

## ABSTRACT

KOULIANOS, PAMELA KATERINA. The Economy of Petra from the First Century BC through the Fourth Century AD: An Analysis of the Nabataean Perfume Industry. (Under the direction of S. Thomas Parker).

This thesis is an attempt to reconstruct the economy of Petra during the third century AD, a period that can be described as a “miniature dark age.” This analysis is made through the lens of a particular type of ceramic vessel, the Nabataean piriform *unguentarium* or perfume bottle.

The Nabataean Kingdom (mostly within what is today Jordan) was first a client state of the Roman Empire. However, it was annexed as *Provincia Arabia* in AD 106. The Nabataean perfume industry began ca. the late first century BC and flourished through the first and second centuries AD. It declined and apparently disappeared in the third century. Yet, what happened to this perfume industry? This thesis suggests that the perfume industry failed to revive at Petra due to the lack of sufficient quantities of key imported ingredients, frankincense and myrrh, thus halting production at Petra. The major routes for importation of these key ingredients shifted north and south (of Petra). The reduced quantities which did reach Petra after the third century were apparently only for local consumption. The perfume industry after the third century continued elsewhere at major urban centers such as Alexandria, when unguents were henceforth shipped primarily in glass *unguentaria*.

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The Economy of Petra from the First Century BC through the Fourth Century AD: An  
Analysis of the Perfume Industry

by  
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## **DEDICATION**

To my Mom and Dad. The greatest support system.

## **BIOGRAPHY**

The author, Pamela Koulianos, was raised in Durham, NC and graduated from Durham School of the Arts. There under the guidance of her history teachers, she developed a passion for history and archaeology. In her first year, while searching for volunteer opportunities, she stumbled upon Dr. S. Thomas Parker's archaeological lab and repository.

Since then she has worked as a research assistant at the lab—becoming a ceramicist. Since 2011 she has traveled to Jordan to participate in three different archaeological projects as a ceramicist.

After graduating with a B.A. in 2011, Pamela continued her educational career at North Carolina State University and during her graduate career she has presented her research at both national and international conferences. After graduating in May 2015, Pamela plans to pursue a career in teaching or museum work.

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## CHAPTER 1

The purpose of this thesis is to analyze the economy of Petra during the third century AD through the lens of one ceramic vessel—*unguentarium*.<sup>1</sup> The Nabataeans were known for their status as middle-men in the trade of aromatics, especially frankincense. Later having realized the potential profit by using imported frankincense to produce a value-added product, i.e. scented oils/perfumes, they created an industry in the late first century BC. Ceramic *unguentaria*, the containers of these scented oils, are signatures of the Nabataean economy and hallmarks of Nabataean cultural identity. The perfume industry continued to flourish in the first and second centuries AD, even after the Roman annexation of Nabataea in 106. But during the mid-third century the bottling of unguents in ceramic containers at Petra declined as evidenced by the disappearance of the vessel from the archaeological record at Nabataean/Roman sites, including the Nabataean capital Petra and Aila, a major port on the Red Sea. While production of ceramic *unguentaria* disappeared at Petra it continued elsewhere. Therefore, the fate of this industry at Petra was not a reaction to

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<sup>1</sup> Because I have found the classifications of small juglets such as *unguentarium*,” “lekythos,” “amphoriskos,” “aryballos,” etc., quite arbitrary I would like to define the term *unguentaria* and how it fits into my research. The ceramic piriform *unguentarium*, is a vessel that ranges in height from 5-12 cm, typically has a pointed based (but could have a rounded or string cut base), features a somewhat flaring bead rim or a simple rounded rim, and a long neck tapering into a bulbous body. While some vessels have neat and distinct ribbing others have sloppy artificial ribbing or none at all. The piriform *unguentarium* I refer to most often is the Nabataean piriform *unguentarium*, but there are ceramic *unguentaria* from other sites such as Stobi that have similar characteristics but were probably made locally. This is probably the case for other industrial cities or large villages that were able to produce perfumed oils and had a functioning ceramic industry. But I do not consider any vessel with handles to be a piriform *unguentarium*. When analyzing ceramic vessels and creating a typology, the appearance of handles and even placement of handles is considered when determining a new type. Therefore, I do not consider an amphoriskos or an aryballos as the same *kind* of vessel but I do realize that the *function* of the vessel is similar if not used for the same purpose. Glass *unguentaria*, on the other hand, look very similar to the ceramic piriform *unguentaria* as we might expect—if the vessel form itself had become associated with a particular product, it makes sense that this form would be preserved in the new medium. Glass *unguentaria* are defined by long tapering necks into a squat or bulbous body; more often however, glass *unguentaria* have a flat base and are not ribbed.

decreased demand in the wider Mediterranean world, but to other unknown factors. This study will suggest answers to an otherwise overlooked historical question: What happened to the perfume industry in the broader context of the economy of Petra in the third century AD?

Chapter one will briefly introduce the Nabataeans and review the history of *unguentaria* as reflections of the perfume industry in the ancient Mediterranean world. Evidence suggests a vigorous and sustained trade in perfumed oils produced at Petra and widely exported throughout Nabataea and perhaps beyond from the late first century BC into the third century AD.

David Johnson has created the only typology of Nabataean piriform *unguentaria* based on evidence from the Temple of the Winged Lions in Petra. Chapter two will serve as a case study to test Johnson's typology using an analysis of these vessels from Aila, a major port of the Nabataean Kingdom. This chapter will argue that all the *unguentaria* recovered at Aila are imports, probably from Petra, about 100 km north of Aila. Analysis of the *unguentaria* from Aila suggests that the vessels fit loosely into Johnson's typology with a few substantive differences. Johnson's typology may need refining. It will also address the historical implications of this vessel at Aila and in the wider region.

Chapter three will discuss the evolving economic and political situation of Petra from the second through fourth centuries by considering the limited but diverse evidence. This is crucial because so little is known about Petra in the third century.

Chapter four will consider where and why the perfume industry continued elsewhere after the third century, which also witnessed a transition from ceramic to glass *unguentaria*—this phenomenon can be seen in cities such as Alexandria in Egypt, a likely place for

continued production of perfume bottled in glass *unguentaria* given its powerful status as a nexus of trade. This chapter will also discuss glass *unguentaria* recovered from other sites from the eastern Mediterranean.

In chapter five the author will bring together all conclusions and discuss the significance of this research to historians of the ancient world.

Pottery is a ubiquitous kind of evidence to illuminate various aspects of ancient societies. Pottery vessels, when analyzed by their origin, type, function, and distribution, can date associated contexts and provide many insights to a society's economy. This chapter will focus on a specific type of ceramic vessel, a juglet called a piriform *unguentarium* found in the south-eastern Roman Empire between the late first century BC and the early third century AD. These vessels were produced within the Nabataean Kingdom, now mostly within modern day Jordan (Figure 1). Nabataea in this period was first a client state of the Roman Empire then was annexed as the Roman province of Arabia in AD 106. This chapter will review the history of *unguentaria* and the relevant primary sources and secondary literature.

### *Historical Background*

The origins of the Nabataeans are a vexed historical issue and cannot be rehearsed here. They were unquestionably Arabs who were present in the region south of the Dead Sea by 312 BC when they were attacked by Antigonus I, a former general of Alexander the Great (Bowersock 1983: 13). The people and the region of Petra were described in two primary sources: Diodorus Siculus's (90-30 BC) *Bibliotheca Historica*, and Strabo's (ca. 63 BC- AD 24) *Geography*. Diodorus was a Greek historian from Sicily. He wrote a "universal history" in Greek which chronicled events up to the first century BC (Bowersock 1983:12). Diodorus reports that he used the eyewitness account of Hieronymus of Cardia (fourth century BC) for the earliest historical reference to the Nabataeans (Diodorus 19.94.2-95.2).<sup>2</sup> According to Diodorus, the Nabataeans were entirely nomadic pastoralists who became wealthy from the trade of spices, frankincense, and myrrh (Diodorus 19.94.2-95.2). This view of the

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<sup>2</sup> All the translations of ancient sources used in this thesis can be found in the "Ancient Sources" reference section.

Nabataeans contrasted with Strabo's *Geography*. Strabo wrote in early first century AD that the Nabataeans were *sedentary* peoples fond of accumulating property, honored those who were wealthy, and profited from the trade of products such as gold, silver, and aromatics (Strabo 16.4.26). A geography has a somewhat different purpose than a history, but Strabo nonetheless discussed the great city in some detail. Strabo relied upon an informant who had visited Petra, as well as his close friend, a Roman prefect of Egypt Aelius Gallus, who had campaigned through a portion of Nabataea (26-24 BC) and provided a first-hand account. What can be discerned from these two sources is that at some point between the fourth to first centuries BC, the Nabataeans evolved from pastoral nomads to a sedentary people using their wealth to build their capital city at Petra.

Petra is situated east of Wadi 'Arabah, ca. 100 km north of the Gulf of Aqaba, an arm of the Red Sea, and ca. 50 km south of the Dead Sea, and rises to about 1000 m in elevation. The climate of this region is characterized by dry, arid summer seasons, followed by cooler wet winters. The area receives ca. 300 mm of annual rainfall. The local rock of Petra is a mixture of granite and sandstone (Bowersock 1983: 7). The most obvious characteristic of Petra is the vibrant coloration of the rock "which has been perhaps the most celebrated glory of that city" (Bowersock 1983: 7).

Trade was crucial for the economy of the Nabataeans, who met both increasing demand for aromatics and increasing competition from others, with a shift to a more full-time, large-scale trading system (Johnson 1987: 16). The products which satisfied such a demand cannot be fully known, however, of particular importance were frankincense, myrrh,

and other value-added products such as oils and perfumes.<sup>3</sup> These latter products required a vessel to store and transport such precious fluids. These containers were piriform *unguentaria* which have been interpreted to suggest large scale production of perfumed oils by the Nabataeans by the late first century BC.

The once independent Nabataean Kingdom fell under indirect Roman control as a client state in 63 BC. The Roman emperor Trajan ultimately annexed Nabataea to the Roman Empire as the province of Arabia in AD 106. Yet it is clear that the region continued to prosper economically, both under indirect (63 BC- AD 106) and direct Roman rule (post-annexation), until the mid-third century.

The ancient city of Aila, now modern Aqaba, was a port at the head of the Gulf of Aqaba on the extreme northern end of the Red Sea. Aila was founded by the Nabataeans ca. 30 BC. Its construction has been interpreted as a direct response to the economic threat created by the Roman annexation of Egypt at this time. The Romans likely wanted to divert control of the lucrative international trade in aromatics via the Red Sea from the Nabataeans, to the newly annexed Roman province of Egypt by construction and/or revitalization of “...ports along the Egyptian Red Sea coast, specifically Myos Hormos and Berenike” (Parker 2009:80). Aila gave the Nabataeans a port on the Arabian coast of the Red Sea to maximize trade by water (and thus compete with the Egyptian ports) supplementing the more costly

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<sup>3</sup> The term “value-added” should be explained—previous scholarship on the topic of perfume produced at Petra refers to perfume as “value-added,” I think with the understanding that the vessel itself provides an intrinsic boost. Confirmed by Johnson’s 1987 dissertation a few additives that were used to make the perfume were native to Petra and thus added to the imported frankincense and myrrh coming from the south (giving the raw materials a value seemingly greater than just the native additives of Petra or the raw materials from the south.).

trade via camel caravans over land routes moving north through the Arabian peninsula (Parker 2009: 80).

The excavation of Aila, between 1994 and 2003 by the Roman Aqaba Project (RAP) permitted the excavators to reconstruct the economy of the city over time. The project analyzed evidence from both a regional surface survey, and extensive excavation of Aila itself. This included recovery of a significant collection of *unguentaria* sherds, most from clear stratigraphic contexts. However, before turning to the specific evidence from Aila itself, I will first review previous scholarship on Nabataean *unguentaria* and the broader Nabataean economy.

#### *Previous Scholarship on Nabataean Unguentaria*

The piriform *unguentaria* were not the first perfume juglets to circulate in the ancient Mediterranean. The earliest such jug, the Greek *lekythos*, normally served as a container for precious oils. By the Hellenistic period (323 BC- 30 BC) the *lekythos* had been replaced by the fusiform *unguentarium* (Johnson 1990: 236). “The fusiform has a heavy bulbous body in the middle, tapering up to a form a long tubular neck, and down to a high cylindrical stem base,” (Johnson 1990: 236). Johnson states that “according to Anderson-Stojanovic, this form first appears in the western Mediterranean in the early to mid-fifth century BC” (Johnson 1990: 236). The earliest fusiform *unguentaria* do not appear at Petra until the late second century BC. All vessels of this form at Petra are imports, implying that perfumed oils (unguents) were not yet being produced at Petra itself (Johnson 1990: 236). Johnson suggests that the piriform *unguentaria* excavated from a city dump of Petra at Katuteh could perhaps be the primary stages of Petra’s perfume industry. Johnson and Nabil Khairy agree that the

piriform *unguentarium* began to appear at the end of the first century BC (Johnson 1990: 236).

Some of the earliest research on *unguentaria* in the Levant was by P. Kahane in 1952. He notes that fusiform *unguentaria* appeared in both funerary as well as domestic contexts. Kahane dated the fusiform *unguentaria* mostly to the early Hellenistic period (323 BC- 30 BC) and reported that these derived from tombs at Marion, from Kountoura Trachonia (both on Cyprus), and in the Nile Delta. He concluded that the Nabataean piriform juglet appeared around the first century BC (Kahane 1952).

Kahane recognized four types of *unguentaria*. His variant A “displays an oval body and a comparatively long neck... [with an] offset rim... [that was] not well made... [with] the mouth often dipped in red pain” (Kahane 1952: 176). Variant B is “distinguishable by the more sacciform body...the highest point of the bulge is placed lower... [and the] rim is mostly...flaring” (Kahane 1952: 176). Most importantly for this research is the Nabataean form, variant D, described as a “bee-hive shaped body with a base in the form of a very shallow conus; the vessel was therefore not meant to stand. The rim is small and offset; the neck is slightly bulgy as is the neck of variant C” (Kahane 1952: 177). Unfortunately, the only graphic Kahane provided in his article is of the fusiform *unguentarium* which he labeled “spindle-bottle” (Kahane 1952: 146). As to the duration of these piriform *unguentaria* Kahane also suggested that they continued into the third and fourth centuries based on evidence found in el-Makr (NE of Acrê, Israel); coins dating from the third and fourth

centuries along with glass vessels were found associated with variant D piriform juglets.<sup>4</sup> As seen below, his suggested terminal date for the Nabataean *unguentaria* seems too late.

In *Palestinian Ceramic Chronology*, P. Lapp used an analysis of the stratified deposits from various sites in light of externally dated imported wares to produce a typology of Palestinian pottery from 200 BC to AD 70. He particularly relied on the excavations of Beth-Zur (175 BC- 100 BC), Qumran (50 BC- AD 68), and Alayiq (AD 1-50) to create this chronological typology. Lapp included examples of fusiform *unguentaria* from Beth-Zur as well as Alayiq and piriform *unguentaria* from Alayiq and Qumran (AD 50-68; Lapp 1961: 199). Lapp argued that piriform *unguentaria* did not appear before the start of the first century AD, a date now pushed back to the late first century BC by subsequent research by Khairy and Johnson.

In 1969 James I. Miller wrote a comprehensive treatment of the spices and spice trade routes of the Roman Empire from 29 BC to AD 641. His text identifies the spices, their origin, where they were later cultivated, and where they were exported. Miller labels Alexandria an *entrepôt* *i.e.* a commercial center where goods are brought for redistribution. The most important attribute of an *entrepôt* is its geographical situation—it must lie on main trade routes (Miller 1969: 173).

As piriform *unguentaria* met a greater demand for perfume, various forms of the vessel were introduced. Nabil Khairy who published an important analysis of these vessels in 1980, argued that the “differing forms of the Nabataean piriform *unguentaria*...probably do not reflect a chronological development but rather demonstrate the craftsmanship of the

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<sup>4</sup> To clarify, throughout this thesis I use the term juglet(s) *unguentarium(ia)* interchangeably.

Nabataean potters” (Khairy 1980: 86). However, Khairy wrote this before the appearance of David Johnson’s ground breaking 1987 dissertation which demonstrated such a chronological development. Khairy also suggested that piriform *unguentaria* “occur frequently from the last half of the first century BC onward” which challenged Lapp’s dating of the beginning of the first century AD (Khairy 1980: 85; Lapp 1961: 97, 112, 122). Khairy suggested that the ribbed vessel is common at Nabataean sites and has close parallels from Petra, Dhat-Ras, Nessana, and from Amman, all but the last site within the Nabataean Kingdom (Khairy 1980: 87). The un-ribbed vessel is restricted to Nabataean sites and can be “compared to examples published by Hammond (1973a: 30, nos. 43-46, ‘Nabataean’) and Horsfield (1942: 149-50, pl. 25: 180, undated)” (Khairy 1980: 87). Khairy provided the only published non-Nabataean parallel to the ribbed piriform *unguentaria* which comes from Qumran on the northwestern shore of the Dead Sea. Khairy says “our un-ribbed Nabataean *unguentarium* is different from those that occur outside Nabataea. The body of our example has a tubular shape, while the un-ribbed *unguentaria* from non-Nabataean sites are more round, coarser, heavier, and of greater capacity” (Khairy 1980: 87). This suggests that there was production and distribution of piriform *unguentaria* beyond Nabataean sites.

Johnson’s 1987 dissertation *Nabataean Trade: Intensification and Culture Change* analyzed Nabataean trade throughout the kingdom’s existence. Johnson created a “timeline” of Nabataean economic and socio-political identities. His reconstruction of Nabataean trade traces its nomadic origins through the Roman annexation in AD 106 and into the late third/early fourth centuries. As such it is pivotal to the analysis of the economy of the ancient city of Aila, which was founded by the Nabataeans as a nexus of trade. Johnson’s work

included the heretofore closest analysis of Nabataean *unguentaria* and a chronological typology of Nabataean *unguentaria* based on stratified, coin-controlled contexts from excavation of the Temple of the Winged Lions at Petra. He demonstrated that the form, technique of manufacture, and fabric of these juglets often have chronological significance. For example, Johnson claimed that later forms of *unguentaria* are more poorly made than earlier examples. He also argued that increased demand for the products within these vessels encouraged their manufacture more quickly and in greater numbers (Johnson 1940: 240). Therefore, this analysis will evaluate Johnson's key conclusions and how these relate to Aila, particularly to the study of its *unguentaria*.

Johnson's major goals were: 1) How was the Nabataean trade system organized in terms of procurement, transportation and storage in this period? 2) How and why did trading systems change? 3) How did these changes affect other aspects of Nabataean culture? (Johnson 1987: 2).

Johnson began by outlining the major developments and crucial changes in Nabataean trade from the Early Nabataean Period (330 BC- 50 BC) to the late third/early fourth centuries AD. He accepted the traditional view of the Nabataeans as originally a pastoral nomadic Arabs, mostly egalitarian, supplementing their pastoral economy by seasonal overland trade in incense from south Arabia to the Mediterranean world. He saw an apparent decline in a Nabataean role in overland trade in the first century BC because of a shift from overland caravans through the Arabian Peninsula to more efficient sea commerce, particularly via Egyptian ports on the Red Sea then overland to the Nile. He argued that the shift to trade by sea largely excluded the Nabataeans. Therefore the Nabataeans created a

new system of overland trade to compete directly with sea trade via Egypt. He suggested that the Nabataeans changed from being part-time traders into full-time specialists in the incense trade. This consequently encouraged a change from a nomadic life to a sedentary lifestyle. This included greater reliance on agriculture and long distance trade, development of a writing system, and creation of a capital city at Petra (Johnson 1987: 1-14).

Johnson's reconstruction of the chronology of Nabataean trade was based on the work of two earlier scholars: Avraham Negev (1977) and G.W. Bowersock (1983) both of whom defined three periods in the kingdom's history: Early Nabataean (ca. 300 BC- 30 BC), Middle Nabataean (ca. 30 BC- AD 40), and Late Nabataean (ca. AD 40- third century AD). Each period naturally has distinct characteristics but all show a progressive trend towards a more sedentary lifestyle, agricultural development, increased military power, and growth in long distance trade (Johnson 1987: 3).

Johnson also relied on Bowersock's *Roman Arabia* (1983) for a reconstruction of Nabataean history and the Roman economy. Bowersock argued for several developments in Nabataea beginning in the first century AD. First there was decreased commercial activity along old overland trade routes via Petra due to the diversion of much of the traffic to the new sea routes via the Red Sea ports to Egypt. Because of this decline the Nabataean King Aretas IV (9 BC- AD 40) developed a policy of urbanization which created more demand for commercial traffic. Such urban centers included Petra, Meda'in Saleh (in northwestern Saudi Arabia), Bostra (now in southern Syria and the residence of the last Nabataean king), and several large villages in the Negev (Johnson 1987: 3). According to Bowersock, the annexation of the Nabataean kingdom by Trajan in 106 was not due to economic motives but

rather “the need to provide security for Trajan’s expansionist policy in the East, rather than the weakness of the Nabataean kingdom due to trade failure or an inability to provide protection as a client state against nomadic incursions into Syria” (Bowersock as cited by Johnson 1987: 7). Bowersock also argued that following the annexation there was continued prosperity in the former Nabataean kingdom as the new *Provincia Arabia*. Petra remained as a crucial center for the province up to the mid-fourth century AD. This prosperity was mostly based on “agriculture with overland trade playing a very minor role because of the shift from overland trade to trade routes to Egypt and Palmyra” (Bowersock 1983: 81-87).

However, like Negev, Bowersock must be placed within a historical context; the suggestion of less traffic on the Petra-Gaza road in the middle of the first century AD was first advanced by Negev in the 1960s, but was later disproved by R. Cohen’s excavation of the road stations in the Negev along the Petra-Gaza route (Cohen 1982; Erickson-Gini 2010). It is also important to note that both Bowersock and Negev argued for a decline of Nabataean trade in the first century AD because of competition from the Egyptian ports on the Red Sea. One must consider the possibility that many Nabataean sites could have flourished in the first century AD because they were agriculturally sited in fertile lands, not necessarily needing much trade. However, more recent scholarship suggests that many Nabataean sites were still thriving, including the Nabataean port of Aila (Parker 2014).

