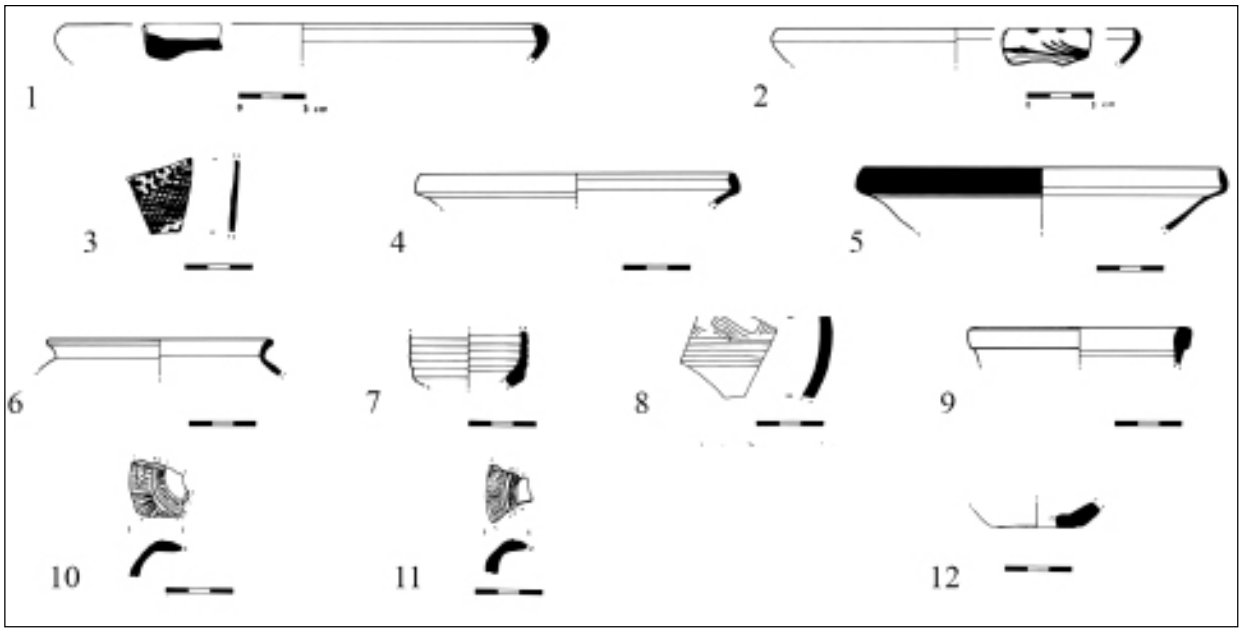
coins were cleaned in a laboratory and then scans of them were read by a specialist.[6] The first two coins (**Fig. 9: 1-2**) are issues minted at Petra that probably depict the emperor Hadrian on the obverse (Spijkerman 1978: 220–21, No. 4). The third coin (**Fig. 9: 3**) is an issue depicting Constantine I that was minted at Arles early in 316AD (RIC 7: 241, No. 89).

A substantial amount of pottery was recovered from the excavation. The post-season analysis of the sherds was undertaken by Dr. Tali Erickson-Gini. She reports the following information about the most significant, diagnostic forms:

The ceramics appear to be a mixture of sherds of various dates: the larger part of the assemblage can be described as Late Roman, from the second–third centuries AD (**Fig.11: 1-16**), a smaller portion can be dated to the first century AD and particularly the late first and early second centuries AD (**Fig 10: 2-12**). The assemblage also contains one Hellenistic bowl sherd (**Fig. 10: 1**), an Early Byzantine jar (**Fig. 12: 1**), and a few fragments of Early Byzantine moulded oil lamps (**Fig. 12: 2-6**). Judging by the fabrics and surface treatment, nearly all the vessels and objects in the assemblage appear to have been produced in Petra itself. A few miscellaneous objects of an undetermined date include two vessels probably used as planting pots (ollae peroratae) (**Fig. 13: 1-2**), part of a figurine (**Fig. 13: 3**) and a piece of a roof tile (**Fig. 13: 4**).

