

Testing the Petra Garden and Pool Complex chronology through the ceramics



Abstract: The Petra Garden and Pool Complex in the ancient city center has been dated based on stratigraphy and an array of diagnostic finds. The present study of the coarse wares from selected contexts at the site (augmented by amphorae and fine wares) aims to show corroborative evidence from the ceramic assemblage to support the dating of three major phases in the history of the complex: the construction of the monumental Nabataean garden and pool complex in the end of the 1st century BCE, the Roman renovations in the early 2nd century CE and, last but not least, the second destruction that ended the occupation of the complex, most probably at the end of the 6th century CE. The overall purpose of this paper is to contribute to the knowledge of Petra coarse ware pottery from the Nabataean and Roman periods.

Keywords: pottery, Nabataean, Roman, coarse wares, Nabataean Painted Fine Ware, Petra Garden and Pool Complex

INTRODUCTION

The Petra Garden and Pool Complex (PGPC) [Fig. 1] is located on the southern terrace in the city center, above the Colonnaded Street, immediately to the east of the Great Temple and directly below the hilltop domestic structures of ez-Zantur. The PGPC project was designed

Pamela K. Koulianos

North Carolina State University

Acknowledgments

Thanks to Dr. Leigh-Ann Bedal for providing the opportunity of a lifetime. I dedicate this publication to the late Dr. S. Thomas Parker for his guidance, unwavering support, serving as an inspiration to all in our field, and for always "knowing what was best for me".

to document the archaeological record of the site and to interpret its function and role in relation to other monumental structures within Petra's city center. Eight previous field seasons and ongoing fieldwork, carried out from 1998 and 2013, included survey and excavation of the site, and the ceramic material from these field seasons has been studied, preliminarily, by the present author. Provisional reports of the site have been published (Bedal 1999; 2001; 2005; 2007) as well as more extensive analyses (Bedal 2004).

Generally, the Complex accentuates the wealth and prestige of Nabataean royal society. The garden was laid out in front of a pavilion situated on an island centered in the middle of a pool. Spectators would have been impressed by the ingenuity of the hydraulic system that supported such a vast amount of water in an arid climate.

Importantly, the PGPC has contributed to a case study for testing and developing methods of garden archaeology (Bedal 2002; Bedal et al. 2013).

PGPC CHRONOLOGY

A brief historical background is in order to understand the importance of the PGPC site for the history of the city center of Petra and furthermore for the nature of Nabataean and Roman economy. In 2014, when this paper was prepared, the study of the site through the ceramic record from the excavations was ongoing.

However, the conclusions reached here, while provisional, have stood the test of time.

Petra is situated east of Wadi 'Araba, about 100 km north of the Gulf of Aqaba, an arm of the Red Sea, and about 50 km south of the Dead Sea. The elevation of the site is about 1000 m.



Fig. 1. The Petra Garden and Pool Complex (Photo P.K. Koulianos)

The climate of this region is characterized by dry, arid summer seasons, followed by cooler wet winters. The area receives approximately 300 mm of annual rainfall. The people and the region of Petra were often described in two primary sources: Diodorus Siculus's (90–30 BCE) *Bibliotheca historica*, and Strabo's (about 63 BCE–24 CE) *Geography*. It can be discerned from these sources that at some point between the 4th and the 1st centuries BCE, the Nabataeans became a sedentary people who prospered as middlemen in the trade of aromatics (Strab. 16.4.26). They used their wealth to build their capital city at Petra.

Other than the lucrative trade in aromatics, the Nabataean famous “egg-shell thin”, painted and undecorated fine ware has been found at a variety of sites across Jordan and beyond (Schmid 2007; Erickson-Gini 2010). This suggests that the Nabataeans profited from the trade of their distinct ceramic table ware. Excavation of a ceramic production center

in Wadi Musa, just outside the city, document continued local ceramic production well into the 6th century (‘Amr 1991).¹

The acquisition of the Nabataean kingdom, or Provincia Arabia, by the Roman Empire in 106 CE has historically been viewed as a relatively easy and resistant-free (although poorly documented) affair, yet recent scholarship argues for quite the opposite. Evidence of destruction and/or abandonment in the early 2nd century has been found at many sites across the region (Dhiban, Aila, and Petra) and sites in the Negev (Parker 2009). Some scholars suggest that this could represent Nabataean resistance against the Romans. Other scholars have suggested a natural phenomenon, like an earthquake, which could have affected such a widespread area (Erickson-Gini 2010).

The general chronological framework specific to Jordan (particularly south Jordan), used by the author to date stratigraphic loci within the PGPC, has been adopted from James Sauer (1973: 3–4). It is as follows:

Table 1. Petra Garden and Pool Complex phasing (Bedal et al. 2007)

Phase	Description	Dating
I	Pre-Garden occupation	1st century BCE
II	Monumental Garden and Pool Complex	End 1st century BCE to 1st century CE
III	Roman renovations	Early 2nd century CE
IV	Abandonment	Late 2nd/early 3rd century CE
V	Destruction	363 CE
VI	Squatter farmers	4th to early 5th centuries CE
VII	Destruction	Late Byzantine: late 6th to mid-7th century CE
VIII	Agricultural activity	Post-Classical to medieval
IX	Modern occupation	Up to the 20th century

1 Khairieh ‘Amr (1987) uses Neutron Activation Analysis (NAA) to demonstrate that Nabataean Painted Fine Ware (NPFW) was produced in Petra. This claim has further been supported by Leigh-Ann Bedal (1998).