To summarize, Johnson provides a chart incorporating the work of Negev and Bowersock—the model is as follows:

Table 1: Negev and Bowersock’s Trade Model

TIME A:	Low level non-intensive system
TIME B:	Highly organized trading system with the advantages of scale and costs
TIME C:	Decline and eventual elimination of the small scale trading system

Johnson points out that this type of model is used to explain “the decline in trade between Mesopotamia and the Indus valley through Iran in the 2<sup>nd</sup> millennium BC, the fall of the Maya state...and the decline of the Saharan trade through Ifrgiya in the twelfth century AD” (Johnson 1987: 15-16). This model does not provide dates because it is used to explain an array of economic shifts in multiple case studies, such as those listed above. Johnson states that this model is still too simple to explain the economic shifts in the Nabataean Kingdom and therefore, modifies the model as follows:

Table 2: Johnson’s Economic Trade Model for the Nabataean Kingdom

330 BC- 50 BC	Low level, small scale, part-time nomadic trade system
50 BC- AD 25	Increased demand, competition leads to a shift into a . . .
AD 1-200	Full time, large scale trading system
Post AD 200	Decreasing demand, return to part-time, small scale trade system

What is crucial about this model is that the demand for products in the second and third periods was increasing at the same time as competition so that an “intensification of the trade system by the Nabataeans could be sustained without lowering the prices of goods” (Johnson 1987: 15-16). Production of *unguentaria* began just after the beginning of the second period. Notably, the final period of decreasing demand in the third century seemingly corresponds to the time when *unguentaria* disappear from the archaeological record. Also note that Johnson’s dates seem to overlap. For example: 50 BC- AD 25 there is a period of “increased demand, competition which leads to...full time, large scale trading system” in AD 1 to 200 i.e., leaving the first quarter of the first century AD within both periods.

Johnson’s model to conceptualize Nabataean trade in general can be used for this specific case study of Aila. Parker has argued on circumstantial evidence that Aila was founded ca. 30 BC, perhaps early in the reign of Obodas III (30 BC- 9 BC; Parker 2014). The foundation of Aila occurred at the beginning of a period of “increased demand, competition lead[ing] to a shift in to a full time, large scale trading system” (Johnson 1987: 15-16). The specific items in such demand cannot be fully known, however, both documentary and archaeological sources provide some evidence of large scale production and trade. Of particular importance is frankincense and myrrh. The high demand for these, as well as value-added products derived from raw frankincense and myrrh, such as oils and perfumes, created a need for a vessel to store and transport these precious materials, i.e. piriform *unguentaria*. The abundance of these juglets at many Nabataean sites has been interpreted to suggest large scale production at Petra itself and extensive distribution of perfumed oils by the Nabataeans.

What evidence is there for such an industry in or around Petra apart from the containers themselves? A ground-breaking botanical survey conducted by Johnson himself yielded evidence that the key botanical ingredients for perfumed oils, such as rock rose, terebinth tree, and *balanites aegyptica* were available in the region of Petra and thus available for the Nabataeans for their own industry (Johnson 1987: 49-53). The Nabataeans, when combining these native plants along with imported frankincense and myrrh, required a container to transport the value-added products, i.e. perfumed oils and unguents (Johnson 1987:49-53).

Johnson suggested multiple functions of *unguentaria*. Their frequent appearance in tombs in both Syria-Palaestina (including Jewish ossuary tombs) and in Nabataea led him to agree with Kahane that these juglets were associated with funerary contexts (Johnson 1990: 240). But Johnson also agreed with the scholarly consensus that the “primary function [was] outside of a mortuary context,” i.e. above all to store and transport perfumed oils (Johnson 1990: 240). Johnson also stated that the “Nabataean piriform unguentaria may also have functioned in tandem with ceramic oil lamps” (Johnson 1990: 242). The pointed bases of these *unguentaria* require support from a stand to keep them upright. But their base could also facilitate placement in the fill hole of a ceramic oil lamp to allow the heat from the lamp wick to warm the oil within the juglet and perfume the air” (Johnson 1990: 242). Evidence for this is found on bottles from Petra which show burn marks on only one side of the neck. The marks are not consistent with a fire because the vessels were not found in layers of ash.

All of these uses of *unguentaria* are suggested in the archaeological record. However, were these containers used exclusively for perfumed oils? What other precious liquids,

aromatics, or cosmetics could *unguentaria* have carried? Since the perfume industry did not begin at Petra, where and when did the lucrative trade begin? Finding both types of bottles in separate burials might suggest a similar function for both fusiform and piriform *unguentaria*; however why was the fusiform no longer adequate for the transportation of oils and perfume? Perhaps the Nabataeans wanted a distinguishably different vessel to compete with the fusiform juglet perhaps to advertise the uniqueness of their own perfumes and oils in small amounts by making the piriform *unguentaria* smaller and in a different shape than its predecessors, the fusiform *unguentarium*. Consumers both within and without the Nabataean kingdom could have more easily recognized the piriform type and thus its contents. A parallel might be drawn to the famous brown colored, Gaza amphora—a transport container consumers associated with its famous white wine. The piriform *unguentarium* is a smaller, more accessible, and easily handled vessel. In contrast, the fusiform had a spindle shape and the lekythos was a large vessel with a handle; like a jug or a jar. Perhaps the Nabataeans also preferred the size and shape of the piriform for easier transport compared to the fusiform.

Johnson divided the piriform *unguentaria* recovered from the Temple of the Winged Lions into three major chronological periods. The first two groups identified (Forms I-IV and Forms V-VII) belong to the first period of production (late first century BC to ca. AD 27). These groups were “characterized by consistent ware and decoration, namely red wares with tan slips and ribbing and evident neck joins with wheel marks” (Johnson 1990: 239). As production increased in the second period (ca. AD 27-100) including Forms VIII-XI and third periods (ca. AD 100-200), including Form XII of production the vessel becomes thicker, still wheel-made and the clay contains “large grits causing extensive blowouts in

firing” (Johnson 1990: 240). Johnson notes that the gradually growing carelessness of production techniques suggested “mass production” of the vessel. Johnson does not otherwise clearly define what he means by “mass production,” with its connotations of modern industrial assembly-line production. However, “mass production” must date to the initial development of the piriform juglet, when quantitative evidence already suggests production in large numbers. Finally, the fourth group, the most abundant type found at the Temple of the Winged Lions, is dated from ca. AD 225 to the mid-third century, after which production at Petra ceased (Johnson 1990: 239). These dates place the various types into the only chronological typology of Nabataean *unguentaria*.

Johnson divides the juglets morphologically into four main groups as follows:

“Group One (Forms I-IV):

Form I: Small, 5.7 cm high made of fine thin red ware with slight ribbing, well-fired, no slip, pointed string cut base, 22 ml in volume.

Form II: Larger, 7 cm high, made of fine thin red ware with a tan slip, ribbed square body with a flaring rim and neck, a string cut base, 25-34 ml in volume. Another variant of the same form is in brown ware with a grey slip which may reflect a firing problem rather than an actual attempt at another variety.

Form III: Two major sizes, one 8-10 cm high, the other 12-18 cm in height. Fine thin red ware, some with a tan slip, bulging neck, everted flared rim, pointed string cut base, crude ribbing. Volumes are either 30 ml or between 90-100 ml” (Johnson 1990: 237).

Johnson dated Forms I-IV to the period shortly before ca. AD 27. His proposed dating may be compared to more recent chronological typology of Nabataean Painted Fine-ware

(NPFW) developed by Stephan Schmid from the Swiss excavations at ez-Zantur, a domestic complex within the city-center of Petra (Schmid 2000: Abb. 9E). Johnson's first period coincides with Schmid's Dekorphase 2b-2c (ca 30/20 BC to AD 20). Johnson noted that *unguentaria* Forms I-IV were found in sand layers, deposited in construction fills before erection of the Temple of the Winged Lions. The fills also yielded Nabataean fine, light red on red painted ware (apparently Dekorphase 2b-2c) which support Johnson's dating of this context and thus the associated *unguentaria* as well (Johnson 1990: 237).

The second group of *unguentaria* "Group Two (Forms V-VIII):

Form V: Small, 8-10 cm high, red ware with a tan slip, pointed base, slightly flared rim, tapered neck, ovoid body with ribbing. Volume is 30 ml.

Form VI: Small, 8-10 cm high, red orange ware with tan slip, flat string cut base, flaring neck, everted ring rim, rounded body. Volume is 30 ml.

Form VII: Small, 8 cm high, red ware with tan slip flat string cut base, thin ovoid body, straight neck. Volume is 23 ml" (Johnson 1990: 238).

These forms are dated from ca. AD 27 to 100, a date supported by their association with Nabataean dark red paint on fine red ware (Schmid's Dekorphase 3a; ca. AD 20-70) found in contexts following the original construction of the temple.

"Group Three (Forms VIII-XI):

Form VIII: Large, 9-18 cm high, red ware with a tan slip, pointed based, long tapering straight neck, rounded bulging body, flaring ring rim. Volume is from 90-100 ml.

Form IX: Large, 12-18 cm high, red ware thing tan slips, pointed base, ovoid body, long straight cut base. Volume is around 25 ml.

Form XI: Small, 6-10 cm high, red ware, no slip, bulging neck, pointed base, flared ring rim. Volume is around 25 ml” (Johnson 1990: 238). This group of vessels was dated after 100 due to association with coins of Trajan (98-117) and late Nabataean painted fine-ware characteristic of the second century with thicker side walls and dark, heavy black paint (Schmid’s Dekorphase 3c/4, ca. 100-150 through the mid-third century). They were in layers with coins from the first quarter of the third century.

“Group Four (Forms XII):

Form XII: Small, 8-10 cm high, red ware with no slip or ribbing, pointed base, flaring rim, straight neck. Volumes range from 25-45 ml” (Johnson 1990: 238).

Form XII was the most common type recovered from this excavation. These vessels were found with coins of Septimius Severus (193-211), Caracalla (211-217), and Alexander Severus (222-235), suggesting deposition perhaps slightly later than the first quarter of the third century; the layers above contained coins of Constantine (306-337; Johnson 1990: 238-239). The terminus of production, Johnson suggested, was also implied by the fact that “examples of *unguentaria* that were found in occupation levels directly under and slightly earlier than the earthquake of 363 AD are reused examples consisting of earlier forms whose necks, broken off in use, have now been ground down to form a new shorter neck and rim” (Johnson 1990: 238-239). This would reflect a decline in the unguent industry at Petra at that time period in keeping with the decline in demand.

The Temple of the Winged Lions proved to be a well-stratified site which supported Johnson’s chronology—however—there is a period of twenty-five years of manufacture that disappears from his record (Johnson 1987: 58-65). His third period (Types VIII-XI) dated to

ca. 100-200 and the next period began after 225. This “gap” of a quarter century appears to be a mistake that Johnson overlooked. On the basis of existing evidence cited by Johnson, I suggest revising the terminus date of the third period from ca. 200 to ca. 225, since the latest coinage from period three suggests that it began after ca. 225.

Johnson’s typology included four groups each that vary morphologically but their wares seem to be consistent with the pink-orange ware characteristic of finer Nabataean ware. However, he also observed a decline in the quality of the ware beginning with the second period and continuing until the end of production, a phenomenon explained by increasing or “mass production.” The production periods of *unguentaria* fit fairly well within the periods of Johnson’s model above, i.e. increased demand and increased competition led to a full-time, large-scale trading system until a decline in demand forced return to a small-scale trading system.

Although Johnson did argue convincingly that the *unguentaria* suggest an increase in demand and thus also in production and trade of aromatics by the Nabataeans, he never offered any quantification of *unguentaria* to allow the reader to conceptualize the size of this industry. This is particularly unfortunate since one presumes that he had access to the records of the excavation of the Temple of the Winged Lions. Such quantification could have been used to compare with evidence from other sites to allow greater historical and economic insights from these vessels.

Johnson did discuss the design and fabric of the *unguentaria* which protected the oils and perfumes from damage due to exposure to heat and light. Other vessels for unguents were made of glass, stone, or lead. However, glass allows light to reach the contents within

the vessel while lead and stone vessels were perhaps too heavy. Ceramic containers on the other hand were lighter than lead or stone and opaque, unlike glass. Johnson also suggested that the tan slip that often decorates the surface of these vessels would also reflect light (Johnson 1987: 69). However a white slip (common in other types of Nabataean pottery) would arguably better protect the contents from light and heat.

To summarize, Johnson concluded that the Nabataeans began as pastoralists who also worked part-time as commercial middlemen, trading in frankincense and myrrh (Johnson 1987: 143). At the end of the first century BC two factors led to a shift from small-scale middlemen to a larger more intensive system: increasing demand from the Roman Empire for such luxury goods and increased competition from commercial rivals in Egypt trading via the Red Sea. This increased competition and demand continued until the general economic decline in the third century. Johnson also concluded that *unguentaria* follow this wider economic trend in that “archaeological evidence from Petra shows continued development of this industry until the beginning of the third century AD when demand for unguents were curtailed by economic decline in the Roman Empire” (Johnson 1987: 144). He also emphasized that this conclusion was “contrary to those such as Negev and Bowersock who feel that the Nabataean trading system collapsed in the first century AD due to decreasing profits because of the development of large scale trade with South Arabia” (Johnson 1987: 145).

This review of previous scholarship reveals that, although previous scholars such as Kahane and Khairy made some important early contributions to the study of Nabataean *unguentaria*, neither offered a real typology nor considered the broader economic

implications of this evidence. In contrast, Johnson's work was fundamental in this regard. But his dissertation also reveals shortcomings, particularly the lack of any quantification of the evidence. The fact that Johnson also selected AD 27 as a crucial date should also be questioned. This derived from a Nabataean inscription not found *in situ* but was nevertheless used by the excavators to date construction of the Temple of the Winged Lions and thus the initial period of his typology. Despite this, as pointed out earlier, the date of AD 27 does fit the associated Nabataean Painted fine-ware evidence. Nevertheless, it provides a useful starting point for analysis of Nabataean *unguentaria* from Aila, where such a quantification and further analysis may be illustrative as a comparable sample to Johnson's corpus from Petra.

The next chapter will present a case study to test Johnson's typology using a collection of *unguentaria* from Aila, a major port of the Nabataean Kingdom.

## CHAPTER 2

This chapter will discuss the *unguentaria* excavated at ancient Aila, including their morphology, fabric, technique of manufacture, quantification and stratigraphic context. As will be seen, the corpus is relatively small and, because it lacks any complete examples of these vessels, it will focus on the more diagnostics sherds, i.e. rims, necks and bases. It will be seen that, although the *unguentaria* from Aila are comparable to the types and dates offered by Johnson, some differences in the *unguentaria* from Aila versus Petra are notable.

This study includes 185 sherds of piriform *unguentaria* juglets from five excavation areas in Aila. These areas, designated “A, B, K, M, and O” have yielded well-stratified sequences extending from the first to late third/early fourth centuries AD and in some cases well beyond (Figure 2). The nature and stratigraphic history of each excavation area will first be briefly summarized, followed by specific evidence of the *unguentaria* found at Aila.

Moving from north to south across these widely scattered excavation areas, the first is Area B, a low mound within the so-called “Circular Area” (Parker 2014: 1-31). Excavation revealed substantial mud-brick structures, apparently domestic in nature, built in the first century AD directly atop the natural alluvial fan. This complex seemingly lay near the northern edge of the ancient city, farthest from the coastline. These structures were abandoned about the turn of the second century and quickly filled with wind-blown sand. The mound was then reoccupied by new mud-brick structures early in the second century, the beginning of the Late Roman period. This occupation was also apparently domestic and continued in three phases up to the fourth century when the mound was abandoned (Parker 2000: 375-377).

A few meters southeast of Area B was Area O, another mud-brick domestic complex. The stratigraphic profile suggested its foundation in the late first century AD in the Early Roman/Nabataean period. After two phases of Early Roman/Nabataean occupation the complex was apparently abandoned at the beginning of the second century but, soon reoccupied later in the same century (Parker 2002: 409-412). This Late Roman occupation witnessed reuse of some walls of earlier structures as well as construction of new walls, again apparently for domestic purposes. Occupation continued through three Late Roman phases until final abandonment sometime in the third century (Parker 2002: 409-412).

Southeast of Area O was Area M, the most extensively excavated of those domestic complexes in the northern sector of Aila. Similar to the mud-brick complexes in Areas B and O, Area M was apparently established on a virgin site in the late first century AD, witnessed two phases of Early Roman/Nabataean occupation, followed by a brief period of abandonment at the turn of the second century, and then reoccupied throughout the Late Roman period in three phases through the second and third centuries. The complex was abandoned by the early fourth century, although the site was reused as a cemetery for shaft burials in the Early Byzantine period (Retzleff 2003).

These three northern areas share a similar history. All were domestic in nature, founded in the first century AD, briefly abandoned around the turn of the second century, then reoccupied through the second third, and (in Areas B and M) into the early fourth century, after which all were abandoned. The lack of later occupation allowed the excavators to reveal large portions of these complexes and recover significant quantities of evidence from the first through third centuries.

In sharp contrast, all major excavation areas to the south (closer to the coastline) yielded rich remains of later periods (especially Byzantine and Early Islamic), allowing Roman strata to be reached only in deep probes of limited size. This accounts for the paucity of *unguentaria* from these southern areas. The only exception is Area K, where the Early Islamic structures were completely removed and a new grid of excavation trenches exposed structures dating from the Late Roman and Early Byzantine periods (second through fourth centuries AD), with a few deep probes reaching Early Roman/ Nabataean levels (Parker 2003: 329-330). Areas A and K coincide with Areas M, B, and O in that they produced Early Roman/Nabataean material (first century AD), Late Roman material in two distinguishable phases (second through third centuries AD). A few more *unguentaria* will likely be identified from other southern areas, Areas J, L, and R, but these areas produced material largely dated to the fifth century or later i.e. after the period of production of *unguentaria* and in the interest of time have been excluded from this study. The few *unguentaria* recovered from such contexts are likely residual and thus would not alter the nature of the study sample in any significant way.

The discussion above explains why the collection of *unguentaria* from Aila is dominated by the three northern areas B, M, and O:

Table 3: Ceramic *Unguentaria* Recovered from Each RAP Main Excavation Area

<b>AREA</b>	<b># OF DIAGNOSTIC SHERD</b>	<b>% FROM TOTAL DIAGNOSTIC SHERDS</b>	<b># OF UNGUENTARIA SHERDS</b>
Area M	<b>11,121</b>	<b>0.085%</b>	<b>93</b>
Area B	<b>3,319</b>	<b>0.135%</b>	<b>45</b>
Area O	<b>3,908</b>	<b>0.069%</b>	<b>27</b>
Area K	<b>4,003</b>	<b>0.249%</b>	<b>10</b>
Area A	<b>1,936</b>	<b>0.367%</b>	<b>7</b>
Area N	<b>85</b>	<b>3.529%</b>	<b>3</b>

Table 4 breaks down the *unguentaria* sherds by stratigraphic contexts and chronological period:

Table 4: *Unguentaria* by Stratigraphic Context from Aila

<b>1<sup>st</sup> century (AD 70-106): ER/NAB (2 Phases)</b>	<b>47 Sherds</b>
<b>TURN OF THE 2<sup>ND</sup> CENTURY</b>	<b>ABANDONMENT PHASE</b>
<b>2<sup>nd</sup> century (Late Roman Phase 1)</b>	<b>54 Sherds</b>
<b>3<sup>rd</sup> century (Late Roman Phase 2)</b>	<b>25 Sherds</b>
<b>Late 3<sup>rd</sup>/ Early 4<sup>th</sup> century (Late Roman Phase 3)</b>	<b>4 Sherds</b>
<b>4th century (Late Roman Phase 4)</b>	<b>3 Sherds</b>

The quantification by stratified contexts reveals an interesting trend about importation of *unguentaria* to Aila. The vessels appear in the earliest strata from several areas of the first century AD and in even larger numbers during the second and early third centuries. However, this is followed by a steep decline during the mid-third century which continues throughout the fourth century. There are few *unguentaria* from the fourth century or later and even these likely represent residual sherds from earlier periods.

Now that we have reviewed the quantitative and distributional evidence over time, let us discuss the *unguentaria* themselves. It is notable that of the 185 sherds only a few can be definitely assigned to Johnson's proposed typology. One sherd (registration #19667 from B.1:97.136)<sup>5</sup> is an example of Johnson's Type III (Figure 3), described as in "two major sizes, 8-10 cm high, the other 12-18 cm in height. Fine thin red ware some with a tan slip, bulging neck, everted flared rim, pointed string cut base, crude ribbing" (Johnson 1990: 237). Form III fits into Johnson's first group, Forms I-IV, which appear before ca. AD 27. Sherd #4290 (Figure 3), from M.5:108.198, is an example of Johnson's Form IV. This form appears during the first century AD and is "small, 9 cm high red ware with a tan slip, a flat string cut base, flared neck, flared ring rim, slight ribbing on the lower body" (Johnson 1990: 237). Despite being larger than Johnson's proposed range (9 cm high) this particular sherd (#4290 from M.5:108.198), displays the flat base of Form IV. Sherd #57244 from O.1:20.81 (Figure 3), fits the description of Johnson's Form V, "small, 8-10 cm high, red ware with a tan slip,

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<sup>5</sup> All sherds discussed here are referenced by a sequential registration number. Their associated stratigraphic context includes the excavation area, trench, locus, and pottery pail number. Thus "B.1:97.136" means that the sherd derived from Area B, trench 1, locus 97, and pottery pail number 136,

pointed base, slightly flared rim, tapered neck, ovoid body, and ribbing” (Johnson 1990: 238). Form V is grouped with Forms VI and VII; all Group 2 forms date to ca. AD 27-100.