The ceramic vessels and objects presented here are classed in four categories: Hellenistic and Early Roman (i.e., pre-annexation), Late Roman (i.e., post-annexation through the third century AD), Early Byzantine (fourth century AD and particularly 363AD), and an undetermined date (i.e., possibly from the first through fourth centuries AD). Generally, it is difficult and probably unrealistic to assign a precise date for most of the vessels and objects; some that appear toward the end of the first century AD probably continue to some extent into the first half of the second century AD. A strong argument can be made for the occurrence of a destructive earthquake in the years before the Roman annexation of Nabataea in 106AD.[7] Multiple lines of evidence of this event have been discovered in Petra and surrounding region, the ‘Arabah and the Negev (Erickson-Gini 2010: 47). In all probability, the event damaged monumental structures in Petra, prompting the apparent renovations that took place during in the early second century in the immediate area of the Upper Market (Fiema 1998; Kanellopoulos 2001 and 2002a), in the Garden Pool Complex (Phase II) and the Great Temple (Bedal 2001: 39; Joukowsky 2007). The earthquake was apparently responsible for the disruption of the well-documented pottery sequence discovered in the az-

6. We would like to thank Naif Zaban and the ACOR Conservation Cooperative for cleaning the coins, and Donald T. Ariel for reading the scans and providing the citations for parallels. The minting of these coins at Petra is certain, but the identification of Hadrian is somewhat tentative, given that the coins were not read firsthand.
7. Compare Russell 1985, who lists a posited earthquake for the period “110-115AD” Data gathered by various projects undertaken since the appearance of this article may now suggest that this proposed tectonic event occurred as early as 98AD.



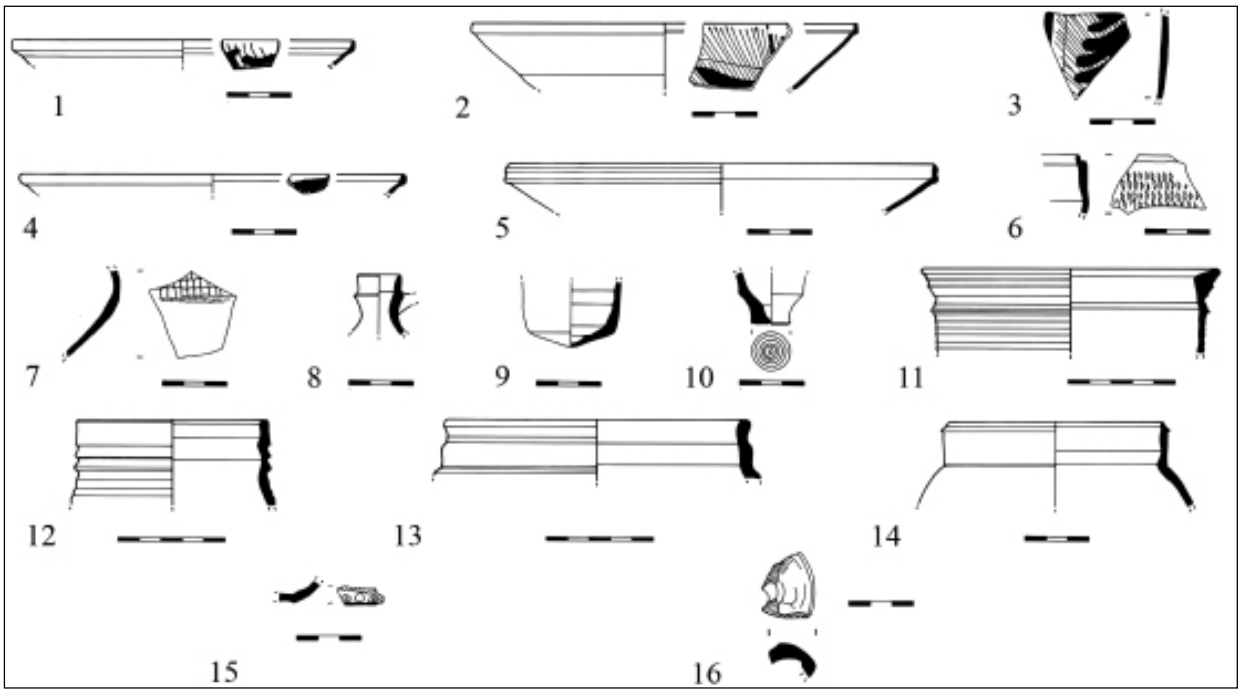
10. Vessels of the Hellenistic and Early Roman Period (M. Qassem).