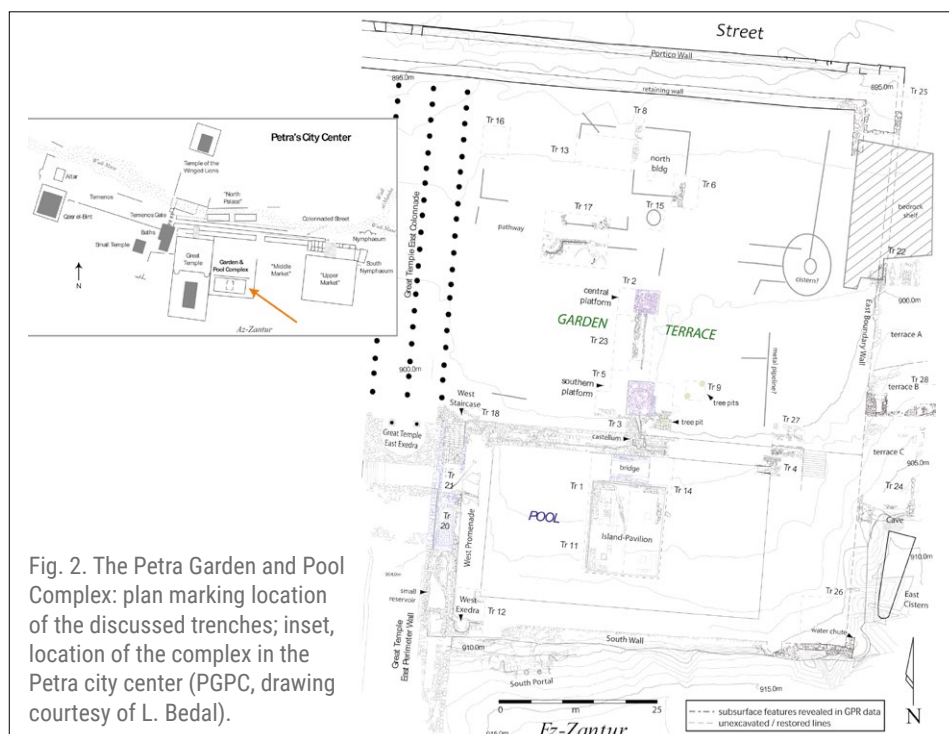
- Hellenistic (323–64 BCE),
- Early Roman/Nabataean (64 BCE–106 CE),
- Late Roman (106–324 CE),
- Early Byzantine (324–about 500 CE),
- Late Byzantine (about 500–630/640 CE).

The site stratigraphy and associated datable material culture (coins, lamps, Nabataean Painted Fine Ware [henceforth NPFW]) served to distinguish nine chronological phases for the Garden and Pool Complex (Bedal et al. 2007) [*Table 1*].

POTTERY DATES TESTING THE PGPC GENERAL CHRONOLOGY

Ceramics were unsurprisingly the most abundant category of finds at the PGPC as at other sites in Petra. The extensive ceramic material studied for this paper, *in*

toto a corpus of 16,698 sherds,² comes from select trenches [Fig. 2]. Specific contexts were chosen with a mind to testing the assigned dating of three major events: the



The pottery assemblage comes from trenches excavated prior to 2009: Trench 2 excavated in 1998, 9 in 2005, and 12, 13, and 14 in 2004. The material was reviewed by Andi Shelton in 2009, and the author incorporates her notes along with her own analyses of the ceramic evidence. Material from the 2011 and 2013 seasons was analyzed by the author.

construction of the monumental Nabataean garden in the late 1st century BCE/1st century CE (Phases I/II); the Roman renovations in the early 2nd century CE (Phase III); and the second destruction layer said to have occurred in the late 6th or early 7th century CE (Phases VII and later) [see *Table 1*].

In order to contextualize the discussion, each phase is first briefly discussed, giving the accepted dating that is based on other material, ceramic and otherwise. In the following section, the pottery assemblages attributed stratigraphically to contexts somehow contemporary or related with the three events mentioned above, concentrating on the coarse wares in particular, but including also amphorae and fine wares, as well as oil lamps.

PGPC CONSTRUCTION

Ceramic data related to the pre-garden occupation validates the dating of the construction of the monumental garden and pool complex. A context predating the construction of the monumental Nabataean garden is the fill of a pit in Trench 13, dated to Phase I and sealed by the levelling debris and layer of garden soil from Phase II (Bedal et al. 2007: 162–163). A cache of pottery was found in this pit, along with a coin of Syllaeus which assigns the pit a *terminus post quem* of 9 BCE.

Coins of even earlier attribution (Aretas II) and Attic black-glazed ware were discovered in a cesspit also dated to Phase I, located in Trench 6 about 15 m to the east, suggesting that the pre-Garden occupation went back even into the 2nd century BCE (Graf 2013: 40). An array of other artifacts, including a lamp, clay figurines, and a carved stone cup, were

found along with the cache of pottery. Their dating is consistent with a 1st century BCE date (Bedal et al. 2007: 162–163).

The vessels from the cache were largely intact and included a variety of forms: cooking pots (hereafter referred to as CP), jugs/jars, and bowls. CP Type 1 has a characteristically flattened rim, sometimes with the rim pulled out over the exterior, usually (but not always) two twin, vertically positioned, loop handles, and ribbing that extends from the shoulder to a rounded base [Fig. 3 top]. A similar form, referred to as Transitional CP Type 1/2, is identical with the first type in form save for a rim that is always pulled out over the exterior [see Fig. 3 top]. These 1st century BCE cooking pots of Type 1, followed by the Transitional CP Type 1/2, suggest a smooth transition from the late 1st century BCE form into the typical, triangular rim tradition of the 1st century CE. CP Type 2, with its collared everted rim, slightly thickened on the inside and triangular in section, often grooved, would become the most prominent form for the next two centuries (1st through 3rd centuries CE) [see Fig. 3].