Assigning the remaining *unguentaria* sherds from Aila to Johnson’s typology has proven to be problematic, because no complete examples of these vessels were recovered from Aila and even most of the more diagnostic sherds are only small fragments, lacking sufficient profile to confidently distinguish each as a type.

There is a unique type, #81311 from M.6:79.157, attested in an Early/Roman Nabataean Phase 1 context (first century AD) at Aila (Figure 4) but seemingly unattested at Qumran or Petra. There are five other rim sherds of this type. There are three rims from an Early Roman/Nabataean context (first century), one from a Late Roman Phase 1 context (second century) and one from an Early Byzantine context, most likely residual. There is not enough profile preserved to determine the form of the base (pointed, flat, or string cut); however, it is of the same characteristic orange/red-pink color of Nabataean fine-ware. If this type, unparalleled in Johnson’s typology, is among the earliest forms of Johnson’s Forms I-IV, why do we not see any parallels from other Nabataean sites? Given the quantity of complete vessels recovered by Johnson, perhaps it represents a rare form at Petra.

On the other hand all the *unguentaria* from Aila share the same characteristic ware—all likely represent imports since none appear to be in the easily recognizable local Aila ware. Instead the ware of nearly all the *unguentaria* is typical of Petra; a pink-red or reddish-orange paste. The vessel is usually finished with a very distinguishable white-cream or tan slip. Few stray from this ware. One example (#95362) is of a unique black-grey ware (Figure 5). It does not seem likely that this is due to secondary charring or that it represents a kiln waster,

so perhaps this is a different ware. Another example (#18193) is unique in that, although it is of imported ware, it does not match the typical Nabataean pink ware. Perhaps this vessel was imported from beyond the Nabataean kingdom?

Other distinguishing features are the forms of the rims, bases, necks and presence or absence of ribbing on these vessels. Of the 185 total sherds, 37 are rims, 97 bases, and 51 are body sherds. Rims also differ between straight, vertical rims versus flaring, everted beaded rims. Some bases are pointed and ribbed while other bases are pointed and un-ribbed. There are also examples of both flat, string-cut bases as well as pointed string-cut bases. Twenty-eight sherds are ribbed and besides the two exceptions discussed above, the wares are all in the familiar pinkish-red Nabataean ware.

Figure 3 illustrates the best preserved profiles of the *unguentaria* from Aila. Five of the seven drawn examples can be assigned into Johnson's *unguentaria* typology. Sherd #57244 (Figure 3) exhibits most of the characteristics of Form V in Group Two. Sherd #57244 is from an Early Roman/Nabataean context which coincides with Johnson's proposed dates for Group Two, dated ca. AD 27 to 100. The ribbing extends from just below the shoulder to just above the conus base. The narrowing of the neck beings where the neck and shoulder meet; this suggests that the form if fully preserved, would most resemble Form V of Johnson's typology. The second *unguentarium* is #72402 (Figure 3), an example of Form IX of Group Three. The base is slightly pointed and the body is narrow, without ribbing. Although it shares some features of Form VI of Group Two, this vessel as a string cut base. Since this sherd was found in an Early Byzantine context it must be residual from the Late Roman period. Sherd #73769 (Figure 3) resembles Form VIII of Group Three and its Late

Roman context coincides with the date of Group Three, i.e. second or early third century. The long narrow neck and everted rim is characteristic of Form VIII; however without the lower half of the profile a definite classification cannot be made. Sherd #95362 (Figure 3) could represent either Form VIII or Form IX of Group Three. The pointed base and lack of ribbing are consistent in both forms. Although the more bulbous body of #95362 is more similar to Form VIII, the lack of preserved rim prohibits certain classification. Form VIII has an everted flaring rim whereas the rim of Form IX is straight. There is no ribbing; however the more bulbous body of form VIII is similar to #95362. If the rim had been preserved a clearer classification would be possible; Form VIII has an everted flaring rim whereas Form IX displays a straight rim. This particular sherd was found in an Early Roman/Nabataean context, suggesting that it is more likely to be Form VIII (ca. AD 100) which does not correspond with Johnson's Group 3 which is dated later than AD 100. Finally #81275 represents our unique form at Aila (Figure 3).

As noted in the previous chapter, Johnson argues for three major periods of production of piriform *unguentaria*. The first period dates from the late first century BC to ca. AD 27 and consists of Groups One and Two. These vessels are of the highest quality red ware, with minimal grits, thin walled and well-fired with few blow marks, suggesting careful clay preparation (Johnson 1987: 66). The second period of production, ca. AD 27-100, consisting of Group Three, is characterized by wheel-made vessels and was produced in "greater numbers and with less care than in the previous period" (Johnson 1990: 239). Johnson suggests that the second period of production is characterized by mass production of the vessel, and that "workmanship is much sloppier, and most vessels no longer have careful

ribbing, and wall thickness is consistently heavier” (Johnson 1987: 67). The third period of production is represented by Group Four (ca. first quarter of the third century AD). These vessels which are made in large numbers or “mass produced” are even less well made than before. Almost all vessels from this period of production of unguents at Petra were followed by increasing demands for these products (Johnson 1987: 67). So, according to Johnson this implies that there was increasing demand from the period between the early second century (second period of production), through the very beginning of the third century (fourth period of production) prior to the crisis period.

The piriform *unguentaria* at Aila may provide some evidence to support Johnson’s arguments, especially in such aspects as ribbing, slip, blowouts and grit characteristics over time (Johnson 1987: 66). Notably however, the partial preservation and relatively small collection of *unguentaria* from Aila prevent definitive conclusions about the key characteristics to distinguish these types by period of production. For example, sherd #17572 from Area B.2:81.116, I most likely a variant of Johnson’s Type IX, Group Three, dated after ca. AD 100 during the second period of production. The placement into this group would suggest that this sherd in particular would show large or many grits, blowouts, and coarse in ware. Sherd #17572 is in fact of coarse ware with large grits and its slip is inconsistently applied. The sherd was found in an Early Byzantine context (ca. AD 324-500) and thus is presumably a residual from the Late Roman period (ca. AD 106-324).

Another sherd #57744 from O.1:20.81 (an Early Roman context), may date to a transitional period of production between the first and second periods. This sherd contains

large inclusions towards the ribbed base; the ribs are sloppy but distinct and thus may be an example of Johnson's Type V from Group Two produced ca. AD 27-100.

A few sherds have notably large or many inclusions which would seem to match the description of characteristics that define Johnson's later periods. An example is sherd #118568 from B.6:9.61, which can be described as "gritty," and of a "sandwich" ware, i.e. a grey dark paste sandwiched between the typical reddish/orange Nabataean ware. The ribbing on the sherd is so faint that it is discernible only by close observation or by touch. If indeed this is "less careful ribbing" then this sherd would be expected to be later in date. However, this sherd has an Early Roman/ Nabataean context (late first century BC to first century AD).

Another example which does not support Johnson's typology is sherd #95362 from K.10:54.114; it has large inclusions throughout the vessel (including an especially large stone inclusion on the base and a blowout visible on the base). These features normally characterize later periods of production, yet this context is Early Roman/ Nabataean.

To summarize, there are clear examples from Aila that could support Johnson's typology based on such characteristics of ware, morphology, and firing. However, there are a number of apparent inconsistencies of sherds from well-stratified contexts that suggest that Aila does not provide strong evidence to support Johnson's proposed dated typology of periods of production. At Aila there are examples of coarse, lightly ribbed *unguentaria*, with blowouts and large inclusions, from Early Roman/ Nabataean contexts. Aila does have examples that fit loosely into Johnson's description of earlier or later production periods; however, his terminology may need refining. For example, what is "careful ribbing" versus "light but distinct?" In fairness, Aila produced only a small sample of *unguentaria* sherds

while Johnson's typology was based on a far greater collection of *unguentaria* including many complete vessels.

A significant number of *unguentaria* derive from the first period in Aila's history, suggesting export of perfumed oils from Petra to Aila when Nabataea was a client state under Roman tutelage. But the greatest number of *unguentaria* date to the earlier Late Roman period (ca. AD 106-250), with a dramatic decline discernible after the mid-third century. The historical implications of this evidence are discussed below.

### *Historical Analysis*

What is the historical significance of these juglets at Aila? For example, what can *unguentaria* tell us about the economy of Aila? How long did Aila import and for what purpose i.e. does this evidence reflect consumption of unguents at Aila or merely transit of these products en route elsewhere? Are all of these vessels found at Aila purely Nabataean? Why did this lucrative trade apparently die out?

As seen above, significant numbers of *unguentaria* appear in the earliest excavated contexts at Aila, i.e. in the first century AD. There is a clear increase in their numbers during the second century. This pattern seems to support Johnson's view that *unguentaria* in the later period of production after ca. AD 100 were "mass produced in greater numbers and with less care" (Johnson 1990: 239). Yet, this may not necessarily suggest an actual increase in the total number of perfume bottles exported to Aila during this period. This remains possible, but it must be stressed that there was much more second century material excavated

at Aila compared to the first century.<sup>6</sup> Nevertheless, the evidence at least suggests that *unguentaria* continued to be imported to Aila in significant numbers in the second century and likely into the early to mid-third century, after which there is a marked decline. This corresponds to the evidence from Petra but may in fact be more significant than the actual numbers of *unguentaria* sherds at Aila suggest. This is likely, because some of the *unguentaria* from later contexts may actually be residual from earlier periods.

When attempting to understand the economic implications of *unguentaria* at Aila, it may be useful to review briefly the distribution of these vessels elsewhere, both within and beyond Nabataea. At Petra itself these vessels are well attested at several other excavated sectors within the city. Since the vessels were presumably produced in or near Petra, there seems no need to cite all this evidence. However, some observations about *unguentaria* from the old excavation of Murray and Ellis, published in *A Street in Petra* (1940), may be useful. Most of the published *unguentaria* from this excavation are similar to Johnson's types. However here are some variations. Most show a typical pointed base. Yet Plate IX: 51, 52, and Plate XXX: 112 appear to have flat bases but in the ware typical of *unguentaria*. Unfortunately, the lack of much preserved profile of these vessels at Aila makes any comparison problematic.

Outside Petra *unguentaria* are commonly attested at sites in the Negev, also within the Nabataean kingdom. Avraham Negev reported that at Nabataean Oboda (modern Avdat) piriform *unguentaria* were the most common type recovered. He observed that the ware of

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<sup>6</sup> According to the unpublished RAP Locus Database of the 5,443 records, 676 (12.41 %) contexts have been defined as Early Roman/Nabataean (64 BC- AD 106), 1,146 (21.05%) as Late Roman (AD 106-324), and 1,393 (25.59%) as Early Byzantine (AD 324- ca. 500).

most was pinkish, i.e. typically Nabataean; however, a few *unguentaria* were of other wares and thus probably represent a different source. Most *unguentaria* are of “fine ware although the workmanship tends to be negligent. The percentage of vessels with painted or partially painted necks is equal to the unpainted ones” (Negev 1986: 105-106). This is an important observation because there were no painted *unguentaria* recovered from Aila and Johnson did not mention any in Petra—at least recovered from the Temple of the Winged Lions—which is especially notable because of his large sample. Unfortunately Negev did not provide any illustrations to show the paint on these “*unguentaria*.” Instead he goes on to say that the *unguentaria* at Oboda are “generally ovoid in shape; the globular variety is completely absent. The local juglet may be described as a vessel with a bulbous body and a flat base; it is occasionally glazed on the inside, and usually glazed on the mouth inside and outside” (Negev 1986: 106). The presence of “glaze” is also noteworthy because at Aila there are no examples of glazed *unguentaria* and none are mentioned by Johnson at Petra. Again, is this a regional practice? It seems likely that Negev was using imprecise or unconventional terminology. By “paint” could he mean “slip?” By “glaze” could he mean “highly burnished slip?” Negev cites as a parallel Lapp’s Type 92 *unguentaria*, dated from 20 BC to AD 68, based on the earliest finds at Samaria and the latest at Qumran, destroyed in AD 68. The decorative elements Negev describes do not appear in Lapp’s publication.

Extensive analysis on the *unguentaria* from Aila has led to a few suggestive conclusions can be made; primarily this analysis suggests a direct relationship with previous scholarship. Johnson’s work allows us to identify some of the major products crucial to the development of Nabataean trade prior to and after the annexation in AD 106, including a

heretofore largely ignored Nabataean industry. In short, the Nabataeans were not only participants in international trade, they also developed a new industry at Petra, creating a “value-added” product from imported raw materials that also appears to have been widely exported throughout and beyond their kingdom (Racatu and Poianna in Dacia, Rome, Argos in Greece, and Stobi in Macedonia Salutaris; Johnson 1987: 68-69).

When and why did these juglets with such high value products disappear from the archaeological record? Johnson suggested that the *unguentaria* found in contexts before the earthquake of AD 363 were earlier examples re-shaped into shorter versions after breakage. Such reuse of *unguentaria* would imply the termination of production of new vessels. But this does not necessarily imply that the market for perfumed oils had also disappeared. Perhaps the disappearance of the clay vessels in the archaeological record reflects a transition from clay to glass containers as a means of storing and transporting perfumes and oils. However, the cost of producing comparable glass vessels was higher and the likelihood of breaking glass vessels was greater than ceramic. Unfortunately, the glass evidence from Aila cannot support this hypothesis of glass replacing ceramic as perfume containers. Janet Jones, the glass specialist for the Roman Aqaba Project, reports that the diagnostic sherds of small glass vessels recovered at Aila are difficult to differentiate between small jugs or *unguentaria*.<sup>7</sup>

Tali Erickson-Gini who has extensive excavation experience with Nabataean sites in the Negev and Wadi Arabah—a shallow valley that extends North-South from the Dead Sea to Aila on the Gulf of Aqaba—agrees with Johnson about production of perfumed oils by the

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<sup>7</sup>Personal communication with Janet Jones April 2, 2011.

Nabataeans as evidenced by the *unguentaria* although she prefers a slightly later date for its inception. She says that these are “commonly found at Nabataean sites from the early first century AD through the early third century AD when their production was sharply curtailed” (Erickson-Gini 2010: 115). She also agrees that before the end of the first century BC both demand and competition in this product increased which allowed for the shift of seasonal trade of raw incense to a year round activity. Erickson-Gini claims that Petra became a producer in order to compete with other major production centers of perfumes and unguents such as Alexandria and Italy (Erickson-Gini 2010: 113). Erickson-Gini goes on to say that *unguentaria* do not appear before the first century AD or after the mid-third century AD in the central Negev and Wadi Arabah.

Do the *unguentaria* at Aila reflect local consumption, transshipment or both? The relatively small number of *unguentaria* recovered does not suggest extensive transshipment of these vessels. Area M, where most of the Aila *unguentaria* were recovered, is a domestic complex which also yielded other fine ware imports such as Eastern Sigillata A (ESA) in great numbers. This would suggest that those living with the mud-brick structures of Area M could afford the valuable perfumes and oils. Further, the lack of ceramic *unguentaria* at Red Sea ports on the Egyptian coast, such as Myos Hormos or Berenike, do not suggest that Aila was a center of transshipment of unguents to Egypt via the Red Sea. However, finds of *unguentaria* along the Petra-Gaza road in the Negev, for example, imply that they were being shipped for export to the Mediterranean and thence perhaps throughout the Empire (Johnson 1987:68).

To conclude the trade of *unguentaria* was an essential contributor to the Nabataean economy and later benefited the Roman Empire after its annexation of Nabataea. Yet, what was the economic and political situation of Petra during the third century AD and why did the perfume industry fail to revive in the following fourth century—a period of reconstruction and revitalization? The next chapter will discuss the economic and political situation of Petra during the third century AD.

### CHAPTER 3

Petra has long been the focus of intensive archaeological research, although certain periods of the city's history are much better known than others. One period of Petra's history that is currently little known but of particular interest for this thesis is the third century AD., which witnessed an empire-wide crisis characterized by foreign invasion, demographic decline, civil war, and economic dislocation. This critical period is unfortunately poorly documented both for the Roman Empire generally and for Petra in particular. Nevertheless, this chapter will consider the available if limited documentary sources and archaeological evidence, some of the latter still unpublished. The archaeological evidence focuses particularly on the architectural structures of the city center, immediately before, during and after the third century. The investigation of these public monuments along the Colonnaded Street, suggest something about the economy of Petra in this period. It suggests that Petra transitioned from a bustling, urban, industrial metropolis, full of monumental architecture, into a more centralized, smaller city, with a gradually increasing Christian population. In most cases during the third century the monumental architecture of the city-center was either abandoned completely or was put to other uses, such as farming.

#### *Historiography*

As noted in chapter 1 the origins of the Nabataeans are based on two primary sources: Diodorus Siculus's *Bibliotheca Historica*, and Strabo's *Geography*. These two sources suggest that at some point between the periods of the fourth to first centuries BC, the once nomadic Nabataeans became a sedentary people using their wealth to build their capital city at Petra. Other relevant primary sources include the Babatha Archive (late first/ early second

centuries AD). The Babatha Archive is an assortment of legal papyri belonging to a Jewish woman who lived near the Dead Sea. She owned various lands, including some within the Nabataean kingdom, later within the province of Arabia. She was summoned to hearings in Petra regarding land disputes before the Roman governor of the new province (Bowersock 1983: 75-79). The documents also reveal the existence of a council (Greek “*boule*”) of the city of Petra, highlighting the importance of the city during this time.

Another interesting source illuminating conditions immediately after the annexation is a personal letter in Greek of AD 107 from recovered from a Roman legionary, Iulius Apollinarius stationed in Arabia, most likely Bostra, shortly after the Roman annexation (P. Mich. 8.466; see White 1986: 165; Speidel 1977: 692). Iulius hopes to visit his father back in Egypt (the former base of his unit, *legio III Cyrenaica*) but the Roman governor has not yet begun approving leaves. This might suggest that the security situation in the new province had not yet fully stabilized. On the other hand, he also asks his father to send some linen garments because merchants from Egypt are arriving daily in Petra. This suggests that commerce was resuming in the city.

Beyond these sources few examples of documentary evidence remain to highlight Petra’s history after the Roman annexation. Therefore scholars must turn to other primary sources such as archaeological material.

Some of the earliest excavations at Petra include the High Place by Horsfield and his wife Conway (1930), Murray and Ellis’s excavation and later publication *A Street in Petra* (1940), the excavations of domestic structures on the North Ridge by Peter Parr (1986), and both the Main Theater (1965) and the Temple of the Winged Lions (1996) excavated by

Hammond. More recent excavations at Petra include but are not limited to the Petra Church found by Russell with excavation continuing under the American Center of Oriental Research (2001), excavation of the Great Temple by the Brown University team under Joukowsky (1998), the ez-Zantur Project by Schmid and Kolb (1996), the excavation of the North Ridge Church by Bikai (1996), the excavations of the shops along the Colonnaded Street directed by Fiema (2002), the Petra Pool and Garden Project directed by Bedal (2004), Graf's Hellenistic Petra Project (2013), and the Petra North Ridge Project co-directed by Perry and Parker (2012). Because these projects and their findings will be discussed in detail below, it is appropriate to shift to a review of the secondary literature concerning the ancient economy. First, I will introduce the debate about the Roman economy, and then discuss previous reconstructions of Petra's history in the light of previous scholarship.

Reconstructing the economic history of the ancient Mediterranean world is an extraordinary challenge. This is due to the lack of much quantifiable, primary economic evidence and the bias evident in surviving sources. Nevertheless, in 1973 Moses I. Finley published *The Ancient Economy*, an attempt to provide a model of the economic history of the Graeco-Roman world between 800 BC and AD 500. Finley's work proved to be both extremely influential as well as controversial and launched a debate among ancient historians and archaeologists that rages to this day. Among other issues is the extent of agricultural surplus in antiquity and the economic role of cities. Finley argued that cities relied heavily upon their agricultural hinterland, exploiting its natural resources. Additionally, in Finley's view, cities were not centers of economic production but parasitical centers of consumption. Notably, Petra would be an exception given the production of perfumed oils and its ceramic

container within the city, most likely what seems to be the industrial area of Petra, Wadi Musa. If agricultural production was near subsistence, as Finley suggests, then the surplus could not contribute much beyond what he called a “house-hold economy.” The rural population could not produce all goods necessary for survival from the little surplus they accumulate, so those items would then be purchased through a barter system<sup>8</sup> by farmers within a three to five mile radius of their farmstead. This represents the “primitivist” model. Notably, Petra would be an exception given the production of perfumed oils and ceramic containers within the city, perhaps in the industrial area of Petra, Wadi Musa. However, if agricultural production exceeded near subsistence, the farmers could engage in further trade—a position proposed by “modernists,” such as Mikhail Rostovtzeff (1957) and Kevin Greene (1986). Modernists reject Finley’s hypothesis and instead argue that rural populations produced enough surplus to not only meet the requirements of their tax obligations but to also serve as a mass market in the trade of both bulk commodities and “luxury goods.” Regardless of Finley’s strong primitivist beliefs, he would have regarded Petra as one of the admitted exceptions to the framework (Finley 1999: 123-149).

In the light of this economic debate what was the nature of the economy of Petra during this time?

G.W. Bowersock provides a lengthy overview of Petra’s history in his *Roman Arabia*. He considers the transition of the Nabataean kingdom into a Roman province and its frontiers, borders, and defenses. His historical timeline is crucial for the analysis of the economy of Petra during the third century, when Elagabalus (218-222) gave Petra the title of

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<sup>8</sup> That is, trading goods for other goods; the use of coinage would be absent from these exchanges. For example: a farmer could trade one goat for a wheel-barrel.

*colonia*, while Severus Alexander (222-235) gave the same title to the provincial capital of Bostra (Bowersock 1983: 121). Petra held the sole distinction of “metropolis” in the region into the mid-third century until Bostra received the same honorific title during Philip’s reign (244-249; Bowersock 1983: 121).

An important synthesis about Petra in the period after the annexation was published by Frösén and Fiema (2002), who argued for the continued prosperity of the city under Roman rule. He points out that construction of a civic center or shops along the Colonnaded Street probably date to the first century AD and that a substantial rebuilding of these structures took place sometime in the late first or the early second century, “probably changing its function and character” (Fiema 2002: 65).