Zanṭūr area at Petra (Stucky *et al*. 1994: 284). However, more detailed research is required in order to determine whether particular types of vessels went out of production at this time or if they continued a few more decades into the first half of the second century AD. Preliminary research suggests the latter possibility. The assemblage from the 2009 excavation of the Upper Market has been evaluated using parallels from recent publications of Late Roman assemblages from the Negev, which were discovered in contexts dating later in the second century and early third century AD. Comparable vessels discovered in Petra have often been dated closer to the start of the second century AD due to the ambiguity resulting from the apparent natural disaster referred to above.

Of the vessels categorized as Late Roman, a number of particularly important diagnostic vessels deserve special mention. These include a type of large, globular jug with a distinctive ledge-rim, wide neck and wide, combed handle (**Fig. 11: 11**) and a type of elongated unguentarium with smooth sides (**Fig. 11: 8**). The ledge-rim, globular jug has been found in association with assemblages dated to the later second and early third centuries AD, particularly in contexts that suggest a sudden abandonment that could be the result of the spread of an epidemic sometime in the first half of the third century. The elongated unguentarium regularly appears in contexts dated to the first half of the second century AD.

The presence of planting pots (*ollae peroratae*) matches their appearance in assemblages uncovered further west in the Petra Garden Pool Complex and the Great Temple. A pot with a perforated wall (**Fig. 13: 2**) corresponds to Macaulay-Lewis' Type B, which was found in the nearby excavation of the Garden Pool Complex. No precise date can yet be assigned to these vessels but on the basis of architectural parallels, the Garden Pool Complex probably dates to the Early Roman period, that is the last half of the first century BC and the first century AD (Macaulay-Lewis 2006: 164). The use of similar planting pots is indicated in the peristyle garden of Herod's palace at Jericho (Gleason 1993: 159-161). A second type of vessel in the PUMA assemblage that may have been used as a planting pot (**Fig. 13: 1**), has a perforated base comparable to a number of such vessels discovered in later contexts in the Great Temple; however, a similar example was also found in the Garden Pool Complex (Macaulay-Lewis 2006: 163).

Fragments of oil lamps from all three periods were discovered. These include the ubiquitous Nabataean radial oil lamp, corresponding to Grawehr's Type Negev E.1 (**Fig. 10: 10-12**), which he dates to the first century AD (although



11. Vessels of the Late Roman Period (M. Qassem).

this type may extend into the second century AD), small fragments of Late Roman types (**Fig. 11: 15-16**) and several sherds of the ubiquitous Early Byzantine lamp (Grawehr's Type L) with raised radial lines and a knobbed handle set in a square frame (**Fig. 12: 2-6**). The Early Byzantine radial lamp is a primary diagnostic vessel associated with destruction layers of the well-documented 363AD earthquake.

In conclusion, it can be observed that the 2009 excavation in the area of the Petra Upper Market produced ceramic sherds dating primarily to the first through third centuries AD. The paucity of later material (with the exception of parts of Early Byzantine oil lamps generally found in assemblages sealed in earthquake debris from 363AD), suggests that the area may have had limited use after the Roman period. It is difficult to determine the nature of the earlier deposits until further work is carried out in the Upper Market area. The presence of planting pots might suggest some form of continuity with the function of the Garden Pool Complex area. Bedal's excavations in the Garden Pool Complex have revealed that its structures were renovated and continued to function in the post-annexation era (Bedal 2001: 39). A similar pattern of construction, renovation and continuity in the Late Roman period in the Upper Market area may be revealed in future excavations. The substantial number of sherds of the Late Roman period in the 2009 excavations may have been deposited during the latest occupation of the area. This supposition is supported by the coins recovered in the same locus, which date primarily to the Late Roman period. While one coin of the fourth century AD was uncovered, no Nabataean coins from the pre-annexation period were found in the deposit.