Dating to the late 1st century BCE are the complete bowls, Types 1 to 3 and Type 6 [Fig. 3 bottom]. Although these forms, especially Type 1 (carinated bowl), span a time from the late 1st century BCE to the early 3rd century CE, those from the cache likely represent the earlier examples, the qualification made based on ware quality and technology. Later variants of these types are thicker, coarser, and debased.

Neither the author nor the excavator are aware of any other examples of a single-phase cache of pottery from an early period, containing a variety of coarse ware and Nabataean fine ware, both painted

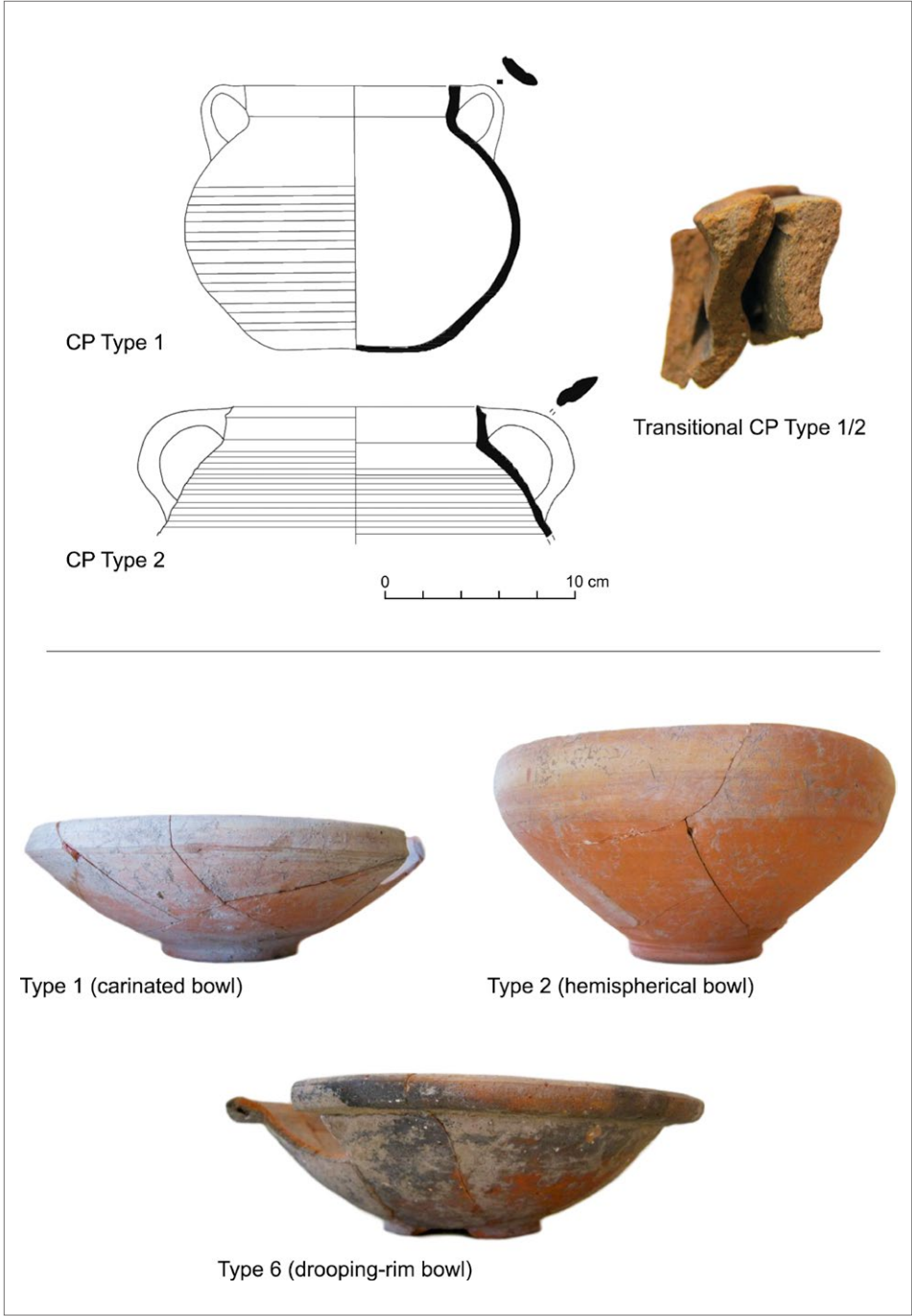


Fig. 3. Coarse wares from the 1st century BCE/1st century CE: top, cooking pots CP Types 1 and 2, and the Transitional CP Type 1/2; bottom, bowls of Types 1, 2 and 6 (PGPC | drawing and photos P.K. Koulianos)

and unpainted (for a discussion of the latter see below). The CP Type 1 and Transitional CP Type 1/2 pots date the cache squarely before the 1st century CE, the time range narrowed down to the last decade of the 1st century BCE thanks to the evidence of the Sylla coin.

Examples of CP Type 1 as well as the Transitional CP Type 1/2 have been published (Gerber 1994: 288, Fig. 15; Gerber 2001: 360, Fig. 1 Nos 10–11), without identifying the transitional type as such.