Fiema attributes the third century AD decline in trade, primarily long distance caravan trade, to the economic “depression leading to a diminished demand for Oriental goods...The trade routes seem to have shifted farther north and south (South Arabia-Ethiopia-Red Sea) of the Petra area. Beginning with the third century, Aila and Clysma (modern Suez) gradually gained importance in the seaborne Indian trade” (Fiema 2002: 65). Although international trade shifted north and south in the later periods of the Empire, Fiema disregards the substantial evidence of continued regional trade, i.e., the quantities of Petra coarse-ware found at sites across Jordan (e.g. ‘Ayn Gharandal, Aila, and Humayma) that dates to the third century and later.<sup>9</sup> The Zurrabah kilns in Wad Musa at Petra support the continuation of local production at least into the fifth century and perhaps beyond (‘Amr

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<sup>9</sup> Personal communication with Lindsay Holman the ceramicist of the Humayma Project, September 2012

1991: 315).<sup>10</sup> It is clear that after the third century crisis, Petra remained an active entrepôt with a significant ceramic (and perhaps other) industry. Fiema also discussed the profound changes made by Diocletian (284-305) and Constantine (306-337). There was a revitalization of the economy followed by gradual Christianization of the empire. Fiema notes that the progress of Christianity in Petra was slow, but bishops from Petra attended Church councils in Sardica (AD 347), Alexandria (AD 362), and Jerusalem (AD 536; Fiema 2002:67).

### *The City of Petra*

An examination of major structures within the city center of Petra may be suggestive about the local urban economy in the third century. These structures include: the Main Theater, the Temple of the Winged Lions, the Garden and Pool Complex, the domestic complex of ez-Zantur, the Colonnaded Street and associated shops, the Great Temple and its associated baths, the Small Temple, the Temenos Gate precinct and Qasr al-Bint, various structures on the North Ridge, and finally the Zurrabah kilns. The Zurrabah kilns lie outside the city center but were in use within this time period and provide useful economic evidence. One caveat, however, is that most of these structures are monumental and/or public buildings. The only exceptions are at ez-Zantur, a domestic complex for the local urban elite, and the more humble domestic structures on the North Ridge, for which only preliminary information is available. Before analyzing the structures in detail, a brief historical summary

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<sup>10</sup> ‘Amr suggests that the date of Kiln V is likely early-to-mid sixth century (‘Amr 1991: 315). ‘Amr dates the storage jar handles built into the walls of Kiln V to the ear-mid sixth century thus, providing a *terminus post quem* for the construction. However, ‘Amr fails in producing a visual of the jar handles she dates to the sixth century, and therefore no parallels can be made. It is extremely difficult to date handles without other diagnostic features such as the rim and/or base. It is more likely that kiln is earlier in date probably fifth century (personal communication with Thomas Parker, December 2012).

is necessary beginning with the political and economic situation of Petra in the second century AD.

### *Petra in the Second Century AD*

#### Political Background

In AD 106 the emperor Trajan annexed the Nabataean kingdom. The acquisition of the Nabataean kingdom as the *Provincia Arabia* has historically been viewed as a relatively easy and resistance-free affair (although poorly documented), yet more recent scholarship argues for quite the opposite. Emerging evidence of destruction and/or abandonment in the early second century has been found at many sites across the region, including several sites within Petra itself. Some scholars suggest that this could represent Nabataean resistance to the Roman annexation (Joukowsky 2005: 147-165; Parker 2009: 1586). Other scholars have suggested that there could have been some natural phenomenon that would have affected such a widespread area i.e. an earthquake (Erickson-Gini 2010).

Whether or not the Nabataeans resisted, historians agree that after the annexation Trajan firmly established direct Roman rule in this region. This direct Roman involvement is apparent in inscriptions. Stephen Tracy published dedicatory inscriptions to Trajan at the “metropolis of Petra” from the excavation of the Small Temple (Tracy 1999; Figure 6). Tracy explains that receiving “metropolitan” status in the year 114 implied that Petra was the main city of the province. What Tracey seems to ignore here however, is that Bostra was the headquarters of the provincial governor and base of Arabia’s sole legion. In this case, however, the inscription suggests Trajan’s particular recognition of the primary status of Petra and its inhabitants (Tracy 1999: 55-56). Its strategic location along major caravan

routes enhanced its economic status—thus it is not a surprise that Trajan would honor such an important city.

Other documentary evidence in Arabia is limited. Yet one source, the Babatha Archive, provides unique information about the early years of the province (early second century AD). The cache of documents, written in Greek, included a marriage contract and was recovered in a cave near the Dead Sea. Babatha was called to Petra several times in order to adjudicate a land dispute. One of the trial transcripts explicitly states “verified exact copy of one item from the minutes of the council of Petra the metropolis, minutes displayed in the temple of Aphrodite in Petra...” (Kennedy 2007: 133). Note the explicit evidence for the existence of a municipal council (*boule*). This evidence is important for understanding not only the administrative importance of Petra by also provides evidence to suggest that within the urban complex, one of the buildings served this *boule*, perhaps the so-called “Great Temple.” The *theatron* (or theater) later inserted located within the so-called “Great Temple” could have played host to the council.

### Economic Situation

Other than the lucrative trade in aromatics, the Nabataean famous “egg-shell thin” painted and un-painted fine-ware has been found at a variety of sites across Jordan and beyond. This suggests that not only were the Nabataeans profiting from the production of unguents by also from the trade of their distinctive ceramic tableware. Excavation of a ceramic production center in Wadi Musa, just outside the city of Petra, documents continued local ceramic production in the second century (‘Amr 1991).

Documentary sources also aid in the reconstruction of the economy of Petra soon after the annexation in 106. Iulius Apollinarius (Figure 7), a Roman legionary who was stationed in Arabia a year after the annexation, wrote to his father mentioning the continuous appearance of linen merchants from Pelusium (a city on the Sinai border of Egypt; Bowersock 1983: 85). This suggests a renewal of trade regardless of any conflict caused by the annexation.

Construction projects are also indicative of economic conditions in the second century. The Main Theater of Petra and the Temple of the Winged Lions were both excavated by Phillip C. Hammond. He dated construction of the theater to the reign of Aretas IV (9 BC- AD 40). His excavation of the Temple of the Winged Lions recovered an inscription of AD 27 (although not found *in situ*) which was interpreted as offering a *terminus ante quem* for the temple's construction.<sup>11</sup> The dating of the Main Theater and the Temple of the Winged Lions is based largely on circumstantial evidence. Scholars credit a construction boom in Petra to the reign of Aretas IV (9 BC- AD 40), including The Main Theater, The Great Temple, and al-Kazneh.

Regardless, the theater at Petra exposes certain societal and economic implications. Theaters are found in almost all major cities within the Roman province of Arabia. Theaters are considered to be among the typical monuments characteristic of a true polis and their main purpose is a means of entertainment. The theater at Petra, carved into the cliffs, lies just

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<sup>11</sup> In the case of the Temple of the Winged Lions, the inscription, if found *in situ*, would suggest that anything found in the layers below the inscription would date prior to AD 27. Thus, the inscription provides a date that pre-dates the material it rests upon or a *terminus ante quem*. However, the issue that the inscription was not found in its original context, and in a building that is associated with but not located within the Temple remains problematic.

inside the Outer Siq carved and built into the western cliffs. Hammond identified eight occupational phases from the initial “Main Use” as a place of entertainment and a “Main Destruction Period,” likely associated with the earthquake of AD 365 (Hammond 1965: 15).<sup>12</sup> Phase II, or the “Early Re-Use” period, is considered to be a building phase and most likely dates to the mid-to-late second century AD.<sup>13</sup> Hammond suggested that the theater seated ca. 8,500 people (Hammond 1965: 28). If correct, this estimate then may provide some indication of the population at Petra.

The Temple of the Winged Lions, which sits on the western fringes on the North Ridge, bears a dedication to a female deity. The search for her identity began when the team recovered a funerary stele presumably brought to the Temple as a gift from Athribis in Egypt (Hammond 1996: 101). Not only were the Nabataeans able to construct two other monumental temples (including Qasr al-Bint and the so-called “Great Temple”) with their surplus wealth, the gift from Egypt hints at the Nabataeans’ connections with other regions.

The Petra garden and pool complex accentuates the wealth and the prestige of Nabataean royal society. Located in the heart of the city center, the pool and garden complex sits immediately east of the The Great Temple, directly below the hill-top domestic structures of ez-Zantur, and was once believed to be the “Lower Market.” However, Bedal discovered that this terraced complex was indeed a *paradeisos* (garden). Bedal highlights nine

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<sup>12</sup> Hammond must mean the earthquake of 363 here regardless of the 365 date he provides in this publication (Hammond 1965: 28).

<sup>13</sup> This date is suggested by the author. It was common for the Romans to reconfigure structures to accommodate for a more communal atmosphere. Perhaps this Phase II and the construction activity that is associated with it are due to the Roman presence within the city after the annexation. However, this assertion is based on circumstantial evidence. Other monumental structures within the city center share an early or mid-to-late second century reconstruction phase.

chronological phases beginning with the original construction during a “Nabataean Phase I,” an intermediate “Early Roman- Phase II,” a “Late Roman/ Early Byzantine Phase III,” a “Early Byzantine- Phase IV” or a destruction phase caused by the earthquake of AD 363, and finally subsequent re-use and abandonment phases. Phase II of the Petra Garden and Pool Complex (PGPC; late first to early second century AD) is characterized by renovations and additions which include a vaulted bridge to provide easier access to the island pavilion (in Phase I the island pavilion could only be reached by swimming or boating; Bedal 2004: 72) and reconfiguration of hydraulic systems. Bedal adds that a close look at the masonry techniques applied to the construction of the bridge suggests a difference in builders. The Phase II mortar was a crumbly, gray-colored, lime-ash which differs from the hard, pinkish-white mortar used in earlier construction phases of PGPC. Bedal concludes that this is a marker for a transition from Nabataean to Roman building programs (Bedal 2004: 72). Because of the construction of the bridge, the pipeline connecting the pool and *castellum* (a water catchment installation) would have been blocked therefore requiring reconfiguration of the hydraulic system was necessary. This was evidenced by installation of new “Later Roman” pipes and the fact that a particular *castellum* may reflect the transition to a more Roman conception of water control (Bedal 2004:74).

A foreigner visiting Petra would have been amazed to see the elaborate gardens full of pomegranate and date trees, a pavilion situated on an island centered in the middle of the pool, housing a place of offering for a local deity. Furthermore, the spectator would have been impressed by the ingenuity of the hydraulic system that supported such a vast amount of water in an arid climate. Ceramic and numismatic evidence dates construction of the complex

to the late first century BC and use throughout the first and into the second centuries AD; it is unclear however if its use was continuous. The date of the abandonment of this complex is also uncertain as well as the duration of its original use as a *paradeisos*.

The domestic complex of ez-Zantur is located on the terrace just above the Petra Garden and Pool. The complex offers insights into Nabataean society and especially the economy since occupation extends from the second century BC until the fifth century AD (Stucky *et al.* 1991-1999). The Nabataean House, constructed in two phases, represents both Hellenistic influence and local Nabataean tradition. Rooms I-V were built and decorated in a Hellenistic manner with Nabataean Corinthian columns and wall paintings and would have acted as an official greeting room for guests. Notably, there is a destruction layer that has been dated to the early second century AD. Following this destruction is an abandonment phase. The excavators explained this second century AD destruction layer by two different possible scenarios: war or a natural disaster. The destruction could be ascribed to Nabataean resistance to the invading Romans in 106 or with the earthquake of ca. 114 (Stucky *et al.* 1991: 178).

The domestic complexes were then reoccupied in a Late Roman phase in the fourth century based on numismatic and ceramic evidence, including a coin hoard found in the Late Roman House I, associated with destruction caused by the earthquake of 363. Unfortunately, there was a gap in occupation of ez-Zantur during the later second and third centuries (Stucky *et al.* 1991-1999). No explanations from the excavators have been offered; however, perhaps the local elites once living there felt inclined to move or were forced to move after the annexation.

Other monumental construction projects during the late first century BC include the Colonnaded Street and the shops associated with it. The Colonnaded Street runs east-west along the south side of the Wadi Musa and is characteristic of cities in the Roman Near East, “serving to unify space and to give the pedestrian the sense of a grand, coherent urban structure” (Augé and Dentzer 2000:76). The street is six meters wide, flanked by sandstone columns and served as a market and center of activity in the Nabataean period. The street was later enlarged and then paved in the second century AD (Kanellopoulous 2001: 9-14).

All this suggests a major urbanization phase occurred in the late first century BC through the early first century AD, as well as a second urbanization phase in the late first century to early second century. Shops along the Colonnaded Street date to this first urbanization period (late first century BC to early first century AD) and are a precursor to the more commercialized market-place Petra would become. The second phase of urban development (late first century to early second century AD) is characterized by major renovations and reconfigurations of many monuments along the Colonnaded Street. There were also many additions to Petra’s city center which transformed the urban area into a typical Roman commercial and administrative center. The Great Temple in particular is a structure that is affected by these early second century renovations/additions.

The Great Temple was interpreted as a religious structure by the excavator. However, there has been much scholarly debate given the discovery of a small (ca. 600 seat) *theatron* inserted into the central space within the structure (Joukowsky 1998b: 11). Masks discovered in the interior of this room suggest an additional function as an *odeon* (concert hall; Bedal 2004: 35). However, historical evidence suggests a different interpretation. The Babatha

letters (second century) mention the *boule* of Petra (Bowersock 1983: 79) and also refer to the governor's regular visits to Petra to hold court, yet there is no mention of where in Petra these activities took place. This led some to interpret the *theatron* as a *bouleterion*.

The ruins of the so-called "Small Temple" lie just south of the Colonnaded Street between the Great Temple to the east, Qasr al-Bint to the west, and the Temenos Gate to the north. A great amount of marble was recovered from its excavation, mostly from western Anatolia and the Balkan Peninsula (Reid 2005: 114-115). Because Roman client rulers in the Levant rarely used marble, the use of this material suggests a particularly Roman origin (Reid 2005: 115). Three inscribed marble fragments at the Small Temple provide dates, dedications, and names of Roman emperors (all post-annexation). The inscriptions are in Latin or Greek and date from ca. 114 to 222-35 (Reid 2005: 123-133). The importation of marble suggests a vibrant economy. The excavator reasonably suggests the Small Temple served the Roman imperial cult throughout the second and into the early third centuries.

A visitor to Petra could not ignore the grandiose, triple-arched gateway that marks the end of the Colonnaded Street and the entrance to the precinct of the Qasr al-Bint. This Temenos Gate once had sockets, door hinges, and bolts, suggesting that it once separated the commercial area of the city from the religious sector. Construction dates to sometime after the Colonnaded Street, yet before the paving of the street, dated sometime between the reign of the last Nabataean King Rabbel II (70- 106), or soon after the annexation 106.<sup>14</sup> Qasr al-Bint has conventionally been seen as Petra's main temple, dedicated to the Nabataean patron god Dushara(es). An inscription of AD 32 mentions some type of construction within the

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<sup>14</sup> This date relies upon a coin found beneath paved, flag-stone pavers in the street. The coin dates to 76 during the reign of Rabbel II (Fiema & Frösén 2002).

courtyard of Qasr al-Bint (Parr 1986: 199). Yet, similar to the Small Temple many inscriptions were recovered from Qasr al-Bint, all post-annexation, and are dedicatory in nature, reflecting the loyalty of the Nabataeans towards the Roman emperors.

At the end of the Colonnaded Street, the visitor's attention would be directed towards the North Ridge which shows evidence for multiple phases of occupation (including rock-cut shaft tombs of the first century AD) and construction of buildings throughout the first through fifth centuries AD. The earliest excavation of the North Ridge uncovered a domestic complex cut through by a later city wall visible on the surface (Parr 1986). Parr dated the wall to the Byzantine period but never published definitive evidence for this date. Renewed excavation along the city wall in 2012 by the Petra North Ridge Project (PNRP) recovered evidence of the early second century AD directly below the foundations of the wall (Figure 8). Other excavated domestic complexes on the ridge seemed to have been destroyed by the earthquake of 363 (Parker and Perry 2014: 1-3). Although the project is in early stages of excavation, the 2014 season shed light on multiple aspects of Petraean society from the first century BC at least up until the fourth century AD.

The early history of all of these structures along the Colonnaded Street, including the paved street itself, hint at the enormous amount of wealth that must have been pouring into Petra. Strabo writes that the Nabataeans were a people fond of wealth and displayed it openly after they transitioned from a nomadic group into a sedentary population (Strabo 16.4.26). As an independent kingdom, then under indirect (63 BC- AD 106) and finally direct Roman rule (post-AD 106) Petra flourished due to a vibrant economy. Petra reflected a hybrid culture of

the Greeks, Nabataeans, and Romans manifested in daily life. Yet, what happened after the second century?

### *Petra in the Third Century AD*

This period was characterized by plague, rampant inflation, political instability, and incessant warfare. In the Roman Levant this included major invasions by the Sassanian Persians and the Palmyrene rebellion and occupation of the region (AD 269-272).<sup>15</sup> Little is known about Petra in the third century either from documentary or archaeological sources. Some early third century inscriptions are associated with the Small Temple and with Qasr al-Bint. However, these texts antedate the Palmyrene Revolt, and thus date before the abandonment and subsequent robbing of these two structures.<sup>16</sup> No later activity is associated with these structures after the late third century. There is evidence of later occupation in front of Qasr al-Bint. The French team recovered NPFW Dekorphase 4 and coins of the third century (Renel 2014). Additionally, there is the continued occupation of the Petra North Ridge domestic complexes (Areas B and C). The ceramics industry, both fine-ware and coarse-ware, continued (Parker and Perry 2014: 1-3).

It would have been quite a different view for one visiting Petra just after the crisis period but prior to the earthquake of 363. After exiting the narrow Siq, and wandering past al-Kazneh, the journey into the main city center would continue by the Main Theater. But by

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<sup>15</sup> Queen Zenobia, a third century queen of the Palmyrene Empire, led a major revolt against the Roman Empire. By 269 Zenobia had conquered Roman territory as far as Egypt until 272 when Zenobia was defeated and taken as a hostage by the Roman emperor Aurelian (Bowersock 1983: 123-137).

<sup>16</sup> Again, this is my interpretation of the evidence. I believe that Qasr al-Bint and the Small Temple share a similar intentional destruction.

this time, the theater no longer served its original purpose. It may have still been used by squatters or for other activity (Hammond 1965: 19).

Further into the heart of the city center on the Colonnaded Street, the once ornate *paradeisos* or garden complex was in reuse as an agricultural area during late third and into the fourth century (Bedal et al. 2004: 76-79). The Great Temple was abandoned in the later third century and appears to have been used as a domestic quarter after the 363 earthquake. However the Late Roman bath-house associated with the Great Temple continued to function during this period. Ez-Zantur remained unoccupied in the third century and only portions of the domestic complex were reoccupied at the turn of the fourth century. The evidence suggests that the occupants were less elite in status compared to the original inhabitants (Schmid et al. 2001-2009). The domestic complexes along the North Ridge continued to be occupied through the third and well into the fourth century but likewise were abandoned after the 363 earthquake (Parker and Perry 2014). However, ecclesiastical construction projects during the fifth century demonstrate continued occupation of the North Ridge west of these domestic structures (Bikai 2001; Fiema et al. 2001).

The Small Temple and Qasr al-Bint were probably first vandalized during the Palmyrene revolt and then further damaged by the earthquake of 363 (Zayadine *et al.* 2003: 117-118).<sup>17</sup> Such was the fate of the Temple of the Winged Lions. Hammond identifies only

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<sup>17</sup> Reid identifies an intentional destruction phase prior to the earthquake of 363 (Reid 2005: 133). I have interpreted this destruction phase to be associated with the Palmyrene destruction Zayadine identifies for Qasr al-Bint. Given the Small Temple proximity to Qasr al-Bint, the fact that the dated inscriptions from both structures end in the early to mid-third century, and the abundance of marble and lucrative items housed in each of these structures, the intentional robbing and destruction of these structures is evidence enough to suggest that a similar situation occurred at the Small Temple.

one phase of absolute dating for this building, a destruction associated with the earthquake of 363.

#### *Petra in the Fourth Century AD*

Given the paucity of evidence about third century Petra, an examination of the city in the much better-known fourth century may be suggestive of the preceding century. The fourth century began with a period of empire-wide revitalization by Diocletian (284-305). Diocletian and his successors, in response to the third century crisis, drastically reformed the administration, economy, social structure, and military of the Roman Empire. The empire became more centralized and was subdivided into many more provinces from ca. 50 to nearly 100. In each province Diocletian separated civil authority from military administration. Therefore, each province was assigned two governors: one military (*dux*) and the other civilian (*praeses*). Diocletian also reformed the coinage and shifted largely to taxes paid in kind (*annona militaris*). He imposed an “Edict on Prices” in an ultimately unsuccessful attempt to reduce rampant inflation. Diocletian also refortified the frontiers by the construction of smaller forts; individual military units were reduced in strength and stationed at these new, smaller forts along the frontiers, including east of the *via nova Traiana* (Parker 1999: 135-136). This included construction of a legionary fortress at Udhruh, just east of Petra, for *legio VI Ferrata* (Parker 2009d: 147-148).

Petra became the capital of the new province of *Palaestina Salutaris* (later styled *Palaestina Tertia*); the new province Palaestina Salutaris/Tertia included south Jordan, the Negev and Sinai (Fiema & Frösén 2002: 66). Although the sixth century Petra Papyri represent a selective image of Petra from the perspective of a prosperous family of local

landowners, the papyri confirms “continuity of urban life and existence of local tax officials and ecclesiastical organization at least up to the 6<sup>th</sup> century” (Fiema 2002: 67). They were preserved due to carbonization caused by a fire which also destroyed much of the Petra Church in the late sixth century. These papyri mention Petra, its political and ecclesiastical titles, but are far more illustrative of Petra’s hinterland. The papyri date after the period of this thesis, but nevertheless offer some potential insights into the local economy and thus will be discussed in Chapter Five.