Descriptions of Pottery

Hellenistic and Early Roman (**Fig. 10**)

1. PUM.09-2/9 Incurved bowl, red 2.5YR5/8, surface: traces of dark reddish gray slip on exterior rim 5YR4/2; comparisons: Hellenistic period – Moyat 'Awad (Erickson-Gini, f.c., Fig. 3.2: 7-8, az-Zanṭūr, Gruppe 2 (Schmid 2000: Abb. 20).
2. PUM.09-2/2 NPFW bowl, red 2.5YR68, red deco 2.5YR 4/8; comparisons: az-Zanṭūr, Schmid's 2b (Schmid 2000: Abb. 84-85); PNR Tomb 1 (Bikai and Perry 2001: Fig. 4:1).
3. PUM.09-2/1 NPFW bowl, red 2.5YR6/8, red deco 2.5YR4/8; comparisons: az-Zanṭūr, Schmid's 3a (Schmid 2000: Abb. 89); PNR

Tomb 1 (Bikai and Perry 2001: Fig. 4:2, 5-6); Masada, Camp F (Magness 2002: Fig. 12.1).

4. PUM.09-2/6 bowl, red 2.5YR5/8, minute white inclusions; comparisons: Early and Late Roman periods – az-Zanṭūr, Schmid's Gruppe 6 (Schmid 2000: Abb. 48), Oboda (Erickson-Gini 2010: Fig. 2:15); Mampsis (Negev and Sivan 1977: Fig. 8:53).
5. PUM.09-3/5 bowl, red 2.5YR5/8, minute white inclusions, surface: light brown slip on exterior rim 7.5YR6/3; comparisons: Early and Late Roman periods, az-Zanṭūr (Schmid 2000: Abb. 52), Oboda (Erickson-Gini 2010: Fig. 2:16).
6. PUM.09-2/8 unguentarium, yellowish red 5YR5/8; comparisons: Petra, Johnson's Form V (Johnson 1990: Fig. 2:V); (AEP 1974: No.70; Area II.2, SU 91).
7. PUM.09-2/4 small jar, red 2.5YR6/8, surface: pink slip 5YR8/4; comparisons: az-Zanṭūr (Schmid 2000: Abb. 251), adh-Dharīḥ (Villeneuve 1990: Pl. II:2).
8. PUM.09-3/2 strainer jar, light brown 7.5YR6/4, surface: pale yellow slip 2.5Y8/3 with brown discolorations; comparisons: Early Roman period into second century AD – adh-Dharīḥ (Villeneuve 1990: Pl. VIII:2).
9. PUM.09-2/5 ESA jug, light red 10R6/6, surface: matte red burnish 10R4/6; Hayes ESA Form 104a (Hayes 1985: Tav. IX: 5).
10. PUM.09-B2 lamp, strong brown 7.5YR4/6; comparisons: az-Zanṭūr, Grawehr's Type E.1 (Grawehr 2006: 298-304), adh-Dharīḥ (Villenueve 1990: Pl. VIII:4).
11. PUM.09-4/6 lamp, pinkish gray 5YR6/2; comparisons: same as above.
12. PUM.09-4/1 lamp base, reddish brown 5YR6/4, minute white inclusions and possible traces of a potter's mark; comparisons: az-Zanṭūr, Grawehr's Type E.1 (Grawehr 2006: 298, nos. 142, 144).

Late Roman (**Fig. 11**)