ROMAN RENOVATIONS

Evidence for a 2nd century CE reconstruction phase can be found in contexts from Trench 5 (southern platform) and Trench 12 (western exedra). The latest material, recovered from contexts T.5.L:149 and T.5.L:158, were five NPFW Dekorphase 3c sherds (about 100–150 CE) and a possible Dekorphase 4 incurved bowl (2nd through 4th century CE). Contexts T.12.L:1, T.12.L:4, and T.12.L:45 yielded similar, early 2nd-century CE material. Context T.12.L:1.PSP12001 yielded five NPFW Dekorphase 3c sherds and one CP Type 2 rim (1st through 3rd century CE). Also to be noted is a Late Roman painted cup (2nd through 4th century CE; context T.12.L:1), one late NPFW Dekorphase 3c body sherd and seven NPFW Dekorphase 3c body sherds, the latter two from context T.12.L:45. The evidence is limited, yet it provides a *terminus post quem* of the early to mid-2nd century CE.

Roman renovations were common throughout the city center of Petra after the annexation of 106 CE, not only at the Garden and Pool Complex, but also at the Great Temple and the Main Theater. The Small Temple was also built in this period. Bedal credits the construction of the vaulted stone bridge, intended to provide easier access to the island pavilion (in Phase II it could be reached either by swimming, by boat or perhaps by an earlier wooden bridge), and reconfiguration of the hydraulic system to the early 2nd century CE.

SECOND DESTRUCTION

Only six pottery lots from Trench 2 (central platform) postdate the destruction attributed to the end of the 6th or the early 7th century CE, which could be the same event that brought down the Petra Church (Niemi and Rucker 2009). These lots (two from Locus 5 and four from Locus 9) correspond to a phase of agricultural cultivation.³ A handful of other contexts from T.12 and T.14 may indicate a date past the 5th century, but the pottery evidence from these contexts is limited. An analysis of these lots has identified sherds supporting a 6th century destruction date.

Context T.2.L:5.P2050 yielded one Aila Ware body sherd, unusually thick and ribbed. It could be from an Aila amphora (5th to 7th centuries CE) or a large Aila

3 This is a relatively thick, grey, compacted cement-like soil that is full of ceramics, the latest of a 4th century date. A thick and grey layer of cultivated soil, covering the entire terrace, contained evidence for continuous cultivation from the 2nd to the 4th centuries CE. The stratigraphic deposition of datable artifacts suggests that the soil was not turned over deeply and, finally, it appears that soot or other burnt material is found in the garden soils across the entire terrace. All of these factors represent a continuous practice of “amendment and gradual change over time” (Bedal, Gleason, and Schryver 2011).

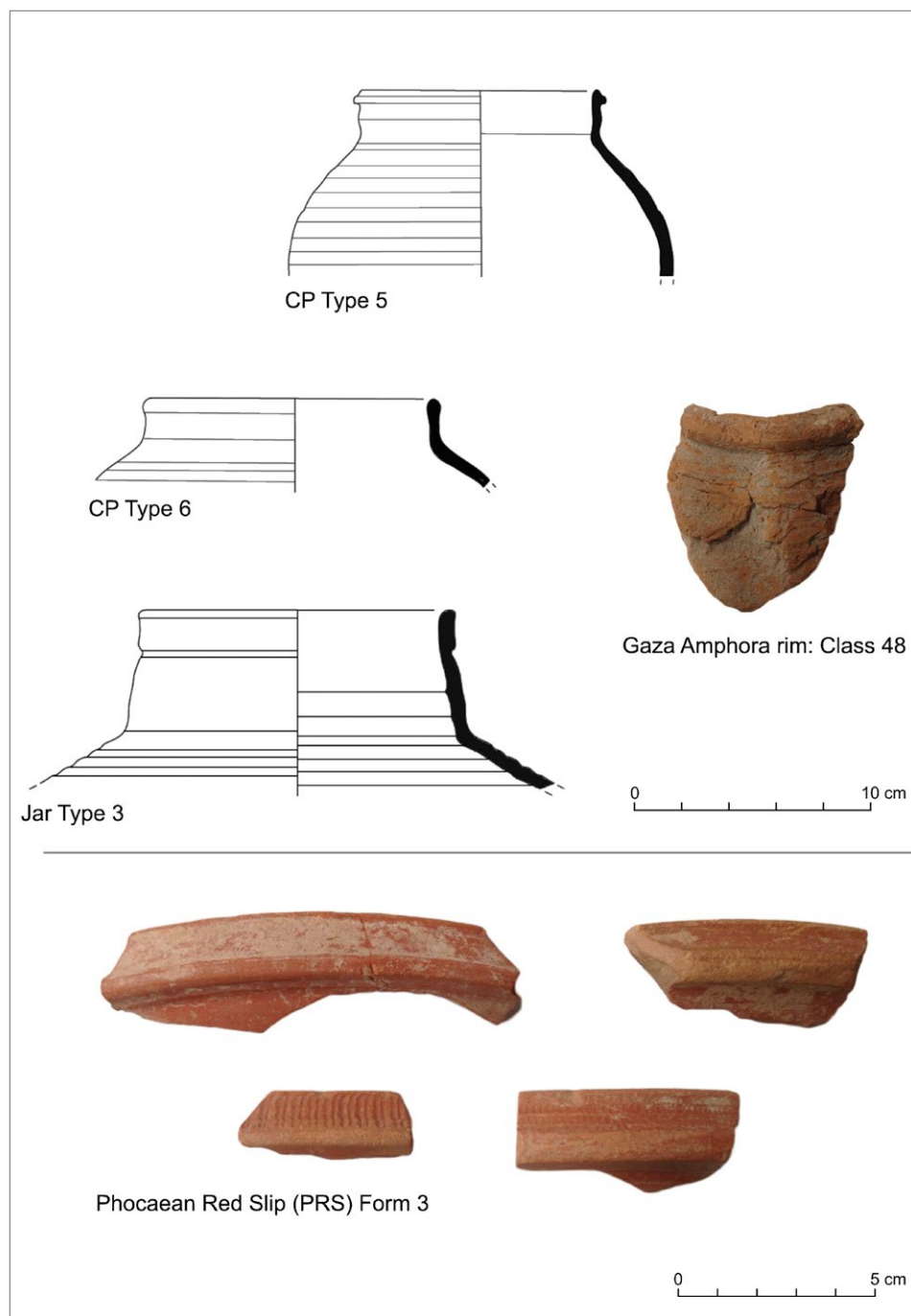


Fig. 4. Ceramics from the Second Destruction phase: top, cooking pots CP Types 5 and 6; center left, jar Type 3; center right, Gaza amphora rim (Class 48); bottom, Phocaeen Red Slip (PRS) Form 3 rims (PGPC | drawing and photos P.K. Koulianos)