Key evidence of the economic situation in Petra during the fourth century is the production and distribution of ceramic materials. Nabataean Painted fine-ware (NPFW) was still being produced in Petra at this time. Dekorphase 4 (late second through third/fourth centuries), was the latest NPFW produced and sherds of this phase are attested at sites as far south as Aila and in the Negev (Erickson-Gini 2010: 134-147). However, this ware is extremely rare at Aila (only nine Dekorphase 4 sherds of 2,351 NPFW sherds recovered at Aila), implying that it was no longer a significant export. More of this latest NPFW reached the Negev although quantified statistics are not available. In short, the latest NPFW was not exported as far afield or in as great quantity compared to earlier periods. On the other hand, Petra was still exporting coarse-ware vessels in great quantity. Sites such as Aila, Humayma, and ‘Ayn Gharandal yield a significant amount of Petra coarse-ware vessels which can be dated to the third through fifth centuries, suggesting that Petra remained an active participant in overland trade at least within the borders of the former Nabataean kingdom (Parker 2014). Aila amphorae (produced from the fifth to seventh centuries) and other vessels from Aila recovered at several sites in Petra suggest continued connections with Aila and the Red Sea

during this time (Figure 10). Additionally, the Zurrabah kilns demonstrate continued pottery production from the first to the fifth or sixth centuries.<sup>18</sup> However, long distance trade routes appear to have shifted south (South Arabia-Ethiopia-Red Sea) and north (Persian Gulf-Mesopotamia-Armenia-Northern Syria; Fiema 2002: 238) bypassing Petra.

Although Christianity was slow to progress in the city, bishops of Petra are mentioned as early as 347 (Fiema 2002: 192). Eusebius (fourth century) and Sozomen (fifth century) mention pagan “superstitions” in Petra and notes that churches were built in the city (Euseb. *Onom.* 36.13-14; Sozem. 7.11.11 as cited by Fiema 2002:192). This suggests that many of Petra’s population still clung to pagan ideology while the city gradually became Christianized. Polytheists might have continued their practice at the Temple of the Winged Lions. It seems that Petra decreased in size and was centered on the North Ridge. Yet, one avenue of research still not fully been explored is Petra’s hinterland. Did the urban population move out of the city into the rural hinterlands? This requires analysis of several regional surveys, some now published in various forms, but this is beyond the scope of this thesis.

The North Ridge overlooks the city center of Petra. This intensively excavated area revealed a possible military installation during the earlier Nabataean and Roman periods. The building was later converted into a church, apparently soon after the 363 earthquake (Bikai 2002:1). A small structure—“south of the Ridge Church”—has been interpreted as the tomb of a military officer (late fourth century; presumably the same time as the inscription). Within this “tomb” was a Greek inscription dedicated to this officer and/or church (Bikai and

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<sup>18</sup> ‘Amr suggests that the date of Kiln V is likely early-to-mid sixth century (‘Amr 1991: 313-315). See n.6.

Egan 1999:510). In the “fifth century the lower part of the hillside contained housing and it would be in a domestic area that the Petra Church would be built” (Bikai 2001: 1). Recent work along the North Ridge (PNRP 2012 and 2014), northeast of the Ridge Church along the city-wall, has revealed that most of the domestic structures were abandoned after 363 (Parker and Perry 2014). This fifth century domestic area has yet to be found.

### *Comparative Analysis*

Petra in the second and fourth centuries allows us to compare and contrast these periods to ascertain continuity versus change during the third century. Although Petra was the capital of the new province of *Palaestina Salutaris/Tertia* in the early fourth century, the new province was considerably smaller in size than the province of Arabia of the second century.

Petra in the second century was characterized as a great metropolis in which town councils were held, disputes between the inhabitants were settled and governors would be expected to visit. Yet, by the fourth century most of the monumental buildings within the city center were either abandoned or converted to a different purpose. Furthermore, many of the construction and projects of the fourth century in the East, focused on the frontier and road systems.

It is apparent that the Christian population of Petra began to increase in the fourth century, which highlights not only the changing religious atmosphere of the city but also a

potentially new political/ecclesiastical organization. The presence of a bishop of Petra in 347 strongly suggests a church of some sort in the city by this date.<sup>19</sup>

Yet what can this comparative analysis suggest about the economy of Petra during the third century AD? By reviewing the history of the monumental architecture, one might assume that much of the urban center of Petra was largely abandoned—either the economy could no longer support the maintenance of these structures or the wealth accumulated from the economy was invested somewhere else.

The decline of the perfume industry and the disappearance of *unguentaria* from the archaeological record could suggest that incense was no longer being transshipped in large quantity through Petra. Given the shift of trade routes to the south, it is likely that instead incense could have been shipped to ports along the Red Sea, namely, Aila. There is no documentary or archaeological evidence to support such an idea yet it is plausible—perhaps the containers in which the incense traveled were skins or other organic material which do not survive in the archaeological record.<sup>20</sup> The major economic boom Aila and other Red Sea ports experienced during the Late Antique period is clear (Ward 2002).

Churches are attested in Petra from the late fourth to early fifth centuries onward and both pagans and Christians used incense in religious ceremonies. So it is unlikely that the import of incense through Petra ceased. Instead, perhaps the purpose for importing incense in

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<sup>19</sup> Fiema states that bishops representing Petra attended the Church councils, including the earliest (AD 347) in Sardica. However, Fiema's reference to Eusebius' mention of Christians in Petra in the late fourth century is evidence to suggest a Christian presence earlier than 347—given that Eusebius dies ca. 340 (Fiema 2002: 67, 192; Euseb. *Onom.* 36.13-14)

<sup>20</sup> Personal communication with Russell Gentry, December 1, 2012. Carbonized palm leaf bags are attested at Qana and traces of frankincense can be detected with them; perhaps these same types of bags were shipped to Aila unless they were carbonized like those recovered from Qana.

Petra shifted from transshipment to local consumption. Moreover, the only kiln site thus far identified at Petra seems to have produced pottery from the first to fifth or sixth centuries. However, a “conspicuously rare Nabataean vessel at Zurrabah is the typical *unguentarium*” (‘Amr 1991: 231). This not only indicates specialization in pottery production at Zurrabah but also confirms that *unguentaria* were made elsewhere in or near Petra.

The perfume industry declined at Petra due to the economic and political instability caused by the Crisis of Third Century and failed to revive in the fourth century. However, Petra still participated in overland trade. The Petra-Gaza road was still in use in the third to early fourth centuries. This is supported by the substantial amounts of Petra coarse-wares found at caravan/supply stops along the route, as well as by numerous Gaza amphorae brought back. Of the total imported amphorae (two-handled transport jar) from the Late Roman Church at Aila (3,328), mostly dating to the fourth century, Gaza amphorae represent 9.3% (or 309 sherds). Although Egyptian amphorae represent a significantly greater percentage, 62.1% Gaza amphorae remain the second most frequently occurring in identifiable amphorae sherds during the Late Roman Period (106-324; Parker forthcoming: 5). This evidence supports the suggestion that the Petra-Gaza road was utilized in the fourth century due to the significant amount of Gaza amphorae, and Petra coarse-wares present at Aila (Cohen 1982).<sup>21</sup>

### *Conclusions*

During the second century AD Petra was an important entrepôt and industrial center. One can imagine a bustling city with foreigners participating in trade, booming laughter and

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<sup>21</sup> There is also a variety of forms in Petra fine and coarse-ware recovered from sites throughout the Negev identified by Tali Erickson-Gini (2010).

applause echoing from the theater, the elite leisurely strolling down the Colonnaded Street and stopping at the small shops on their way to give offerings to Dushares at one of the great temples. If fatigued they could ascend the stairs into the garden and pool complex, enjoy a few drinks and then end their day at home awaiting their guests in a Greek style hall, sipping wine and reclining on *kline* (banquet couch). Once the Romans arrived, trade clearly continued, yet the monumental structures along with the Colonnaded Street were part of a reconstruction project. A small but lavishly decorated temple, likely dedicated to the imperial cult, was erected in the city center and one of the largest structures, the so-called “Great Temple,” was possibly converted to a concert hall or city council chamber. These private, once royal areas were now open and served as administrative and communal buildings.

In the fourth century, our view of Petra is quite different. Some trade revived after the crisis of the third century, but Petra’s urban center was mostly abandoned with the exception of some areas being used as public agricultural lands (the garden and pool complex and the Great Temple). Activity continued in some areas within the city center such as the Late Roman/Byzantine baths, and the Late Roman houses/structures on the North Ridge. The luxurious domestic complex a top ez-Zantur, overlooking the city center was reused in a more modest domestic occupation. Otherwise any new construction projects in subsequent centuries were concentrated along the North Ridge.

So, after the late third century, Petra experienced a decline in its perfume industry but a continuation in the production and export of its ceramic industry, a reorientation of the urban center towards the North Ridge, and finally a gradually increasing Christian population. One might reasonably suppose that its population was now significantly smaller.

Petra still engaged and contributed heavily in the trade of ceramics in the fourth century and beyond. There was clearly strong and sustained demand for its pottery vessels (for storage, cooking, serving) some of which possibly carried some organic product that does not survive in the archaeological record. The Petra-Gaza road was still utilized in the third and fourth centuries as was the *via nova Traiana*, which connected the Red Sea with southern Syria and ran through Petra. Large and small settlements south of Petra, such as Aila, Humayma, and ‘Ayn Gharandal, and west of Petra in the Negev desert, such as Oboda and Mampsis, imported substantial amounts of imported coarse-ware ceramics from Petra in the fourth century: cooking-pots, jug/jars, casseroles, and bowls (Erickson-Gini 2010).

One may ask if Petra was engaged heavily in the export of its own ceramics then what was Petra *importing* in the evolving economy of Petra of this period. It is a common feature of published excavation reports that imported fine-wares and amphorae make up very small percentages of the total ceramic corpus (Schmid *et al.* 1996).<sup>22</sup> The dearth of imported fine-wares and amphorae at Petra is not concentrated in one period alone; it seems as if the trend continued from the time when the Nabataeans began manufacturing their own fine-ware (ca. first century BC). One explanation for this phenomenon is the preference the Nabataeans held for their own products. The Nabataeans manufactured their own highly levigated, egg-shell thin painted and un-painted fine-wares. At Beyda, just a few kilometers away from

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<sup>22</sup> This trend is also common in the assemblages from the Petra Garden and Pool Complex, The Great Temple, the Main Theater at Petra, and the Petra North Ridge Project (with the exception of the ceramics from the first century tombs excavated by Megan Perry). I would like to suggest that the Nabataeans favored imported fine-wares as funerary goods, along with their painted and un-painted fine-wares. The first century tombs located on the North Ridge yielded an abundant amount of Western Sigilatta, Eastern Sigilatta, and African Red Slip wares.

Petra, wine presses suggest wine production throughout the Nabataean periods.<sup>23</sup> Perhaps the inhabitants of Petra simply preferred their own ceramic tradition and their own wine over other foreign products.

One significant change at the beginning of the fourth century AD (ca. 303-304) that influenced Petra's economic and political situation was the arrival of the *legio VI Ferrata* at Udruh (ca. 10 km east of Petra). The arrival of the legion would have both increased local security as well as increased demand for local foodstuffs and everything else a legion (at least one thousand troops plus dependents) required, such as leather, metal, timber, and stone (Parker 2009d).

Despite some surveys, evidence of Petra's agricultural hinterland is scarce. A common trend in parts of the Empire in Late Antiquity was the movement of some urban population to the agricultural hinterlands. This trend was common in the northwestern Empire but not generally apparent in the East in the Byzantine period. The migration of the urban population to the hinterland could be true for Petra, but excavations at Beyda seem to undermine this suggestion. There is Byzantine occupation at Beyda but wine presses and grape cultivation cease well before this period (Bikai 2008: 465-466). Furthermore, the Petra Papyri mention two villages that had been abandoned by the sixth century. It appears that the population of Petra decreased, occupying a smaller city (Arjava et al. 2007: 34, 69; Fiema 2002: 209, 211).

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<sup>23</sup> The wine presses and occupation at Beyda are 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 in which a throne was added, presumably for a bishop. It is not clear if there is continuous occupation from the Nabataean through Byzantine periods (pre 63 BC-AD 391; Bikai 2008).

Petra seems to have undergone a gradual Christianization in the fourth and fifth centuries, while a significant amount of the population still practiced polytheism.<sup>24</sup> Christianity does not seem to have played a major role in the economic, political or social life of the city before the fifth century.

So how did Petra's economy change after the third century? Finley described Petra in an earlier period as a "caravan city" and as such, an exception to his primitivist model. But Petra after the third century crisis may well be described as being in a parasitic relationship with its hinterland (which Finley saw as the norm throughout the classical Mediterranean World) with sharply reduced industry and no longer a nexus of international trade. And what of Petra's perfume industry and its apparent collapse during the third century? If Nabataean *unguentaria* were no longer in production, in what containers were perfumes shipped and where were they made?

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<sup>24</sup> The practice of polytheism was strong until the fifth century, as implied by the bar Sauma episode. Bar Sauma arrived in Petra in 423 with forty monks with the intentions of destroying the city's pagan temples and Jewish synagogues. To prevent this, the inhabitants of the city close the gates against them. Bar Sauma threatened to attack the city and burn it if they refused to let him enter. At that time Petra was suffering from a severe drought. Coincidentally however, once Bar Sauma arrived, it began to rain heavily and a flood washed away the city walls. The pagans were amazed and interpreted the event as divine intervention later converting to Christianity (Politis 2007).

## CHAPTER 4

Petra was not the only source of perfume oils (unguents) in the ancient Mediterranean world. Conquered at the dawn of Augustus' reign in 30 BC Egypt was hailed as Rome's wealthiest province. Egypt's key political, commercial, and industrial city was Alexandria which manufactured many value-added products from raw material imported from the East including perfumed oils (unguents) carried in *unguentaria*.

The Nabataean perfume industry, as see above, began in the late first century BC and flourished into the mid-third century AD, when apparently it disappeared. However, the perfume trade did not simply cease to exist after this period.<sup>25</sup> There was continued demand and the capability to provide perfume in late antiquity yet, at Petra, the major nexus of trade of the Nabataean kingdom, there was an obvious decline in bottling unguents in ceramic *unguentaria* after the mid-third century. It is likely that glass *unguentaria*, in use contemporaneously with ceramic, extends beyond the use of ceramic into the late antique periods. This chapter will argue that the perfume industry that once used ceramic vessels instead turned to glass *unguentaria* based on a handful of key sites including a few known perfume production centers. It must be stressed that this is a small sample and needs to be verified by analysis of other sites in the wider Mediterranean. The sites discussed below have been chosen because they have yielded substantial quantities of glass *unguentaria* which have been published in a typo-chronological sequence. Furthermore, evidence from

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<sup>25</sup> This is the perspective of one scholar. Tali Erickson-Gini, and thus this statement is a response to her claim discussed below. This claim does not reflect the scholarly consensus that the perfume industry ceased to exist after the mid-third century. No other work is referenced by Erickson-Gini, other than her own, to support her claim. In either case this is not a general development throughout the Empire, and instead reflects the situation at Petra.

*Provincia Aegyptus* and elsewhere in the fourth through sixth centuries suggests continued manufacture and distribution of perfume. The perfume industry declined at Petra. Yet, the bottling of unguents must have continued elsewhere at sites such as Alexandria and shipped within a different container, *i.e.* glass.

### *Historiography*

#### Ancient Documentary Sources

The relevant primary sources include the *Historia Augusta* (a collection of imperial biographies of second and third century emperors, probably composed in the late fourth century) and the *Totius Orbis Descriptio* (fourth century) both describe Alexandria as an industrial city noted for its linens, glassware, papyrus, and many other luxury goods such as silverware, jewelry, and perfumes and unguents made from oriental imports (*Historia Augusta, Saturninus 8; Totius Orbis Descriptio 35-36*).<sup>26</sup>

Strabo states that by his time (early first century AD) the bulk of frankincense trade moved by sea from southern Arabia to the Egyptian port of Myos Hormos, across the eastern desert, and thence via the Nile to Alexandria. He asserts that this was now more popular than the overland caravan route to Petra (*Geography 16:4.24*). Interestingly, Pliny states that at Alexandria frankincense was “falsified” or “vamped up” (*interpolantur*). Its value is underscored by his report that the workmen were identified by a seal on their aprons (*subligaria signantur opifici*) and after having worked in the factory were stripped of all their clothes to prevent being smuggling of the precious product (Pliny, *Natural History 12.32.58-60*).

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<sup>26</sup> As cited by Jones 1986: 1358.

The *Periplus Maris Erythraei* (first century AD) an anonymous merchant captain's guidebook for navigation among Red Sea ports describes the distance between ports, general descriptions of a port's landscape, the specific kinds of goods available at or in demand in each port (frankincense and myrrh), and potential dangers to sailors or merchants (Casson 1989).

Archaeology provides more evidence, including key excavations at Alexandria (Rodziewicz1984), Karanis (Harden 1936) and Myos Hormos (modern Quseir al-Qadim) excavated first by the University of Chicago (Whitcomb 1990) and subsequently by a British team (Peacock and Blue 2006). Finally, Gladys Davidson published a chronological typology of artifacts from Corinth (1952).

### Secondary Sources

Reconstruction the socio-economic history of the Mediterranean world offers an extraordinary challenge. This is due to the lack of much quantifiable, primary economic evidence and the bias evident in surviving sources. Nevertheless, in 1964, A.H.M. Jones compiled a social, economic, and administrative survey of the Later Roman Empire from 284 to 602. Jones' work is impressive and detailed—the information he provide is supported largely by documentary evidence.

Roger Bagnall provided a useful overview of late antique Egypt including the environmental, economic and administrative characteristics of other cities within Egypt, and their relationship with its man villages. Bagnall highlights major industries in urban settings. It is not surprising to learn that papyrus, textiles, food, construction projects, and

metalworking industries dominated the urban landscape. Most disappointing however, is Bagnall's brevity reserved for discussing pottery and glass production. He states that:

the remaining materials-based crafts appear to have been of minor importance. Pottery...was fundamentally...a rural industry because of proximity to the clay beds...That does not exclude the urban production of pottery, probably in the main fine wares, for which the transportation of clay to the city would be less burdensome than in the case of bulky coarse wares...Glass clearly occupied a small group of workers (Bagnall 1993:84-85).

The present author agrees that pottery production and manufacture can be “fundamentally, a rural industry,” but Egyptian amphorae and other coarse ware pottery have been found throughout the Mediterranean, the Red Sea Littoral, within and beyond the Empire.<sup>27</sup> Not enough emphasis is placed on the ceramic industry by Bagnall. Also, if we assume that Alexandria, one of the leading commercial and industrial entrepôts of the Mediterranean world, operated with only a small guild of glassworkers than how were glass vessels being “mass-produced?” In short, Bagnall relies too heavily upon literary sources and not enough on archeological sources, probably because there is as yet minimal archaeological evidence for glass factories within Alexandria.

### *The Perfume Industry*

#### Ceramic Unguentaria

Petra was simply one of several centers of perfume manufacture throughout the Empire. As previously explained, the Nabataeans gained their wealth through their status as middlemen in the trade of aromatics. They realized they could increase their profits if they

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<sup>27</sup> It has already been noted by Hayes that Egyptian Red Slip an Egyptian fine-ware, was rarely exported beyond Egypt (compared to other fine-wares). The main kind of coarse ware exported was amphorae. Hayes notes this in his *Late Roman Pottery* (Hayes 1972: 397-400).

produced a valued-added product from raw frankincense and myrrh, such as perfumes and thus they began to bottle these unguents in ceramic *unguentaria*.

There are few explanations for the cessation of production of *unguentaria* in the mid-third century. This period was characterized by plague, rampant inflation, political instability, and incessant warfare. In the Roman Levant this included major invasions of Syria by the Sassanian Persians in the 250s and the Palmyrene rebellion and occupation of the Levant ca. 270.<sup>28</sup> With all this turmoil, the market for luxury items such as perfumed oils likely declined sharply.

The cessation of *unguentaria* production at Petra itself suggests the death of this industry in this period. But this does not necessarily imply that the market for perfume oils also disappeared. Although Petra became a smaller city, it experienced some revitalization of trade in the fourth century, as suggested by the city's ceramic industry. Petra continued to export pottery to sites as far south as Aila, 'Ayn Gharandal, and Humayma. Pottery from Petra is also attested throughout the Negev in this period (Erickson-Gini 2010). Furthermore, even though Petra was still capable of producing key ingredients necessary for perfumers and unguents the city no longer produced ceramic *unguentaria*. This could simply mean that Petra, regardless of its still successful ceramic industry, was perhaps henceforth more an urban consumer of imported products rather than a major international nexus of trade. On the other hand, could the perfume industry have actually continued by bottling the product in glass rather than ceramic *unguentaria*?

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<sup>28</sup> Queen Zenobia, a third century queen of the Palmyrene Empire, led a major revolt against the Roman Empire. By 269 Zenobia had conquered Roman territory as far as Egypt until 272 when Zenobia was defeated by the Emperor Aurelian (Bowersock 1983: 126-137).

### Glass Unguentaria

Glass and ceramic *unguentaria* were used contemporaneously. However, there was an apparent shift in emphasis from ceramic to glass *unguentaria* after the mid-third century. Before discussing glass *unguentaria* in detail, it is necessary to provide a brief summary of Roman glass production and trade. Additionally, glass *unguentaria* from the first through fourth century will be examined from various sites within Egypt and the Levant. Due to lack of quantifiable evidence provided by the authors, it was impossible for the present writer to include the frequency of glass *unguentaria*, or any statistics concerning the various types. Therefore, the evidence of the apparent shift from ceramic to glass can be seen from the disappearance of ceramic *unguentaria* from the archaeological record with a replacement of glass *unguentaria* recovered from contexts that date after the mid-third century.