1. PUM.09-4/4 NPFW bowl, red 2.5YR5/8, dark red deco 2.5YR3/6; comparisons: Early and Late Roman periods - az-Zanṭūr, Schmid's Dekorgruppe 3b (Schmid 2000: Abb. 91); Oboda (Erickson-Gini 2010: Fig. 2:2).
2. PUM.09-1/9 NPFW bowl, red 2.5YR5/8, dark red deco 2.5YR3/6; comparisons: same as above.
3. PUM.09-1/10 NPFW bowl, light red 2.5YR6/8; red deco 2.5YR3/6; comparisons: same as above.
4. PUM.09-4/3 NPFW bowl, red 2.5YR6/8, dark reddish gray deco 5YR4/2; comparisons: Oboda (Erickson-Gini 2010: Fig. 2:1), az-Zanṭūr, Schmid's Dekorgruppe 3c (Abb. 93); PNR Tomb 2 (Bikai and Perry 2001: Fig. 9: 4-6); adh-Dharīḥ (Villenueve 1990: Pl. III.3).
5. PUM.09-4/2 bowl, red 2.5YR5/8, occasional small white inclusions; comparisons: Moyat 'Awad (Erickson-Gini f.c., Fig. 3.12:4); az-Zanṭūr, Schmid's Gruppe 7 (Schmid 2000 Abb. 54-56); Sbaita – Shivta (Crowfoot 1936: Pl. III: 2); Mampsis (Erickson-Gini 1999: Fig. 2.1.2-5); PNR Tomb 2 (Bikai and Perry 2001: Fig. 9: 4-6).
6. PUM.09-1/13 rouletted ware bowl, red 2.5YR5/8; comparisons: Oboda (Erickson-Gini 2010: Fig. 2:10) az-Zanṭūr, Schmid's Gruppe 9 (Schmid 2000: Abb 61-65); PNR Tomb 2 (Bikai and Perry 2001: Fig. 8:1).
7. PUM.09-1/12 rouletted ware bowl, red 2.5YR5/8; numerous white inclusions, surface: pink wash on rouletting 5YR7/3; comparisons: Moyat 'Awad (Erickson-Gini f.c., Fig. 3.13: 11).
8. PUM.09-3/1 unguentarium, light brown core 7.5YR6/3, surface: yellowish red slip 5YR5/6; comparisons: Petra, Johnson's Type IX (Johnson 1990: Fig. 3:IX); (AEP 1974: no. 46; 1976: nos. 216-220); Mampsis (Erickson-Gini 2010: Fig. 2:37); adh-Dharīḥ(Villeneuve 1990: Pl. VIII:2).
9. PUM.09-4/7 juglet, red 2.5YR5/8, surface: very pale brown slip 10YR8/2; comparisons: Early and Late Roman - Moyat 'Awad (Erickson-Gini f.c.: Fig. 3.18:6); az-Zanṭūr (Schmid 2000: Abb. 323-325); PNR Tomb 2 (Bikai and Perry 2001: Fig. 9:17).
10. PUM.09-2/7 juglet or cup, pinkish gray core 7.5YR6/2, surface: light reddish brown exterior 5YR6/4, string cut base; comparisons: adh-Dharīḥ (Villeneuve 1990: Pl. II:3).
11. PUM.09-1/1 ledge-rim globular jug, red 2.5YR5/8, surface: pale slip on exterior rim 2.5YR8/3; comparisons: Oboda (Erickson-Gini 2010: Fig. 2:43); PNR Tomb 2 (Bikai and Perry 2001: Fig. 8:14); adh-Dharīḥ (Vil-

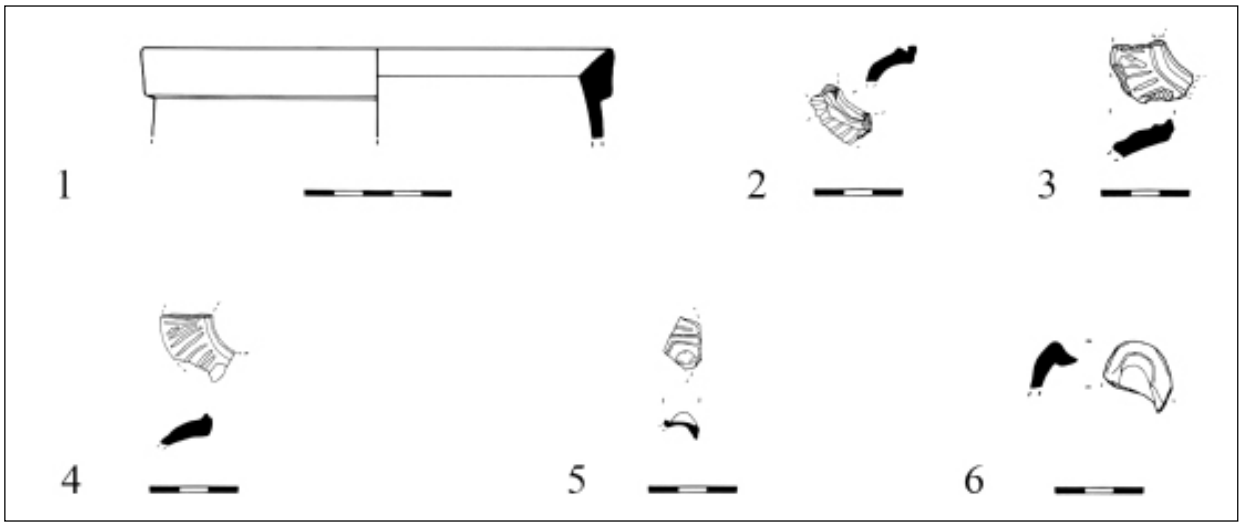
leneuve 1990: Pl. VII:3).
12. PUM.09-1/3 ridged-neck storage jar, red 2.5YR5/8; numerous white and gray inclusions, surface: pale brown 10YR8/3; comparisons: Oboda (Erickson-Gini 2010: Fig. 2:52); al-'Aqaba (Dolinka 2003: 128, nos. 20-21).
13. PUM.09-1/4 storage jar, yellowish red 5YR5/8, numerous white and dark gray inclusions, surface: reddish brown 5YR5/4; comparisons: Moyat 'Awad (Erickson-Gini f.c. Figs. 3.25:9-10).
14. PUM.09-4/5 cooking or serving pot, red 2.5YR5/8, fine ware quality, surface: pink slip 5YR8/3; comparisons: Oboda (Erickson-Gini 2010: Fig. 2:60); az-Zanṭūr (Stucky *et al*. 1994: Fig. 16:B).
15. PUM.09-1/11 lamp, light reddish brown 5YR6/4, light brown core; comparisons: az-Zanṭūr, Grawehr's J.2 Type 2, Variante g (Grawehr 2006: 327, no. 371) – (dated to 180-210/260AD)
16. PUM.09-1/6 lamp, red 2.5YR5/8, surface: worn dark slip 2.5YR4/8.