storage jar (Parker 2009: 81 Fig. 9.3). Were it indeed from an Aila amphora, it would provide a *terminus post quem* of about 400 CE for the Second Destruction layer (Phase VII). Also recovered from Locus 5 were two CP Type 5 rims. This particular rim tradition begins early in the Late Roman period, yet seems to extend well into the Byzantine period [Fig. 4 top]. It is likely that this is a later, most likely Byzantine example, given the sherds it is associated with. There is one Early Byzantine (324–500 CE) casserole rim and handle, and one Early Byzantine CP Type 6 rim (rounded rim) [Fig. 4 top]. Additionally, Locus 5 yielded a Late Roman, possibly 3rd to 4th century, Type 4 bowl with a rounded rim and single groove under the rim, as well as a Class 48 Gaza amphora rim (3rd to 4th centuries CE) [Fig. 4 center right]. Two Aila Ware body sherds from Locus 9 could represent an Aila amphora. Other ceramic finds included cooking pot rims: one CP Type 5 and one CP Type 7 (Early Byzantine “hooked” CP rim), and one Type 3 folded-rim jar (4th century CE) [Fig. 4 center left].

T.12.L:16.P12043 and T.14.L:7.P14007 yielded a mix of material dating from the 1st through 4th centuries CE. However, a ribbed, thick-walled body sherd of Aila Ware, which could be a 5th-to-7th-century Aila amphora (although the identification based on a body sherd is speculative at best) came from T.12.L:16.P12043, thus pushing the date of this context into the 5th century CE. Two pilgrim flasks, one of them in Aila Ware, were recovered from T.14.L:7.P14007. These flasks start being produced in the 4th century CE; still they extend well into the 6th and 7th centuries (see also Rosenthal-

Heginbottom 2021, in this volume).

The pottery from these two loci are mostly early Byzantine in date (324–500 CE), with a few residual Early Roman/Nabataean (ER/NAB) and Late Roman (LR) sherds. The LR sherds are for the most part forms that extend into the Early Byzantine period and most of the Early Byzantine sherds also extend into later periods. There is, however, no fine ware or amphorae to suggest or confirm a date later than the 5th century CE for these pottery lots. If the Aila Ware body sherds are indeed Aila amphorae, then this extends the chronological range for these loci into the 5th century CE. Currently, because the latest ceramic evidence does not support a late 6th or early 7th century destruction date, it could be suggested that the Garden and Pool Complex was destroyed in the earthquake of 419 CE. The latest datable pottery, with the exception of post-Classical sherds, dates to the late 4th century CE. Yet, the excavation yielded a variety of Late Roman Red Wares, including African Red Slip (ARS), Cypriot Red Slip (CRS), and Phocaean Red Slip (PRS). The ARS forms range from Form 6 to Form 104, the date spanning a period from the early 2nd to the late 6th century CE. There are two CRS forms, Form 1 (late 4th century CE) and Form 9A (550–600 CE). Noteworthy is a handful of PRS rims that represent a variety of types of Form 3, dated to the early 6th century CE [Fig. 4 bottom]. Despite the fact that these sherds were recovered from wash or fill contexts, they are an indication of fine ware imports being brought to Petra well into the late 6th and perhaps even early 7th centuries CE.

REMARKS ON THE PGPC POTTERY ASSEMBLAGE

The coarse ware assemblage examined for the purpose of this paper comes associated with other ceramics, which include amphorae (discussed below), a few fragments of imported fine wares, numerous Nabataean fine wares (NFW) and Nabataean semi-fine ware (NSFW) sherds (also discussed below), as well as bricks, tiles, and pipes. Not the least, there was a handful of nearly complete Nabataean lamps, including a complete lamp from the 2013 season [Fig. 5] and a body sherd from a *polycandelon* recorded in the 2011 season (a complete two-tier *polycandelon* from the exedra in front of Qasr al-Bint was dated by the excavators to the 2nd or possibly 3rd century CE; see Renel 2021: Fig. 21 on page 651, in this volume).

COARSE WARES

Coarse ware bowls, jars/jugs, and cooking wares predominated. The most common cooking pots date from the 1st century



Fig. 5. Terracotta oil lamp (compare with Grawehr 2006: 286, No. 69; 1st century CE) (PGPC | photo P.K. Koulianos)

BCE to the 4th century CE. Noteworthy is the presence of CP Type 1 vessels [see Fig. 6], found in mixed contexts throughout the site, as well as from a pre-Garden context in Trench 13 (see above). Seven of these CP Type 1 rims, as well as two Transitional CP Type 1/2 rims (transitioning to the traditional triangular rim of CP Type 2; see above) come from context T.13.L:18.13029, which has generally been pottery-dated to a transitional Nabataean/Early Roman period. It could place the end of production of the CP Type 1 in the late 1st century BCE, which is tantamount to accepting the date for the introduction of CP Type 2.