Archaeologists have recovered large blocks of glass, presenting primary production of this material, from shipwrecks which would suggest that these blocks were being exported to secondary production centers such as Alexandria and Jalame, a “glass factory” on the coast of Palestine. There the blocks would then be intentionally broken and melted down to be molded or blown into a specific vessel (Meyers 1992:15; Saleh *et al.* 2013: 143). Glass blowing began ca 50 BC and was a revolutionary innovation, dramatically lowering its cost and making glass vessels low-end luxury products, as suggested by their subsequent wide distribution in some quantity across the Mediterranean World. Carol Meyers who analyzed glass from Quseir al-Qadim (Myos Hormos on the Egyptian Red Sea coast), suggests that these vessels seem to imitate the ceramic fine-ware of this era (*terra sigillata*; Meyers 1992: 15).

## *Karanis*

Karanis, modern Kom Aushim, lies in the northeast corner of the Fayum Oasis, a depression in the desert immediately west of the Nile, south of Cairo, in Upper Egypt. Karanis was an agricultural town established in Graeco-Roman Egypt under Ptolemy II Philadelphus (285-246 BC; Bagnall 2004: 131). The Roman glass discussed below was recovered by the University of Michigan (1924-1929). Donald B. Harden's typology of this glass has ever since remained a milestone for the study of Roman glass (Harden 1963).

The glass from Karanis provides key evidence to support the argument of this thesis. Harden describes seven types (A-G) of "Toilet Bottles," or *unguentaria*. Types B, C, D, and H are relatively early, dating from the first to late second/early third centuries. Type F and G are intermediate types from the late second to mid-third centuries. Type A dates from the second through fourth centuries, and finally Type E is chiefly if not entirely late (probably late third/fourth through fifth centuries; Harden 1936: 265). Types A, E, and F date to the third century or later. Barbara Johnson later published eleven ceramic *unguentaria* and two piriform *unguentaria* from Karanis. Johnson dates a majority of the fusiform *unguentaria* to the second half of the second to early third centuries. She dates two examples from post-Ptolemaic (i.e. after 30 BC) to ca. mid-third century. The two piriform *unguentaria*, specifically #267—which looks most like the typical Nabataean piriform *unguentarium*—date to the early third century, despite the fact that much late third, fourth, and fifth century ceramic material is published in the same volume (Johnson 1981; Figure 11). The apparent absence of ceramic *unguentaria* after the mid-third century might suggest that by this period glass containers had re-placed ceramic for such unguents.

## Corinth

Excavations of Corinth have also yielded significant quantities of glass. Gladys Davidson published small finds from Corinth, including glass vessels. Davidson refers to the “Late Roman” period (fourth through sixth centuries) as distinguished from “Byzantine” (ninth through twelfth centuries; Davidson 1952: 72-102). The Roman period yielded the first evidence of large scale importation of glass. She argued that most of these finds derived from Athens.

Davidson noted a decline in the craftsmanship of glass after the third century. Byzantine material was by far the most abundant, when at least two glass factories flourished at Corinth, suggesting the site had necessary materials available to manufacture glass. Furthermore, although there was as yet no evidence of local glass production prior to the Medieval period, this seems possible.

Of the eight glass vessels identified as “Toilet Bottles,” by Davidson four date possibly later than the third century. For glass vessels #668 and #671, Davidson references Harden’s *Karanis* #835, which is dated to the third to fourth centuries (Davidson 1952: 102; Figure 12). Davidson dated #673 to the first century, however she notes that there is a late version of this type that dates to the fourth century (Figure 12).<sup>29</sup> Finally, #674, although dated by Davidson to the second century is dated to the third/fourth century by *comparanda* (Figure 12).<sup>30</sup> It is hard to interpret the dating of these “Toilet Bottles,” because Davidson provides a different and earlier date for each vessel mentioned above than those given in her

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<sup>29</sup> Davidson references Morin-Jean’s Form 32 here from his *La Verreire en Gaule*, p. 82.

<sup>30</sup> Again, Davidson references Morin-Jean; here he compares #674 to Morin-Jean’s Form 38 from *La Verrerie en Gaule*, p. 90.

reference to Harden and Morin Jean. Perhaps these types were manufactured over a long period of time. Despite this, there are examples of glass *unguentaria* that post-date the third century.

Excavations of the Sanctuary of Demeter and Kore at Corinth also yielded a few ceramic *unguentaria*. Number 142 is the only one published from destruction debris of the late first century AD (Slane 1990: 4). Slane reports that “fragments of no fewer than two and no more than nine clay examples were found” (Slane 1990: 64). Slane suggests that the paucity of ceramic *unguentaria*:

might be explained by...[the fact that] glass *unguentaria* are coming into common use in Corinth at the end of the third quarter or during the fourth quarter of the first century...it is therefore possible that the relative lack of Roman clay *unguentaria* in the Sanctuary is due to the fact that they only appear in years immediately before they were replaced by glass (Slane 1990: 64).

In other words, Corinth may have experienced this transition from ceramic to glass containers much earlier than at the other sites reviewed here.

### *Alexandria*

Alexandria was founded ca. 331 BC by Alexander the Great on the Egyptian Mediterranean coast (Bagnall 2004:51). Not only was it an important commercial and industrial center in the Hellenistic period (323- 30 BC), it continued to thrive throughout the Roman period and well into the early Islamic period. As discussed earlier, some of the many primary sources describe the city as a major industrial center famous for manufacture of glassware and perfumed oils.<sup>31</sup>

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<sup>31</sup>*Saturninus, SHA: 8; Totius Orbis Descriptio: 35-36. As cited by Jones 1986:1358.*

A Polish team published their excavations in Alexandria in three volumes, including a significant amount of ceramic material (Rodziewicz1984). The single published plate of various glass-wares included three possible glass *unguentaria* recovered from a latrine pit and described as “light-blue flasks and bottles” (Volume III; Figure 13). Lacking specific evidence for their dating, the present author assumes that these glass vessels may be dated by the latest associated pottery of the fifth through seventh centuries. No ceramic *unguentaria* appeared in these contexts, perhaps because glass *unguentaria* had replaced that of ceramic by this period, although this is admittedly an argument from silence.

#### *Jalame*

Excavation of Jalame on the coast of Palestine near Mount Carmel revealed a glass factory which excavators dated from the mid-to-late fourth century (Weinburg 1998: 103). Jodi Magness and Kathleen Slane have now pushed the terminus of occupation of the site to the fifth and sixth centuries based on associated Late Roman Red wares (Magness & Slane 2005: 260-261). Not surprising is the complete absence of ceramic *unguentaria* among the published pottery. Various cosmetic glass flasks were found but here but these were judged as “not in the factory’s repertory” (Weinburg 1998: 103).

Several small glass flasks date to the first century AD and onwards (#321-324). Additionally, one vessel #324 in particular was recovered from a pre-mid fourth context (Figure 14). It is unclear how early this context should be dated; however, these vessels were in use and thus are clear examples of small glass *unguentaria* during the mid-third century. Vessel #340, described as a lentoid flask, dates as early as the first or second century; however, others date to the third or fourth century (Figure 14).

The most significant find is vessel #327 (Figure 14), a spindle or pipette shaped flask common in the fourth century in the East and West. The contents may have been medicinal liquid of a measured quantity, likely from Syria. Although this form is found in Egypt it was not attested at Karanis (Weinburg 1998: 74). Because no ceramic *unguentaria* were published at this site and all *unguentaria* were glass, this again suggests the possibility that glass *unguentaria* had replaced the use of ceramic by this period.

Before turning to other centers of glass manufacture this analysis will consider an apparent exception to this trend—sixth century ceramic fusiform *unguentaria* from al-Katuteh in Petra. Other published ceramics recovered, primarily Late Roman Red Wares and lamps, clearly date to this period. It is surprising that these “fusiform *unguentaria*” have not appeared in previous excavations of the city center. Perhaps these sixth century *unguentaria* were not common, unlike the Nabataean piriform *unguentarium* (Figure 15). The monuments south of the colonnaded street lay in ruins by this period which may account for their absence at structures such as the Garden and Pool complex, the Great Temple, Qasr al-Bint, and ez-Zantur. Perhaps, then we must consider the churches that dot the North Ridge. Unfortunately, the pottery published from the Petra Church was largely limited to that recovered from under the foundations and ceramics from the Ridge Church and the Blue Chapel remain largely unpublished.

Notably, Slane has published similar vessels from Corinth excavated in a large pit in the Peribolos of Apollo (Slane 1994). It is “the first deposit of the late third and early fourth centuries identified at the site” (Slane 1994: 127). The pit appears to have been a dump, dug into Roman levels of the Peribolos. Two bronze coins of Diocletian “indicate a date no

earlier than AD 292 for the dumping of the debris” (Slane 1994: 128). Slane published neither ceramic piriform *unguentaria* nor glass *unguentaria* in this article. However, she refers to ceramic vessels #61 and #62 as “roughly made *unguentarium*,” described as having “sandy red fabric, with very abundant, fine to tiny clear and sand-size black inclusions and sparse angular mineral rock grains” (Slane 1994: 146; Figure 16). Could these roughly made *unguentaria* derive from Petra? If so, although Slane’s *unguentaria* are dated to the late third and early fourth century rather than the sixth century, are these ceramic descendants of Nabataean piriform *unguentaria*.

Similarly, in 1971, Hayes published “A New Type of Christian Ampulla” a roughly made ceramic fusiform *unguentarium* (Figure 17). Hayes himself has termed the “small pottery flask which...appears regularly on sites of sixth-to-seventh-century date throughout the eastern Mediterranean,” i.e., a Late Roman *unguentarium* (Hayes 1971: 243). Hayes explains that a majority of the vessels exhibit Early Christian monograms; yet the most significant find—and according to Hayes the most informative of vessels which indicates its function—comes from Rhodes and is stamped with an inscription: CEYHPIANOY EΠICKO<ΠIOY> or “of Bishop Severianos.” The bishop’s name suggests that the vessel contents belonged to the bishop were likely of some value and would have held religious significance such as holy water or oil, such as “Menas flasks” (Hayes 1971: 244). The dates of these vessels are supported by the fact that the same monogram-stamps are common on “monuments, coins, and silver plate of the period ca. AD 450-650” (Hayes 1971: 244). Excavations of the Athenian Agora have yielded several examples of these vessels in a mid-sixth century context. The example from Rhodes was found with amphorae “of micaceous

brown fabric of a type which may be dated c.450-550” (Hayes 1971: 245). These Late Roman fusiform *unguentaria* have been recovered from Corinth, Istanbul, and Tocra in Cyrenaica from sixth century or later contexts but not in earlier contexts (Hayes 1971: 245). Notably, Hayes also suggests two likely places of origin based on analysis of the ware—Palestine or Jordan.

Could these vessels Hayes published almost forty years before Khairy’s examples from al-Katuteh be from Petra? The ceramic industry was still thriving at Petra well into the sixth century, so perhaps these roughly made, ceramic fusiform *unguentaria* were manufactured in Petra and exported to sites such as Bethany—a pilgrimage site on the Jordan River known for its holy water (Saller 1957). Perhaps this was a less costly industry to continue rather than manufacture of perfumed oils.

#### *Possible Centers of Glass Manufacture*

Evidence for glass *unguentaria* from after the mid-third century has been discussed above. What were the possible centers of manufacture of glass *unguentaria*?

#### *Petra*

Jalame, discussed above, is the only Levantine glass manufacturing site excavated and fully published. But there is some limited archaeological evidence to suggest that Petra itself may have engaged in glass production.

The Petra Church on the North Ridge was erected in the mid-to-late fifth century. During the later “non-Ecclesiastical” occupation (early seventh century; Fiema *et al.* 2001: 104) of the structure Room IX was interpreted as a “glass collection and processing center.” A significant find from this room was a group of glass paste cakes “usually considered to be

products of a glass re-melting process...a total of 50 cakes or fragments were found” (Fiema *et al.* 2001: 96-97). Cakes of colored glass were apparently intended for production of wall mosaic *tesserae*, since a few cakes with straight surfaces suggest that they had been cut. The cakes were associated with late sixth to the early seventh century ceramics. The excavators interpreted this room as a storage area for recycling glass, “perhaps to be used for the manufacture of new glass objects, including the mosaics, for the use somewhere else in Petra or in the region” (Fiema *et al.* 2001:97).

These glass cakes suggest a furnace within the city center, perhaps in or close by the former church complex, to melt down recycled glass into cakes. The excavators state that “the manufacture of raw products using secondary material has significance in relation to the late history of Petra...” (Fiema *et al.* 2001: 97).

If the furnace was not on the North Ridge itself, it likely lay within another of the monumental structures abandoned by this period along the Colonnaded Street, such as Qasr al-Bint, the Great Temple, the Small Temple, the Garden and Pool Complex, or the Temple of the Winged Lions. After the mid-third crisis, most of these structures were used as agricultural areas, squatter/camp grounds, dumps, or abandoned completely. Thus it would have been easier to house a furnace within one of these monuments, given their proximity to the Petra Church during the Early Byzantine period.

Another site within Petra offers further evidence for local glass production. The hill-top domestic complex ez-Zantur, above the Garden and Pool Complex yielded a stratigraphic sequence from the late second century BC to the early fifth century, although with a gap in

occupation from the early second through the third centuries AD. Daniel Keller provides an impressive and detailed analysis of the glass from ez-Zantur (Keller 2006).

Keller identified “an indigenous glass region covering Petra and the surrounding areas of the Negev and Southern Jordan” (Keller 2006: 183). The best parallels for the glass from Petra are from the Negev and southern Jordan. The glass vessels from northern Jordan, Judaea, and Galilee are “typologically or technologically different” (Keller 2006: 183). During the Nabataean period imported glass vessels are attested in very small numbers which “provides evidence for personal souvenirs or gift exchange of Nabataean merchants rather than for the organized large scale trade in glass” (Keller 2006:183). It was not until the third century that a complete set of glass tableware can be found in Petra. The typical Roman use of small glass flasks or vials to store liquids and spices began in the fourth century and continued into the fifth—regarding Petra at least (Keller 2006: 183). The house destroyed by the earthquake of 363 yielded *in situ* glass vessels which confirmed the use or storage of glass in different rooms at this time. Keller argues that use of typical late Roman (fourth/fifth centuries) drinking custom glass beakers reflects a tradition restricted to the Roman elite as suggested by depictions on mosaics, tomb paintings, silver dishes and stone sarcophagi (Keller 2006: 183). Drinking from ceramic bowls was reserved for those socially lower; these ceramic bowls were replaced by glass. Evidence for this is shown “by another earthquake context of the early 5<sup>th</sup> century on the terrace of EZ I” (Keller 2006: 183).

Furthermore, Keller says that this replacement of fine ceramic ware drinking vessels with glass beakers illustrates the increased use of glass vessels in the late Roman period. The evidence to support local glass production in Petra from the fourth century onwards is the

“regional glass corpus, the predominant use of glass drinking vessels and their indigenous typo-chronological development” (Keller 2006: 184). Keller goes so far to state that this “strongly indicate(s)” local production of glass in the late Roman and Byzantine Petra even without direct evidence of a workshop. Interestingly, Keller mentions that because of the decline of imported raw glass, locals would have recycled broken glass (cullet) for reuse as raw material—this assertion can be linked with the glass collected for apparent recycling in the Petra Church. However, the present author must emphasize that no glass *unguentaria* have appeared at Petra apart from two Janiform glass “bottles” one of which the author has personally seen from the Petra Garden and Pool Complex. Janiform glass *unguentaria* have been recovered throughout the Mediterranean and were quite common (Antonaras 2010: 390).

#### *Alexandria/Egypt*

Having already considered glass manufacture in the Levant, it is appropriate now to examine glass production within Egypt and specifically at Alexandria.

Wadi el-Natrun, located in a valley east of the Nile ca. 80 km from Alexandria, was a main center of the Roman glass industry in Egypt. Both key glass-making ingredients, silica and natron, were abundant in the area. Published reports from Wadi el-Natrun focus on technical information about the glass-making process but not glass forms or glass waste. There were two types of crucibles at the site for fritting and for melting. The crucible for “fritting”<sup>32</sup> “had a rectangular form...[probably] intended to facilitate the transport of the glass frit blocks to glass factories in different places where raw materials were not available”

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<sup>32</sup>The mixture of silica and fluxes that is fused at high temperatures to make glass.

(Saleh *et al.* 2013: 143). Once the glass was shaped into these large, rectangular blocks, they would have been shipped out to glass factories, such as those at Jalame and Alexandria to be smashed, re-melted and then molded or blown into vessels.

Pliny discusses Alexandria's production of perfumed oils but does not specify their containers. It is unclear whether Alexandria produced ceramic *unguentaria*. However, on display at the Field Museum in Chicago is a small "Late Ptolemaic-Roman" period juglet of chocolate-brown color, covered in white slip.<sup>33</sup> It shares a similar profile to the Nabataean piriform ceramic *unguentarium*. This example has no provenance, but perhaps represents an Egyptian piriform *unguentarium*. Perhaps ceramic *unguentaria* were used before glass *unguentaria* in Egypt as well. But because no ceramic *unguentaria* are as yet published from Alexandria we cannot necessarily assume that glass replaced ceramic containers.

The Polish excavations identified a glass furnace at Alexandria with three main categories of glass finds; fragments of locally made flasks "which confirmed the use of cosmetic or medicinal liquids," fragments of bottles, and plates (Rodziewicz 1984: 347). Of these categories a sub-category is "dismantled glass" or glass slag/waste. Remains of a glass kiln were found in a domestic complex "House B" with associated pottery from the fifth to early seventh centuries, compelling evidence for glass *unguentaria* production in this period (Rodziewicz 1984: 106-109).

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<sup>33</sup> Upon communication via Helen Dixon with Lorien Yonker of the Field Museum regarding Egyptian Vessel 1998.4036.173977, I learned that the vessel was given an accession number in 1998 but had already been at the museum for many years. The collection, including this vessel, was originally given to the museum in July of 1925 by Stanley Field and Ernest R. Graham. The pieces had been selected by Professor Henry Breasted from the collection of Andre Birchers. It is described in the museum's records as an "Egyptian pottery bottle, perfect with dark dull red surface. Wheel made but shape slightly irregular. Fragments of papyrus strips adhere around neck and diagonally across body. The finder, provenience, date are all unknown.

## *Corinth*

Two flourishing glass factories in medieval Corinth (Davidson 1952: 5) suggest that necessary materials were locally available. Although there is as yet no earlier evidence for glass manufacture at Corinth this remains possible.

### *Conclusions*

After the mid-third century crisis, ceramic *unguentaria*, including Nabataean piriform *unguentaria*, disappear from the archaeological record. It seems that with the revitalization of the economy in the fourth century the perfume industry continued almost exclusively in glass containers. Evidence published by Hayes, Johnson, and Khairy cannot be ignored, and although the contents within these Late Roman *unguentaria* are not certain, the fact remains that limited quantities of ceramic *unguentaria* were being produced. The perfume industry continued elsewhere most likely at Alexandria, the most viable alternative source for the production of *unguentaria*, along with other glass manufacturing centers such as Jalame and possibly Corinth and Petra (the latter based on circumstantial evidence). This suggests the likelihood of multiple centers of glass manufacture, several of which produced and exported glass *unguentaria*.

Perhaps now it is appropriate to ask how many sites show a transition from ceramic to glass *unguentaria*? That is to say, if a number of sites share this transition then is it sufficient to suggest this phenomenon occurred at Petra?

Keller raised an interesting point. An apparent decline in importation of raw glass in the late Roman period to southern Jordan encouraged the locals of Petra to recycle broken glass vessels, melt it down to cullet, and reuse as raw material. This opens another avenue of

research for glass specialists. Studies of regional glass manufacture are almost non-existent; Keller suggests that southern Jordan and the Negev share the same typo-chronological characteristics which differ from northern Jordan, Judaea and Galilee (Keller 2006: 184). Could this be the case elsewhere in the Levant or in the Roman Empire? Perhaps this may solve the disparity in dates between Davidson and Harden, mentioned earlier. Perhaps the vessels from Corinth and its hinterland do not match the typo-chronological characteristics of Karanis and its hinterland.

In conclusion, it is evident that the Mediterranean perfume industry continued through Late Antiquity into the Islamic period. This industry, which had once relied on both ceramic and glass containers clearly shifted primarily to glass after the mid-third century. These glass *unguentaria* were likely manufactured at commercial and industrial entrepôts such as Alexandria, which also imported raw materials to manufacture perfumed oils. Finally, although no glass *unguentaria* wasters have been recovered at any of the sites discussed above, particularly Petra, to suggest a workshop dedicated to producing these vessel in either its ceramic or glass forms, it can safely be assumed that centers of glass manufacture were producing *unguentaria* along with other luxury and utilitarian items.

The analysis discussed in this chapter leads to broader historical questions regarding the perfume industry and more specifically the economy of Petra after its apparent disengagement from the perfume industry. Chapter five will consider why apparently once lucrative perfume industry at Petra ceased production after the mid-third century.

## CHAPTER 5

The crisis of the third century was characterized by incessant warfare, plague, inflation, and many other serious problems which affected the entire Roman Empire. The late third/early fourth centuries witnessed a transition from an Empire in ruins to an Empire under reconstruction. Significant economic change occurred throughout the Levant, including Petra, which presumably affected the local perfume industry. This chapter will consider why the once lucrative perfume industry at Petra apparently ceased production in the third century. This cannot be explained either by the lack of available local resources or the disappearance of the local ceramic industry itself. Instead it appears that the decline and eventual disappearance of Petra's perfume industry must be explained by other factors: temporary reduction of demand in the mid-third century, a shift in trade routes, cessation of sufficient quantities of imported raw frankincense, and as a consequence the migration of perfumers. This chapter will bring together the conclusions of the previous chapters regarding the perfume industry and discuss the significance of this research in the broader history of the ancient Mediterranean world.