Early Byzantine Period (**Fig. 12**)
1. PUM.09-5/1 jar, yellowish red 5YR5/8, occasional small to medium white inclusions, charred inside and out; comparisons: az-Zurrāba ('Amr 2004: Fig. 2).
2. PUM.09-1/16 lamp, brown 7.5YR5/4; comparisons: az-Zanṭūr, Grawehr's Type L (Grawehr 2006: 348, 518).
3. PUM.09-3/4 lamp, yellowish red 5YR5/6, occasional large white inclusions; comparisons: az-Zanṭūr, Grawehr's Type L (Grawehr 2006: 343, no. 485).
4. PUM.09-1/15 lamp, reddish yellow 5YR6/6; comparisons: az-Zanṭūr, Grawehr's Type L (Grawehr 2006: 384, no. 520).
5. PUM.09-1/14 lamp, grayish brown 10YR5/2; comparisons: same as above.
6. PUM.09-3/3 lamp nozzle, brown 7.5YR4/4, traces of black soot; comparisons: az-Zanṭūr, Grawehr's Type L (Grawehr 2006: 340-349).

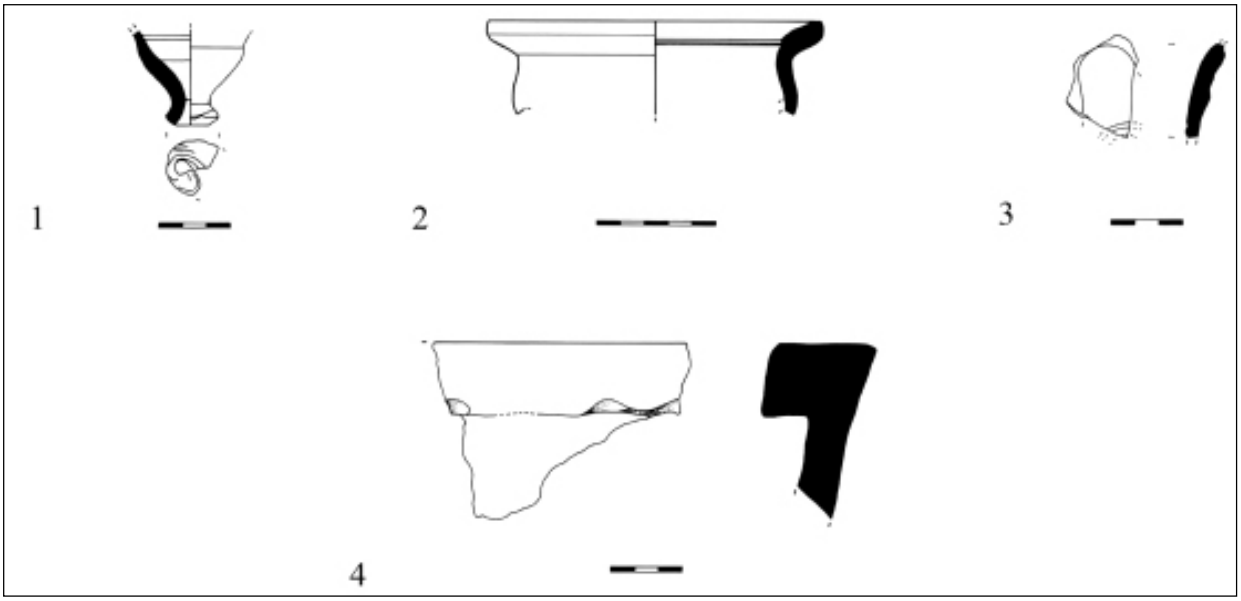
Miscellaneous of Undetermined Date (**Fig. 13**)
1. PUM.09-2/3 planting pot or juglet, red 2.5YR6/8, minute white inclusions, perforated string cut base; comparisons: Petra, Macaulay-Lewis's Type A (Macaulay-Lewis 2006: Fig. 1:Pot 2, Pot 6).
2. PUM.09-1/2 planting pot, red 2.5YR5/8, light brown core, minute dark gray inclusions, surface: traces of pale slip on exterior and also interior rim 2.5Y8/3; comparisons: Petra, Macaulay-Lewis's Type B (Macaulay-Lewis 2006: Fig. 3).
3. PUM.09-4/5 figurine, light red 2.5YR6/8.
4. PUM.09-4/8 roof tile, red 2.5YR5/8, dark gray core, numerous medium white inclusions, surface: very pale brown 10YR8/2.