Curiously, some of the cooking ware vessels are not blackened and were most likely never actually used for cooking. Cooking pots are multi-functional vessels and could have been used for other purposes than the obvious transport, storage and dining. At other sites, like Khirbet Shema', cooking pots were found inside a cistern because their twin vertical loop handles lent themselves well for attaching ropes in order to draw water from such installations (Meyers, Kraabel, and Strange 1976: 105). Once broken, they would have been discarded in the cistern. At the PGPC complex, the cooking pots could have served in a similar capacity: drawing water from the cisterns to water the plants, remove dirty water from the pool and fill it with fresh water.

Notably, the material includes a handful of "flower-pot" or planting vessel sherds, but lamentably never from a secure archaeological context [Fig. 7]. These vessels have string-cut bases (sometimes



Fig. 6. Complete pots from the Trench 13 cache: complete CP Type 1 pot shown front and center (PGPC | photo P.K. Koulianos)



Fig. 7. Flower-pot bases (PGPC | photo P.K. Koulianos)

a ring-base) and a hole intentionally punched through it. String-cut bases are typical of later, Roman production, but this kind of base is attested in the Early Roman/Nabataean periods. However, planting pots of this kind (e.g., Macaulay-Lewis 2006: 160–161, Figs 1, 3) are conspicuously rare at the PGPC.

AMPHORAE

The variety of amphorae from the site illustrates the range of imports coming into Petra and the dating of these vessels corresponds to the existence and use of the garden and pool [Table 2]. However, compared to other Nabataean sites, the quantity of finds from PGPC is curiously limited.

One should mention a large reconstructible body sherd from a jar of overfired Aila Ware, characteristically green

in color, that S. Thomas Parker identified as a tentative Aila amphora.

Also the rareness of Gaza amphorae at the site seems odd and apparently significant given Petra's location and the long use of the Petra–Gaza road well into the 3rd century CE (Erickson-Gini 2010) [Table 2]. In addition to that, the absence of Aila amphorae should also be viewed as surprising, in view of their recorded presence at the nearby quarter of ez-Zantur. The Garden likely consumed the contents of amphorae, but the vessels themselves need not have been stored at the site. Their contents could have been decanted elsewhere and the evidence is lying discarded at an as yet undiscovered dump in the vicinity. The present author has also argued in favor of individual wine preferences of the Nabataeans living at Petra. At Beyda, just a few kilometers from Petra, wine presses suggest wine production throughout the Nabataean period.⁴ Therefore, being producers of their own wine, the Nabataeans may have been less inclined to import foreign brands. While this could work for the earlier period, it admittedly does not explain the lack of Gaza amphorae in the late Roman and Byzantine periods.

Finally, comparing the percentage of amphorae at PGPC to other Nabataean and Roman sites, such as Aila, one would expect a greater difference between a port site like Aila and an inland site like Petra. Amphorae constituted barely about 1% of all the pottery in the PGPC assemblage,

Table 2. Quantification of amphorae

Amphorae	Total n=16,698	% of sherd total
Undiagnostic	104	0.62%
Aila	5 (confirmed 1)	0.03%
Gaza	11	0.065%
Rhodian	3	0.017%
Dressel 2–4/ Koan	3	0.017%
Class 44	2	0.012%
Class 45	3	0.017%
Class 47	17	0.101%
Egypt	4	0.024%
TOTAL	152	about 1% (0.910%)

4 The wine presses and occupation at Beyda is Nabataean in origin, yet occupation in the area surrounding Beyda extends into the Byzantine period. One of the Nabataean structures was turned into a church, adding a throne, presumably for a bishop. It is not clear if there is continuous occupation from the Nabataean through Byzantine periods (pre-63 BCE–391 CE; Bikai 2008: 465–466).

and the same percentages were calculated for the Roman Aqaba Project, where the total count of sherds is about 650,000. The fact that shore or harbor areas, which is where one would expect to find the greatest quantity of discarded amphorae, were not excavated at Aqaba could bias the ultimate quantity of amphorae found at the latter site. Despite this caveat, it is surprising still that the percentage of amphorae at Aila is similar to the percentage at PGPC (Parker 2014: 206).

FINE WARES

The collection of imported fine wares was just as limited as the amphorae, but still represents a wide variety of types and forms. The latest datable sherds from the PGPC included CRS, PRS, and ARS wares, supporting Bedal’s suggested late 6th century date for the Second Destruction.

Table 3. Quantification of NFW sherds from PGPC

NFW Dekorphases and date	Total <i>n</i> =16,698	% of sherd total
1		
150 to 50 BCE	2	0.012%
2a		
50 to 30/20 BCE	4	0.024%
2b		
30/20 to 1 BCE	428	2.536%
2c		
1 BCE to 20 CE	69	0.413%
3a		
20 to 70 CE	560	3.354%
3b		
70 to 100 CE	150	0.898%
3c		
100 to mid-2nd c. CE.	545	3.263%
4		
2nd/3rd to 4th c. CE	34	0.203%

The Nabataean fine wares: painted (NFW), unpainted (NFW), and semi-fine (NSFW), were abundant in all the periods. The most popular NFW attested at the PGPC are Dekorphases 2b (20/30–1 BCE), 3a (20–70 CE), and 3c (100–mid-2nd century CE) [Table 3] (see Erickson-Gini 2021; Wenner and Parker 2021, both in this volume). Given the presumed date of the construction and initial use of the Nabataean Garden and Pool Complex—the late 1st century BCE into the 1st century CE—the predominance of Dekorphases 2b and 3a is not surprising. Dekorphase 2b also represents the latest datable painted fine ware from contexts underlying the garden soil (Trench 3), and from the foundation trench for the pool facade wall (Trench 18). The two Dekorphase 1 (150–50 BCE) sherds from Trench 6 or the southeastern corner of the North Building are noteworthy (the level below the garden soil included a cesspit). Assuming that they had not been brought from elsewhere at a later time (which is possible given the site topography and the context), these sherds could suggest activity on the site during the 1st century BCE. Finally, the abundance of Dekorphase 3c sherds shows that the site was being used (either for its original function as a *paradeisos* or later as an agricultural area) into the mid-2nd century CE.