### *Historiography*

#### The Primary Sources

First it is appropriate to review and analyze the ancient documentary sources concerning the economic and political atmosphere of Late Antiquity. These include Eusebius' *Onomasticon* (fourth century), Ammianus Marcellinus (fourth century), Procopius' *On Buildings* (sixth century), and the Petra Papyri (sixth century). Eusebius became bishop of Caesarea around 314 and is most famous for his work *The Ecclesiastical History*, which

chronicles the events from the time of the Apostles up until his own period. However, crucial for this research is his *Onomasticon*. Eusebius' *Onomasticon* was a guide-book for travelers or those interested in sites mentioned in the Bible. In this text he mentions that the *legio X Fretensis* based at Jerusalem since AD 70, had been transferred to Aila by 300 (Parker & Smith 2014: 16).

Writing half a century later was Ammianus Marcellinus a Roman soldier and historian from Antioch in Syria. He served in the army under Constantius II (337-361) and Julian (361-363) on the Rhine and eastern frontiers. Given his origins it is no surprise that he mentions the city of Zeugma, located at a major crossing point of the Euphrates in northern Mesopotamia and of great commercial importance since its Hellenistic foundation.

Procopius of Caesarea was a historian of the mid-sixth century who wrote *The Wars*, *Secret History*, and *On Buildings*. These works contain useful political and economic information concerning the eastern empire.

The sixth century Petra Papyri reflect the perspective of a prosperous family of local landowners. The papyri mention Petra several times, yet are far more illustrative regarding Petra's hinterland. These papyri suggest something of the economic, political, and social situation of Petra in Late Antiquity.

Other primary sources include the material culture recovered from archaeological excavations, including Zeugma, Petra, and the Red Sea ports of ancient Aila, Berenike, and Clysma. With the exception of Petra, these sites collectively represent critical mercantile sites of the Roman Levant in the late third through sixth centuries. It appears that after the third century crisis these cities experienced an economic boom due to a shift—mostly south—in

trade routes which diverted any substantial international trade from the once vibrant Nabataean capital of Petra. This diversion subsequently caused the demise of the perfume industry at Petra and consequent decline of the city's economic status in later antiquity.

### The Secondary Sources

Some secondary sources provide an overview of the economy and political atmosphere of the later Roman and Early Byzantine period of the Levant (fourth through sixth centuries). In 1964, A.H.M. Jones compiled a social, economic and administrative survey of the Later Roman Empire from AD 284 to 602. Although Jones does not refer to any of the cities in this chapter, his detailed overview of political and economic organization of Late Antiquity is crucial for understanding the Later Roman Empire.

Kenneth C. Gutwein's *Third Palestine: A Regional Study in Byzantine Urbanization* examines the factors which influenced the development of urbanization within the Byzantine province of *Palaestina Salutaris/Tertia*. It addresses questions regarding the planning and growth of cities during this period. Thus he states that the "economic base of the province cannot be neglected in the process of urbanization. [Therefore] inquiry into both the textual and archaeological sources must be made in order to ascertain the reason for the apparent rapid economic expansion" (Gutwein 1981: 2). He stresses the continued importance of Petra in the Byzantine period regardless of the apparent reduction in size of the city (Gutwein 1981: 172). He attributes a resurgence of capital investment into Palestine as religiously motivated—the "number of pilgrims who desired to visit the biblical sites via pilgrim routes through Third Palestine" can undoubtedly be paralleled with the affirmation of Christianity as the official religion of the Empire" (Gutwein 1981: 246).

In an attempt to summarize the archaeology of the Byzantine period of Palestine, S.T. Parker provides an historical narrative for this previously neglected period in his 1999 article “An Empire’s New Holy Land: The Byzantine Period.” Parker begins his review with the transformation of the empire under Diocletian (284-305) and how these political, economic, and social changes transform culture in the region. Parker provides a thorough review, analysis, and historical interpretation of recent archaeological excavations including smaller settlement sites (rather than only monumental or palatial complexes) and surveys. Finally, he concludes with evaluating the influence of archaeological work on the overall historical reconstruction of the Byzantine period (Parker 1999).

G. Young discusses the nature of trade in the East from the Augustan period until the end of the Diocletian’s reign in 305 (Young 2001). He discusses at length the incense trade, the purpose of the Late Roman army on the eastern frontier, economic recovery after the mid-third century crisis, and specifically the major over-land and sea-transport routes—mentioning, appropriately, key ports and caravan stations along these routes *i.e.* Aila, Clysma, and Zeugma. Young’s conclusions are largely based on documentary evidence while employing some recent archaeological finds.

Walter Ward’s M.A. thesis is an overview of material culture from the Red Sea ports of Berenike, Myos Hormos, Aila, Clysma and Leuke Kome. The evidence from at least two is much more elusive as Ward argues that only three were active as ports during the Roman period: Berenike, Myos Hormos, and Leuke Kome (see Ward 2002). The other ports of Clysma and Aila “begin to thrive as ports in the Byzantine period” (Ward 2002: abstract).

Although these assertions are debatable, his synthesis of Clysmas, Berenike, and Myos Hormos are helpful in contributing to the analysis in this chapter.

Averil Cameron's *The Mediterranean World In Late Antiquity* (2012) focuses on the Roman Empire during the fifth and sixth centuries. Chapter four deals primarily with the economy, Cameron's argues that the East continued to prosper economically while the West declined.

#### *Regional and Historical Background*

Evidence from various sites suggests a shift in trade routes to the north and south of Petra no later than the early fourth century. As a consequence, Petra no longer had access to sufficient quantities of imported raw frankincense, thus halting production of the perfume industry. This chapter will first discuss the economic evidence from sites mentioned above focusing especially on the nature of trade in the fourth through sixth centuries.

#### *Aila*

As already discussed, Aila—modern Aqaba—is located at the southern tip of Jordan in the great rift in the earth's surface that extends southwards through the Jordan Valley, the Dead Sea, the Gulf of Aqaba, and the Red Sea (Parker 2014: 206). The climate of Aila is quite arid with rainfall of ca. 40 mm per year limited to the winter and high temperatures during the summer. "However, fresh water is available through tapping groundwater a few meters below the surface, making Aqaba a coastal oasis" (Parker 2014:206). To the west lies the Sinai desert, to the north the Negev, and to the east the Hisma desert.

Aila was founded in the late first century BC, possibly during the reign of the Nabataean king Obodas III (30- 9 BC; Parker 2009a: 80). The main purpose of the port was

to serve as a transfer point between ships and caravans connecting the Red Sea littoral with the Mediterranean world (Parker 2009a: 80). The foundation of Aila, at the northern tip of the Gulf of Aqaba, gave the Nabataeans a port which maximized trade by water while minimizing the more costly over-land caravan trade. In AD 106 the Nabataean kingdom was annexed as the province of Arabia but trade seemed to continue unabated throughout the region.<sup>34</sup>

It has been suggested that the Roman annexation was not a smooth transition. Evidence from Aila of this “tumultuous” transition can be seen by the short abandonment of several Nabataean domestic complexes (Areas M, O, and B) and destruction in another sector of the site (Area J). This could imply either resistance to the Roman occupation or perhaps a natural phenomenon such as an earthquake. Regardless, after the annexation, Aila did not stop producing pottery and its importance as a trading port only increased with the Trajanic reopening of the Nile-Red Sea canal, an all-water route connecting the Nile valley with the Red Sea littoral on a seasonal basis (Parker 2003: 82). Also, Aila lies at the southern terminus of the *via nova Traiana*, completed between 111 and 114, which connected the port to sites farther north in the new province of Arabia.

Various evidence suggests that after the crisis period, Aila experienced an economic “boom” in the fourth century influenced by the revival of Red Sea trade and the arrival of *legio X Fretensis*, previously based in Jerusalem (Parker 2014: 206). Although the legionary fortress at Aila was never found, many elements of the Byzantine city were revealed through excavation by the Roman Aqaba Project: a domestic complex, a church, a long segment of a

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<sup>34</sup> See the discussion of the letter of Iulius Apollinarius in Chapter 3.

new city-wall, and two cemeteries. Material culture found at Aila yielded imported ceramic vessels from Palestine (especially Gaza), Egypt, Syria, Cyprus, the Aegean, North Africa, and even beyond the empire, such as Axum (in Ethiopia) and India. Late Roman Red Wares (LRRW)—African Red Slip (ARS), Egyptian Red Slip (ERS), Cypriot Red Slip (CRS), and Phocaeen Red Slip (PRS)—are common at the site (n=3,010; Parker 2014: 206) suggesting an intensification of trade in the Later Roman periods. The table below displays the quantification of LRRW’s recovered from Aila.

Table 5: Quantification of Late Roman Red Wares from Aila

<b>Type of Ware</b>	<b>No. of Sherds</b>	<b>% of All Sherds</b>
African Red Slip	2294	76.2%
Egyptian Red Slip	551	18.3%
Cypriot Red Slip	131	4.4%
Phocaeen Red Slip	34	1.1%
Total	3010	100%

Yet, the greater quantities of LRRW’s compared with the early Roman red-wares could simply be explained by the fact that more, later Roman and Early Byzantine contexts were excavated than earlier Nabataean/ Roman strata. Much evidence of kiln wasters and ceramic slag were found suggesting local pottery production continued at Aila from earlier periods. “Aqaba Ware” pottery was obviously consumed locally but as also widely exported, even beyond the frontiers of the empire (Parker 2003:80). Regardless, this ceramic evidence suggests continued trade from the Early Roman periods into the Late Roman and Early Byzantine periods.

At the turn of the fifth century, Aila began producing its own amphorae which would suggest the development of a new industry. But it is uncertain what Aila amphorae carried. They are attested at Petra (Fellmann-Brogli 1996: Abb. 766-77) and other sites north of Aila but the main distribution was clearly to the south and the Red Sea littoral. In addition to this new industry, export of other kinds of Aqaba coarse-ware vessels continued throughout the fifth, sixth, and even into the seventh centuries.

Discussed previously, Young refers to Aila and Clysma as two ports that rose to importance during the Tetrarchy. Young states that the bulk of the datable physical remains at Aila are from the fourth century, which points towards a peak period of commercial activity.<sup>35</sup> Young also attributes the rise in Aila's economic status to the destruction of Coptos by Diocletian in the late third century, "which would have effectively ended, at least temporarily, commercial importance of Berenike" (Young 2001: 127). Thus with the removal of Coptos the trade route to the Nile from Berenike was untenable, forcing merchants to sail further up the Gulf, *i.e.* to Aila and Clysma (Young 2001: 128). Young concludes that by this time (fourth century) the main route in use carrying trade, which formerly would have passed through Palmyra, included Aila (Young 2001: 128). However, Young's study was published while the excavation at Aila was still on-going and only brief preliminary reports had yet been published. The appearance of Aila amphorae in the *fifth* century and their widespread distribution in great quantity until the seventh century casts doubt on Young's assertion that

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<sup>35</sup> Certainly, the evidence from Aila does suggest that there was an apparent increase in trade during this period. But it is important to understand the bias in the archaeological evidence that was available to excavators. Ancient Aila lay under the modern city of Aqaba, and areas of the ancient city are either permanently lost or excavation of these areas were severely limited due to modern establishment. For example, excavation of the harbor at Aila was limited. Perhaps if more amphorae were recovered from the period of Aila's foundation this would skew the interpretation of the port's economic history.

the fourth century was the peak for Aila's commercial economy. Further continued excavation of Berenike clearly reveal a revival of its economy in the fourth and fifth centuries, casting further doubt on Young's assertion about a permanent shift in trade routes between the Red Sea and the Nile.

### *Clysmā*

Other ports along the Red Sea that seem to rise to new prominence in the fourth century is Clysmā, located at the southern end of the Suez isthmus and already attested as a port in the Roman period. Clysmā served as a "bridge" between Egypt, the Sinai, Palestine and the Red Sea (Ward 2002: 104). The site was excavated in the 1930s (Bruyère 1966). Unfortunately, the site was poorly excavated with no chance of further investigation as the site is now lost. However, ancient documentary sources illustrate the importance of Clysmā. Ptolemy (ca. AD 90- 168) alludes to a fort at Clysmā which suggests that the city housed a garrison in the second century (Ward 2002: 103; Ptolemy *Geography* 4.5.8). Strabo discusses a canal near Arsinoe that empties into the Red Sea and the Arabian Gulf—a city which some refer to as Cleopatris. "It [Arsinoe/Cleopatris] flows through the Bitter Lakes, as they are called...but when the above mentioned canal was cut they underwent a change because of the mixing of the river, now they are well supplied with fish" (Strabo 17.1.25). It is known now that Strabo is referring to the Suez isthmus here and that later Arsinoe or Cleopatris would adopt the name of Clysmā (Ward 2002: 105).

The 1966 report suggests a Ptolemaic foundation and occupation extending into the Islamic period (Bruyère 1966). Once Trajan had re-opened the Nile-Red Sea canal it was easier for merchant ships on the Red Sea to travel to Clysmā, which was closer to Alexandria

than sites such as Myos Hormos, which was abandoned in the third century (Ward 2002: 35). By the fourth century the most advantageous port would have been Clysma given its proximity to Alexandria—the major link connecting the Levant to the rest of the Mediterranean world.

### *Berenike*

Berenike lies on the Red Sea coast a little over 250 km south of Myos Hormos and ca. 250 km from the Nile. The climate is hyper-arid, characterized by mild winters and hot summers, and the availability of water depends entirely on annual rainfall (Ward 2002: 60). Similar to Myos Hormos, Berenike lacks water which had to be imported to the site (Sidebotham and Wendrich 2000: 380).

Given Berenike's long history and prominence in antiquity, the site is mentioned by a plethora of ancient authors. One of the earliest, Diodorus Siculus describes shipping in the region (first century BC). Strabo noted the favorable location of the port city due to the dangers of the Red Sea *i.e.* it offered a sheltered harbor and ships docking there could avoid the strong northerly winds (Ward 2002: 56). The author of the *Periplus* mentions Berenike as one “of the designated harbors of the Erythraean Sea...first comes Egypt's port Myos Hormos and beyond it, after a sail of 1800 stades to the right, Berenike” (cited in Ward 2002: 57).

Excavations “have firmly dated the periods of known habitation at Berenike from the third century BC until the early sixth century AD,” which have been broken down into six major phases of the site: “Ptolemaic,” “Early Roman,” “Late Second to Mid Fourth century,” “Fourth Century,” and finally “Late Fifth to early Sixth century” (Sidebotham and Wendrich

2000: 1). The precise location and development of the settlement during its initial Ptolemaic phase of occupation are still unclear.

The history of Berenike in the late second to mid-fourth century is of particular importance here. Sidebotham and Wendrich mention a “third century gap” in the archaeological record; yet, Berenike shows a compelling case of continued sustainability. The editors conclude that although there seems to be very little activity during this period, there is clear evidence of the “protection of, presumably, trade activities...” (Sidebotham & Wendrich 2000: 415).

After the “third century gap,” Berenike evolves and undergoes vigorous building activity in the mid-to-late fourth century (Sidebotham and Wendrich 2000: 415). This implies that the city went through revitalization in areas crucial to the site’s commercial activity. The excavators report on-going activity in this eastern part of the site throughout the late fourth and fifth centuries, if not later (Sidebotham and Wendrich 2000: 1).

The archaeological evidence suggests that during the Late Roman periods the material imported to Berenike shifted away from Mediterranean products to more imports from India and Sri Lanka such as precious stones and beads. There also seems to be an increase in Indian ceramics. This suggests an increase in contact between these areas and also reveals the nature of the population at Berenike; “an urban population varied both in social-economic and ethnic backgrounds,” which one would expect to find at an international trading site (Sidebotham and Wendrich 2000: 419).

## *Zeugma*

Zeugma, meaning “bridge” in Greek, was critical to international trade. This name is quite appropriate given the geographical location of the city as a link between the East (especially India and China) and Syria. Zeugma, originally a Hellenistic settlement, fell under Roman rule in 64 BC when Pompey annexed Syria (Early *et al.* 2003). Zeugma is mentioned by a number of Greek and Roman authors who document the site’s early history. However, for the purposes of this analysis it is more suitable to discuss documentary sources from the Late Roman and Early Byzantine periods. Bishops from Zeugma are mentioned in a number of church councils beginning with Nicaea (325) and continuing through a council which Zeugma hosted itself in 433. This hints towards the ecclesiastical importance of the city. Ammianus Marcellinus’ mentions Batnae, a town near Zeugma, as the site of a trade fair in the mid-fourth century (14.3.3). It is likely then that Zeugma, given its geographic and economic importance, must have benefited from similar trade fairs, whether hosting the fairs at Zeugma or welcoming the overflow of traffic from neighboring fairs. Ammianus also refers specifically to Zeugma in 359 when he and his fellow soldiers “planned to hasten to Samosata in order to...break down the bridges at Zeugma and Capersana, and so...repel the enemy’s attacks” (18.8.1). Procopius of Caesarea reports of Justinian’s plans to refortify Zeugma against the Persians. And “so they [Zeugma and Neocaesarea] are justly called cities...well built for hostile attacks” (*On Buildings*: 2.9.18-20). This implies that Zeugma’s location was strategically important into the sixth century. Refortifying the city would also provide safety for merchants participating in trade allowing for continued commercial activity into the sixth century.

It is obvious from recent field reports that the city revived after its mid-third century destruction at the hands of the Persians. Evidence includes re-use of elite domestic complexes, public and religious spaces during the Byzantine period (Early *et al.* 2003). Unfortunately, the international team that published their findings have thus far not supplied much evidence to support this dating because this report “was prepared prior to the detailed study of artifactual assemblages as a result of which good dating evidence for the structures and phases uncovered is not yet available” (Early *et al.* 2003: 9).

Now that these sites have been discussed it is appropriate to review the economic situation of Petra in the fourth century. What does the nature of the city’s economy in this period suggest about the location and nature of trade elsewhere *i.e.* north and south of Petra?

Fourth century Petra, once boasting elaborately constructed monumental buildings along a colonnaded street with flag-stone pavers, was a dramatically changed city. Most of the major monumental structures now lay in ruins. The small city now seems to have been centered along the North Ridge, yet even here several domestic complexes were not rebuilt after their destruction in the late fourth century. Petra experienced the decline of its perfume industry but a continuation in the production and export of the ceramics industry. It served as an important administrative center as capital of *Palaestina Salutaris/Tertia* and ecclesiastical center. Could the vessels Hayes identified as possibly from Palestine or Jordan and Khairy unearthed in Petra be a sixth century attempt by the Petraeans to revive the perfume industry? Technically, because no residual analysis has been done to find lipids or oils, it is assumed that these sixth century fusiform *unguentaria* could have carried holy water and not perfume/unguents. If so this would decrease the profit of producing a value-

added product significantly and thus the potters at Petra would simply produce roughly made fusiform *unguentaria* and ship them out for export. Perhaps the reason for the paucity of these vessels in Petra is due to the fact that these were meant to be exported to sites such as Bethany, to then bottle water from the Jordan and sell. If the containers carried unguents, then perhaps Petra, returning to its natural resources (and thus not relying on imported raw frankincense and myrrh from southern Arabia), attempted to revive a perfume industry in the sixth century—yet the industry would not be as successful as its predecessor nor last as long given the Islamic conquest of the region in the mid-seventh century.

### *Conclusions*

The decline of the perfume industry and the disappearance of *unguentaria* from the archaeological record could suggest that incense was no longer being transshipped in quantity through Petra. Given the shift of trade routes mostly to the south, it is likely that instead incense could have been shipped to ports along the Red Sea, namely, Aila, and from there across the Negev to Gaza and other Mediterranean ports, bypassing Petra. There is no documentary or archaeological evidence to support such an idea yet it is plausible—perhaps the containers in which the incense traveled were skins or other organic materials that do not survive in the archaeological record.<sup>36</sup> The major economic boom Aila and other Red Sea ports experienced during the Late Antique period is clear, yet how much of this economic explosion at Aila is due to the arrival of the legion (ca 300)?

Churches are attested at Petra in the late fourth to fifth centuries and both pagans (mentioned as still practicing in Petra at this time by Greek and Roman sources) and

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<sup>36</sup> See above, n. 16.

Christians used incense in religious ceremonies. So, it is unlikely that the importation of incense to Petra completely halted. Instead, perhaps the incense that reached Petra was now simply for consumption.

The perfume industry at Petra declined due to the economic and political instability caused by the crisis of the third century and failed to revive in fourth century. However, Petra to some extent still participated in overland trade. The Petra-Gaza road was still in use in the third to early fourth centuries, suggesting some revival in trade after the crisis of the third century. But Petra's urban center was mostly abandoned. Activity continued in some areas within the city-center, such as the Late Roman/Byzantine baths, and the Late Roman domestic structures along the North Ridge. The once luxurious domestic complex atop ez-Zantur, overlooking the city-center, was abandoned in the early second century but later was reused by a more modest domestic occupation. Otherwise any new construction projects in subsequent centuries appear to have been concentrated along the North Ridge.

Although there is no evidence besides the disappearance of ceramic piriform *unguentaria* from the archaeological record, it is likely that the perfumers of Petra either left, sought out other professions, or simply died in the plagues and warfare of the crisis period. Perfumers who left Petra might have traveled to seek work elsewhere. Given the shift in trade routes north and south of Petra, limited quantities of frankincense and myrrh likely continued to reach Petra, but not in the with the substantial quantities required to support "mass production."

In short the perfume industry at Petra failed to revive after the third century crisis as a consequence of a shift in trade routes north and south of Petra. Significant quantities of the

necessary raw products no longer reached Petra and therefore its perfumers were either forced to relocate or choose another profession. It is possible Petra created a new industry in the sixth century—the manufacture of roughly made fusiform *unguentaria* for the purpose of bottling holy water or other valuable liquids (Hayes 1971; Khairy 2013). However, there is no direct evidence as yet of Petra as the source of these ceramic fusiform *unguentaria*. If subsequent analysis in fact shows this to be the case then it is an industry from which Petra did not receive much economic benefit; unless one assumes that income from this industry helped to build the churches that dot the North Ridge. The perfume industry remained vibrant in Late Antiquity with production elsewhere, such as at Alexandria.