Conclusions and Future Research

Our work in this initial field season was focused in nature and limited in duration. Yet our



12. Vessels of the Early Byzantine Period (M. Qassem).



13. Miscellaneous Objects of Undetermined Date (M. Qassem).

single test trench yielded some tantalizing results, and confirmed our interest in this particular sector of the Petra city center. We hope to continue work — employing geophysical exploration, architectural mapping and additional excavation — to further clarify the changing nature and functions of this space over time, as well to establish the space's role when integrated within a wider civic context. Future work by BUPAP in the "Upper Market" will look to contribute new data and analyses that span not only issues of architectural practice and urban planning but also the transformations in how this city was conceived and lived in by its inhabitants across its multiple periods of occupation.

It is also hoped that future seasons will soon see the inception of BUPAP's other projected research activity, regional work in the environs of Petra, at Wādī as-Sulaysil to the north, and the further expansion of our efforts to treat the world wonder of Petra in a diachronic, integrated and regional fashion.

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References

'Amr, K.
2004 Beyond the Roman Annexation: The Continuity of the Nabataean Pottery Tradition. *SHAJ* 8: 237-245.

Bachmann, W., Watzinger, C. and Wiegand, T.
1921 *Petra*. Wissenschaftliche Veröffentlichungen des deutch-türkischen Denkmalschutz-Kommandos, Heft 3 (Berlin & Leipzig: Walter de Gruyter & Co.).

Bedal, L.-A.
2001 A Pool-Complex in Petra's City Center. *BASOR* 324: 23-41.
2003 *The Petra Pool-Complex. A Hellenistic Paradeisos in the Nabataean Capital*. Gorgias Dissertations, Near Eastern Studies 4 (Piscataway, NJ: Gorgias Press).

Bikai, P.M. and Perry, M.A.
2001 Petra North Ridge Tombs 1 and 2: Preliminary Report. *BASOR* 324: 59-78.

Brünnow, R. and von Domaszewski, A.
1904 *Die Provincia Arabia auf Grund zweier in den Jahren 1897 und 1898 unternommenen Reisen und der Berichte früherer Reisender beschrieben. Band I: Die Römerstraße von Mâdebâ über Petra und Odruh bis El-'Akaba*

(Hildesheim: Georg Olms Verlag AG).

Bruun, P.M.
1966 *The Roman Imperial Coinage* VII: *Constantine and Licinius A.D. RIC* 7: *313-317* (London: Spink & Son Ltd.).

Crowfoot, G.M.
1936 The Nabataean Ware of Sbaita. *PEFQSt* 68: 14-27.

Dolinka, B.J.
2003 *Nabataean Aila (Aqaba, Jordan) from a Ceramic Perspective*. BAR–IS 1116 (Oxford: Archaeopress).