One final point: if the 4th century layers are truly so rich in pottery, why would there be so few Dekorphase 4 sherds? Could the explanation for this be that the NFW production had declined by this period? The other Dekorphases present a notably higher percentage than Dekorphase 4 [see Table 3], although admittedly these results are statistically not

significant. Recapitulating, the Nabataeans seem to have favored their own wares, being more likely to ship/distribute the imported products.

Unguentaria

The typical Nabataean unguentarium falls loosely into the fine ware category (NFW, NSFW, and even coarse ware), still it merits a separate discussion because of its uniqueness. The category counts a total of 79 vessels, which translates into only 0.47% of the total sherd count from the site. One complete example was classified as a Johnson Type I from Group 1 (pre-27 CE); another vessel is a Johnson Type V from Group 2; and finally, a nearly complete profile represents a Type III unguentarium from Group 1 (Johnson 1990). One flat base, probably string-cut, appears to be Late Roman; the ribbing is sloppy but distinct. The author's initial impression was that it could be a residual example of Groups 1 or 2 in Johnson's typology.

While applying scented oils after swimming does not seem to have been a common practice, it would be interest-

ing to compare this with the quantities of unguentaria found at the baths. Given the numbers, it should perhaps be assumed that the unguentarium was not typically used at the Garden site.

The decline of the perfume industry and the disappearance of unguentaria from the archaeological record after the 3rd century CE could suggest that incense was no longer being transshipped in quantity through Petra. Churches are attested at Petra from the late 4th century onwards and both pagans and Christians used incense in religious ceremonies (Euseb. *Onom.* 36.13–14). So, it is unlikely that the importation of incense ceased; rather the demand for incense in Petra shifted from supplying a perfume industry for export to limited local consumption. Given the shift of trade routes to the south, it is likely that incense was imported through ports along the Red Sea, such as Aila, bypassing Petra. Perhaps the incense containers were skins or other organic materials that do not survive in the archaeological record (R. Gentry, personal communication, 2012).⁵

CONCLUSION

In conclusion, the coarse ware pottery from stratified contexts in the PGPC have corroborated the dating of individual phases established on the grounds of stratigraphic and architectural analyses.

Pottery pre-dating the construction of the monumental Nabataean garden is of late 1st century BCE date; supported

by numismatic evidence, it gives a *terminus post quem* for the construction of the complex. In turn, the ceramic corpus from relevant contexts provides a *terminus post quem* in the early 2nd century CE for the Roman renovation phase. And finally, the limited pottery associated with the Second Destruction

5 Carbonized palm leaf bags with frankincense are attested at Qana; perhaps bags of this kind were shipped to Aila, where they would not have survived unless they had been carbonized as in Qana.

phase provides a *terminus post quem* of about 400 CE for the ruination. No longer a *paradeisos* from the 3rd century CE, the Garden and Pool Complex was turned into agricultural land. The pottery here does not support clearly a date for the Second Destruction as late as post-597, but it does provide a *terminus post quem* for the latest occupation of the complex at least not before the 5th

century CE. The only evidence to support a mid-to-late 6th century date is supplied by the Late Roman Red Ware sherds (CRS, ARS, and PRS), but, as discussed earlier, they all derive from post-destruction contexts.

Further investigations should help to shape a more accurate chronology of the complex and illuminate change in use over time.

Pamela K. Koulianos

<https://orcid.org/0000-0001-5533-9149>

North Carolina State University

pkkoulianos@gmail.com

How to cite this article: Koulianos, P.K. (2021). Testing the Petra Garden and Pool Complex chronology through the ceramics, *Polish Archaeology in the Mediterranean*, 30/2, 611–628. <https://doi.org/10.31338/uw.2083-537X.pam30.2.10>

References

Primary sources

- Diodorus Siculus, *Library of history*, vol. II (*Loeb Classical Library* 303) 1935. Transl. C.H. Oldfather
- Notley, R.S.; Safrai, Z. (eds) (2005). *Eusebius, Onomasticon: The Place Names of Divine Scripture*. Boston–Leiden: E.J. Brill
- Strabo, *The Geography*. vol. II. H.L. Jones (tr.) 1930. Cambridge, MA: Harvard University Press

- ‘Amr, K. (1987). *The pottery from Petra: A neutron activation analysis study* (=BAR International Series 324). Oxford: B.A.R.
- ‘Amr, K. (1991). The Petra National Trust Site projects: Preliminary report on the 1991 season at Zurrabah. *Annual of the Department of Antiquities of Jordan*, 35, 313–323
- Bedal, L.-A. (1998). Neutron activation analysis of pottery. In M.S. Joukowsky (ed.), *Petra Great Temple I. Brown University excavations 1993–1997* (pp. 346–367). Providence, RI: M. Joukowsky
- Bedal, L.-A. (1999). A *paradeisos* in Petra: New light on the “Lower Market.” *Annual of the Department of Antiquities of Jordan*, 43, 227–239