Erickson-Gini, T.
1999 Mampsis: A Nabataean-Roman Settlement in the Central Negev Highlands, in the Light of the Ceramic and Architectural Evidence Found in the Excavations during 1993–1994. M.A. Thesis, Tel Aviv University.
2010 *Nabataean Settlement and Self-Organized Economy in the Central Negev. Crisis and Renewal*. BAR-IS 2054 (Oxford: Archaeopress).

Erickson-Gini, T. and Hirschfeld, Y.
f.c. The Pottery. *Rudolph Cohen's Excavations in the Nabataean-Roman Sites along the Incense Road in the Negev Desert, 1978-1988. Final Report*.

Fiema, Z.T.
1998 The Roman Street of the Petra Project, 1997. A Preliminary Report. *ADAJ* 42: 399-424.

Gleason, K.
1993 A Garden Excavation in the Oasis Palace of Herod the Great at Jericho. *Landscape Journal* 12 (2): 156-167.

Grawehr, M.
2006 Die Lampen der Grabungen auf ez Zantur in Petra. *Petra ez Zantur III. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen, Teil 2*. (Mainz: Verlag Philipp von Zabern).

Hayes, J.W.
1985 Sigillate Orientali. *Enciclopedia Dell'Arte Antica* (Rome: Classica E Orientale).

Humbert, J.–B. and Desreumaux, A. (eds.)
1998 *Fouilles de Khirbet es-Samra 1: Le voie romaine, le cimetière, les documents épigraphiques*. (Turnhout, Belgium: Brepols).

Johnson, D.J.
1990 Nabataean Piriform Unguentaria. *ARAM* 2: 1 and 2, 235-248.

Joukowsky, M.S.
2007 *Petra Great Temple, Volume II. Archaeological Contexts of the Remains and Excavations* (Providence, RI: Brown University Petra Exploration Fund).

Kanellopoulos, C.
2001 The Architecture of the Shops and Colonnaded Street in Petra. *BASOR* 324: 9-22.
2002a The Monumental Entrance to the Upper Market and the Trajanic Inscription at Petra, The Architectural Context. *ADAJ* 46: 295-308.
2002b A New Plan of Petra's City Center. *Near Eastern Archaeology* 65(4): 251-254.
2003 The Layout of the Garden and Pool Complex in Petra: A Metrological Analysis. *ADAJ* 47: 149-157.

Kanellopoulos, C. and Akasheh, T.S.
2001 The Petra Map. *BASOR* 324: 5-7.

Macaulay-Lewis, E.R
2006 Planting Pots at Petra: a preliminary study of *ollae perforatae* at the Petra Garden Pool Complex and at the 'Great Temple. *Levant* 38: 159-170.

Magness, J.
2002 In the Footsteps of the Tenth Roman Legion in Judea. Pp. 189-212 in A.M. Berlin and J.A. Overman (eds.), *The First Jewish Revolt. Archaeology, History and Ideology* (London and New York).

Negev, A. and Sivan, R.
1977 The Pottery of the Nabataean Necropolis at Mampsis. *Rei Cretariae Romanae Fautorum Acta XVII–XVIII*: 109-131.

Olin, S.
1843 *Travels in Egypt, Arabia Petraea, and the Holy Land*. Two volumes (New York: Harper and Brothers).

Schmid, S.G.
2000 Die Feinkeramik der nabataer im Spiegel ihrer kulturhistorische. *Petra ez-Zantur II. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen, Terra archaeological IV*. (Mainz: Verlag Philipp von Zabern).

Spijkerman, A.
1978 *The Coins of the Decapolis and Provincia Arabia*. Studium Biblicum Franciscani, Colectio Maior 25 (Jerusalem: Franciscan Printing Press).

Stucky, R.A., *et al*.
1994 Swiss-Liechtenstien Excavations at Ez Zantur in Petra 1993. The Fifth Campaign. *ADAJ* 38: 217-292.

Tuttle, C.A.
2009 *The Nabataean Coroplastic Arts: A Synthetic Approach for Studying Terracotta Figurines, Plaques, Vessels, and other Clay Objects*. Ph.D. dissertation, Brown University.

Villeneuve, F.
1990 The Oil-Factory at Khirbet edh-Dharih. *ARAM* 2:1 and 2: 367-383.

Warry, P.
2006 A Dated Typology for Roman Roof-Tiles [*tegulae*]. *Journal of Roman Archaeology* 19: 246-65.