- Bedal, L.-A. (2000). *The Petra pool-complex: A Hellenistic paradeisos in the Nabataean capital (results from the Petra "Lower Market" survey and excavation, 1998)* (Ph.D. diss.). University of Pennsylvania
- Bedal, L.-A. (2001). A pool complex in Petra's city center. *Bulletin of the American Schools of Oriental Research*, 324, 23–41
- Bedal, L.-A. (2002). The Petra Garden feasibility study, 2001. *Annual of the Department of Antiquities of Jordan*, 46, 381–390
- Bedal, L.-A. (2004). *The Petra pool-complex: A Hellenistic paradeisos in the Nabataean capital. Results from the Petra "Lower Market" survey and excavation, 1998* (=Gorgias Studies in Classical and Late Antiquity 10). Piscataway, NJ: Gorgias Press
- Bedal, L.-A. (2005). Petra. The Petra Garden and Pool Complex. In S.H. Savage, K.A. Zamora and D.R. Keller, Archaeology in Jordan, 2004 season. *American Journal of Archaeology*, 109, 552–554
- Bedal, L.-A., Gleason, K.L., and Schryver, J.G. (2011). The Petra Garden and Pool Complex, 2007 and 2009. *Annual of the Department of Antiquities of Jordan*, 55, 313–328
- Bedal, L.-A., Gleason, K.L., Schryver, J.G., Ramsay, J., and Bowsher, J. (2007). The Petra Garden and Pool Complex, 2003–2005. *Annual of the Department of Antiquities of Jordan*, 51, 151–176 (<http://publication.doa.gov.jo/Publications/ViewChapter-Public/1664>)
- Bedal, L.-A., Conyers, L.B., Foss, J.E. and Gleason, K.L. (2013). The Petra Garden and Pool Complex, Ma'an Jordan. In A.-A. Malek (ed.), *Sourcebook for garden archaeology: methods, techniques, interpretations and field examples* (pp. 625–641). Berne: Peter Lang/Fondations des parcs et jardins de France
- Bikai, P.M. (2008). Beidha in Jordan: A Dionysian hall in a Nabataean landscape, *American Journal of Archaeology*, 112, 465–507
- Erickson-Gini, T. (2010). *Nabataean settlement and self-organized economy in the Central Negev: Crisis and renewal* (=BAR International Series 2054). Oxford: Archaeopress
- Erickson-Gini, T. (2021). Problems and solutions in dating Nabataean pottery of the post-annexation period. *Polish Archaeology in the Mediterranean*, 30/2, 681–706
- Gerber, Y. (2001). Selected ceramic deposits. In Z.T. Fiema, C. Kanellopoulos, T. Waliszewski, and R. Schick, *The Petra Church* (=American Center of Oriental Research Publications 3) (pp. 359–366). Amman: American Center of Oriental Research
- Graf, D.F. (2013). Petra and the Nabataeans in the Early Hellenistic period: the literary and archaeological evidence. In M. Mouton and S.G. Schmid (eds), *Men on the rocks: The formation of Nabataean Petra (2–4 December 2011: Berlin)* (pp. 35–56). Berlin: Logos Verlag
- Grawehr, M. (2006). Die Lampen der Grabungen auf ez-Zantur in Petra. In D. Keller and M. Grawehr, *Petra. Ez Zantur III. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen* (= Terra Archeologica V) (pp. 257–398). Mainz am Rhein: Verlag Philipp von Zabern
- Johnson, D. (1990). Nabataean piriform unguentaria. *ARAM*, 2, 1&2: 235–248

- Macauley-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(1), 159–170
- Meyers, E.M., Kraabel, A.T., and Strange, J.F. (1976). *Ancient synagogue excavations at Khirbet Shema', Upper Galilee, Israel, 1970–1972* (=Annual of the American Schools of Oriental Research 42). Durham, NC: Duke University Press
- Niemi, T. and Rucker, J. (2009). Evidence of Nabataean occupation at Qasr at-Tilah in Northern 'Arabah valley from exposures in Wad at-Tilah. *Annual of the Department of Antiquities of Jordan*, 53, 107–114
- Parker, S.T. (2009). The Roman port of Aila: Economic connections with the Red Sea littoral. In L. Blue, J. Cooper, R. Thomas, and J. Whitewright (eds), *Connected Hinterlands: Proceedings of Red Sea Project IV* (BAR International Series 2052) (pp. 79–84). Oxford: Archaeopress
- Parker, S.T. (2014). Coarse ware pottery of the first through third centuries at Roman Aila (Aqaba, Jordan). In B. Fischer-Genz, Y. Gerber, and H. Hamel (eds), *Roman pottery in the Near East: Local production and regional trade. Proceedings of the round table held in Berlin, 19–20 February 2010* (=Roman and Late Antique Mediterranean Pottery 3) (pp. 205–215). Oxford: Archaeopress
- Peacock, D.P.S. and Williams, D.F. (1986). *Amphorae and the Roman economy: An introductory guide*. London: Longman
- Renel, F. (2021). Roman pottery from the Building C4 pantry in the Qasr al-Bint area of Petra. *Polish Archaeology in the Mediterranean*, 30/2, 629–654
- Sauer, J. (1973). *Hesbon Pottery, 1971: A preliminary report on the pottery from the 1971 excavations at Tell Hesban*. Berrien Springs, MI: Andrews University Press
- Schmid, S.G. (2007). Nabataean fine-ware pottery. In K.D. Politis (ed.), *The world of the Nabataeans* (=Oriens et Occidens 15) (pp. 309–326). Stuttgart: Franz Steiner Verlag
- Stucky, R.A., Gerber, Y., Kolb, B., and Schmid, S.G. (1994). Swiss–Liechtenstein excavations at ez-Zantur in Petra 1993. The fifth campaign. *Annual of the Department of Antiquities of Jordan*, 38, 271–292
- Wenner, S. and S.T. Parker (2021). Response to Erickson-Gini’s “Problems and solutions in dating Nabataean pottery in the post-annexation period”. *Polish Archaeology in the Mediterranean*, 30/2, 707–736