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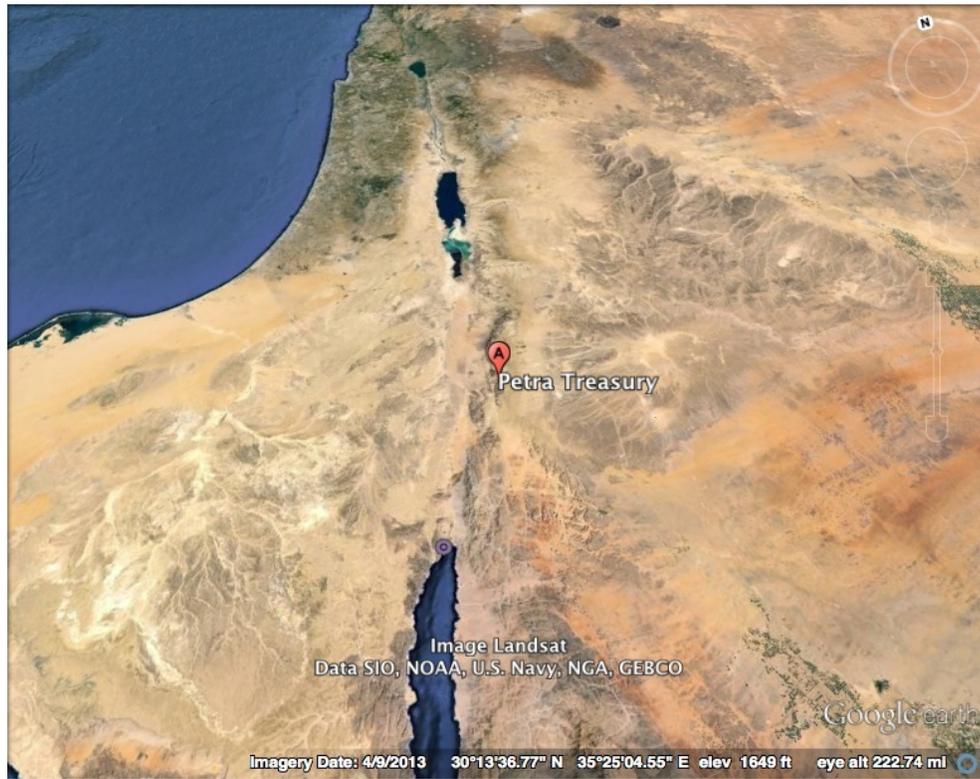
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**FIGURE 1.** Petra, Jordan. (Courtesy of Google Earth)

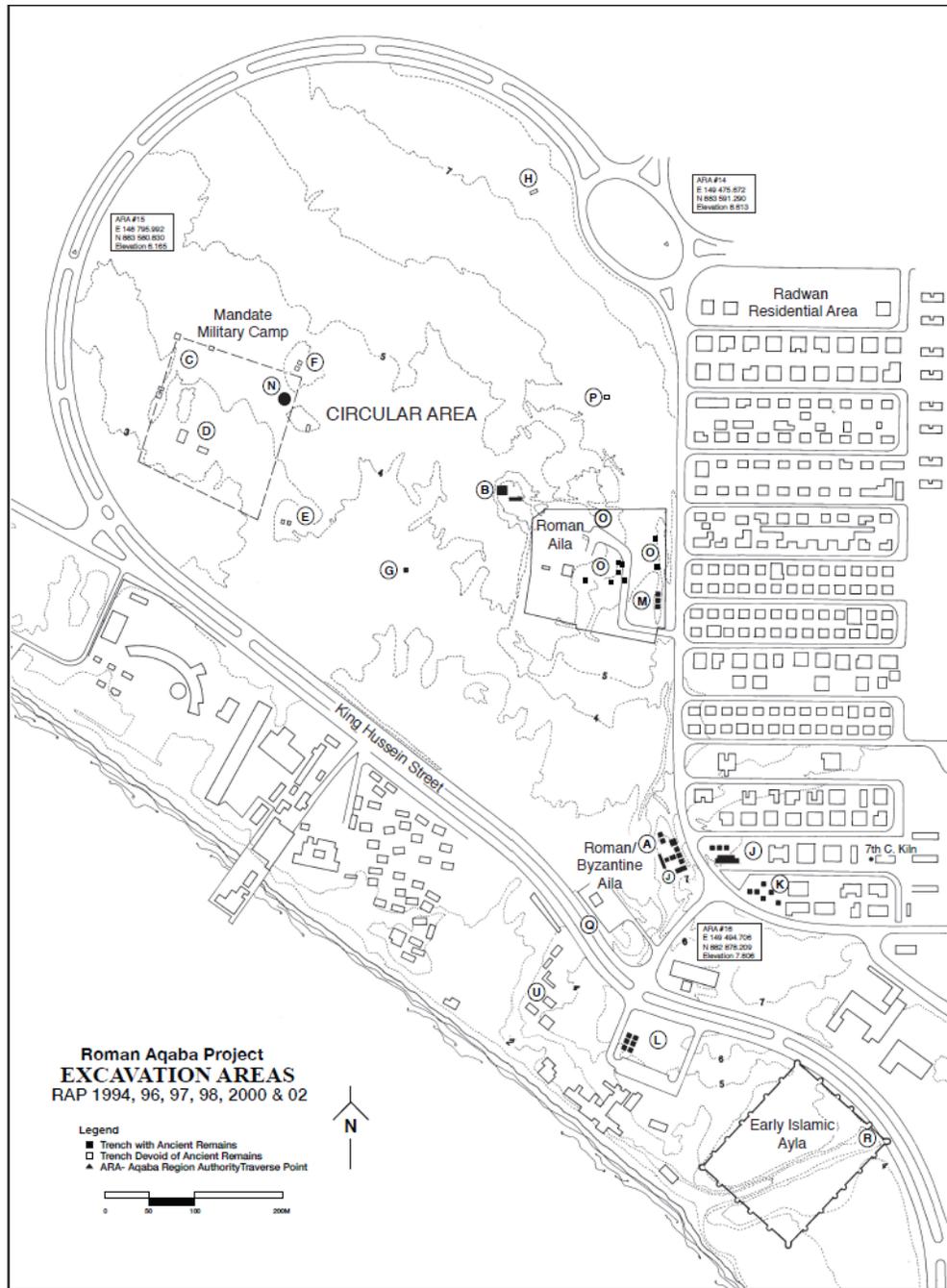
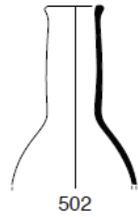
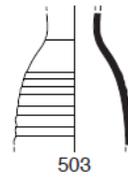


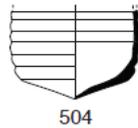
FIGURE 2. Excavation Areas of the Roman Aqaba Project. (Courtesy of RAP)



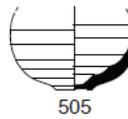
502



503



504



505



506



507

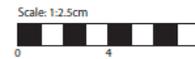


Image	Vessel Type	Type	Combine	Reg. Number	Ware	Paste	Exterior	Interior
497	Juglet	1	O.1:9.31	50619	NSFW	10 R 7/1	10 R 6/8	10 R 6/6
498	Juglet	1	B.3:75.118	18140	NSFW	5 YR 6/8	5 YR 6/8	5 YR 6/8
499	Juglet	1	M.6:12.26	23899	NFW	5 YR 6/6	7.5 YR 8/3	5 YR 6/6
500	Juglet	2	B.2:31.42	3502	NFW	5 YR 6/8	5 YR 6/8	5 YR 6/8
501	Juglet	2	M.3:69.95	57017	NSFW	7.5 YR 6/4	5 YR 6/6	5 YR 6/6
502	Unguentarium	3	B.1:0.10	17523	IMPORT	5 YR 6/8	10 YR 8/1	5 YR 6/8
503	Unguentarium	3	B.1:97.136	19667	IMPORT	5 YR 6/6	5 YR 7/4	5 YR 6/6
504	Unguentarium	3	B.3:108.184	58705	IMPORT	5 YR 4/1	5 YR 5/6	5 YR 6/6
505	Unguentarium	3	M.5:108.198	75136	IMPORT	5 YR 6/6	5 YR 6/6	5 YR 6/6
506	Unguentarium	5	O.1:20.81	57244	IMPORT	2.5 YR 5/6	2.5 YR 5/6	2.5 YR 5/6
507	Unguentarium	6	M.4:12.16	13394	IMPORT	5 YR 6/6	5 YR 6/6	5 YR 6/6

**FIGURE 3.** Nabataean Piriform *Unguentaria* from Aila (Courtesy of RAP)

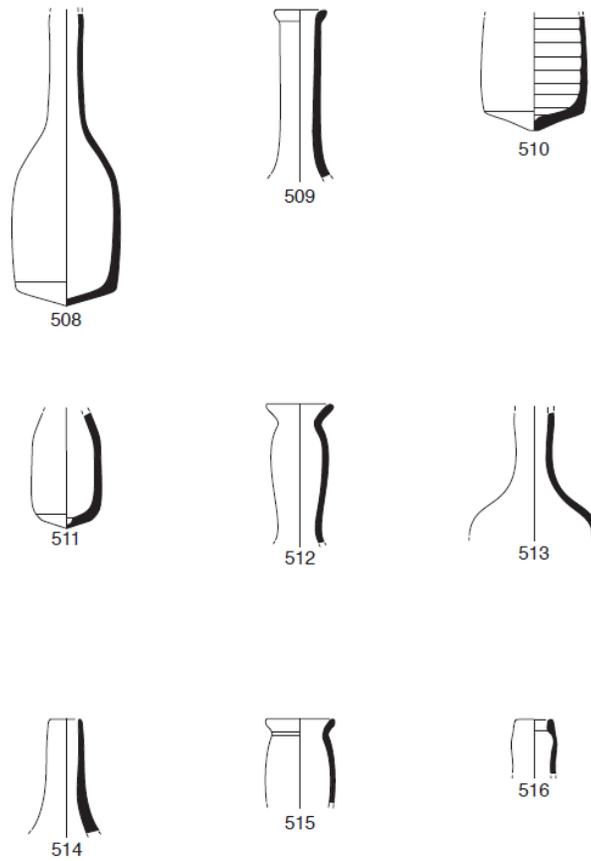
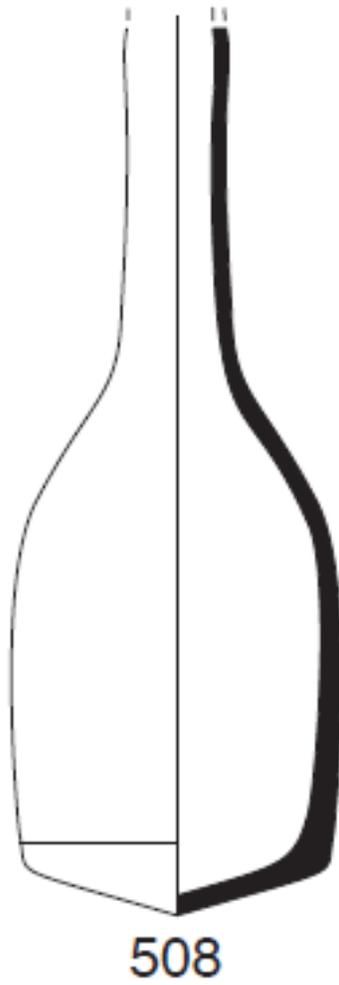


Image	Vessel Type	Type	Combine	Reg. Number	Ware	Paste	Exterior	Interior
508	Unguentarium	8	K.10:54.174	95362	IMPORT	2.5 Y 8/1	7.5 YR 4/1	2.5 Y 8/1
509	Unguentarium	8	O.9:14.32	73769	IMPORT	2.5 YR 5/6	2.5 YR 5/6	2.5 YR 5/6
510	Unguentarium	8	M.2:59.128	15370	IMPORT	5 YR 6/6	5 YR 6/6	5 YR 6/6
511	Unguentarium	12	B.2:81.116	17578	IMPORT	2.5 YR 5/6	2.5 YR 5/6	2.5 YR 5/6
512	Unguentarium	MISC	M.6:79.151	81311	IMPORT	5 YR 6/6	5 YR 6/6	5 YR 6/8
513	Unguentarium	MISC	A.8:2.15	9246	IMPORT	2.5 YR 6/6	10 YR 5/6	2.5 YR 6/6
514	Unguentarium	MISC	O.9:14.24	72402	IMPORT	10 YR 5/1	10 YR 7/1	10 YR 5/2
515	Unguentarium	MISC	M.6:77.148	81275	IMPORT	2.5 YR 5/6	2.5 YR 7/4	2.5 YR 5/6
516	Unguentarium	MISC	B.1:0.141	131335	IMPORT	5 YR 6/6	5 YR 6/6	5 YR 7/6

**FIGURE 3.** Nabataean Piriform *Unguentaria* from Aila (Courtesy of RAP) Continued



**FIGURE 4.** # 81311 Possible Unique Ceramic *Unguentarium* Recovered from Aila



**FIGURE 5.** #95362 Ceramic Piriform *Unguentarium* from Aila



**FIGURE 6.** Monumental Inscriptions from the Small Temple that honor Petra as a “Metropolis”

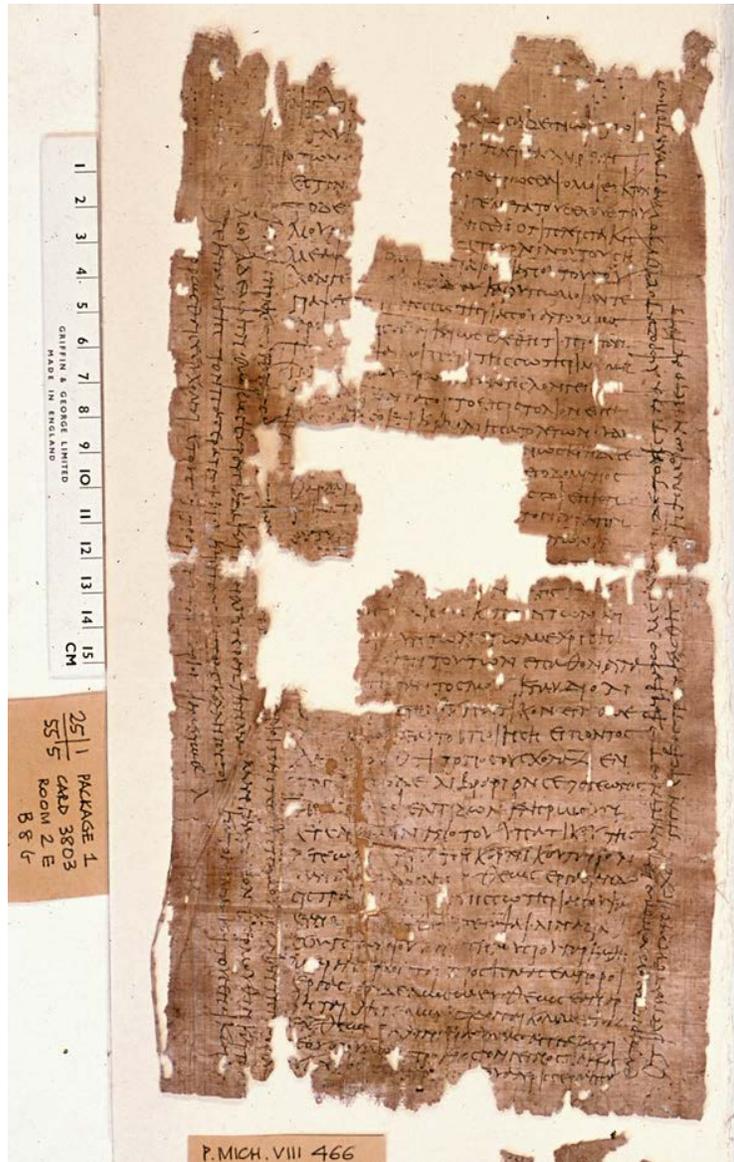
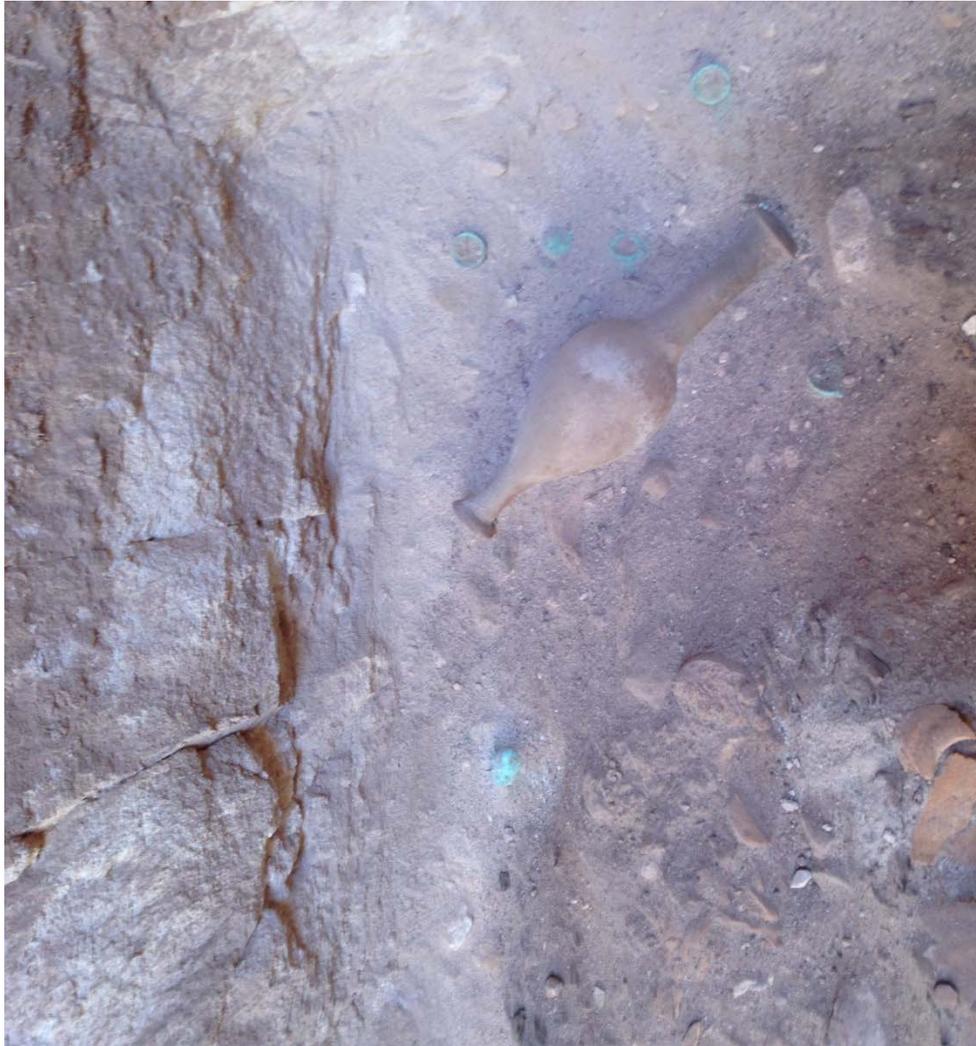


FIGURE 7. Letter of Iulius Appolinarius to his father (Courtesy of University of Michigan)



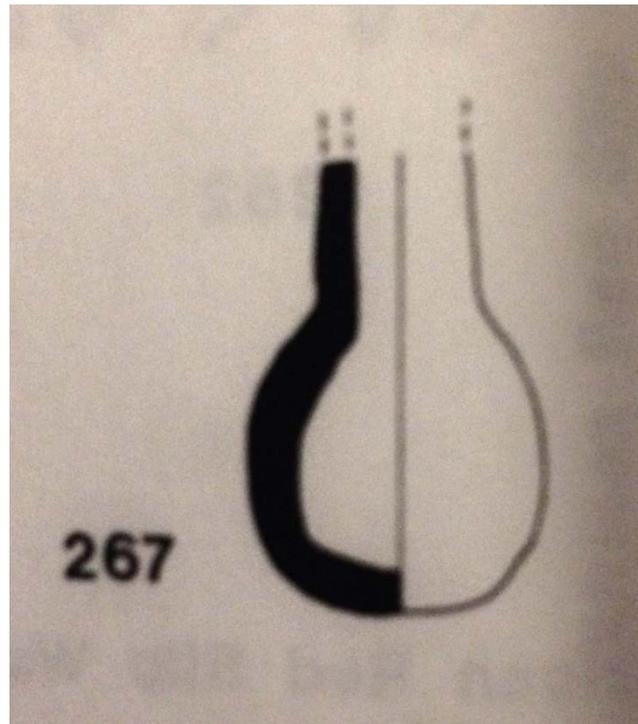
**FIGURE 8.** Top: The City-wall along Petra's North Ridge (Courtesy of PNRP) Bottom: An example of Nabataean Painted Fine-ware Dekorphase 3c; Dekorphase 3c was the latest NPFW to have been recovered from the foundations of the city wall.



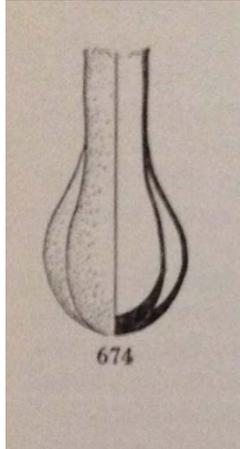
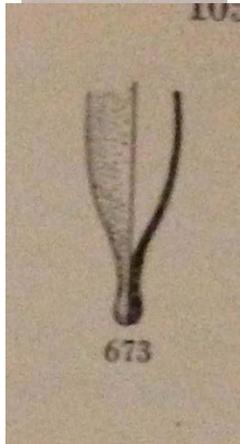
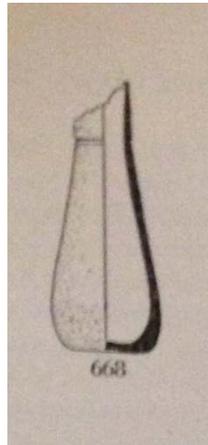
**FIGURE 9.** Coffin Embellishments from a shaft-tomb (Courtesy of PNRP)



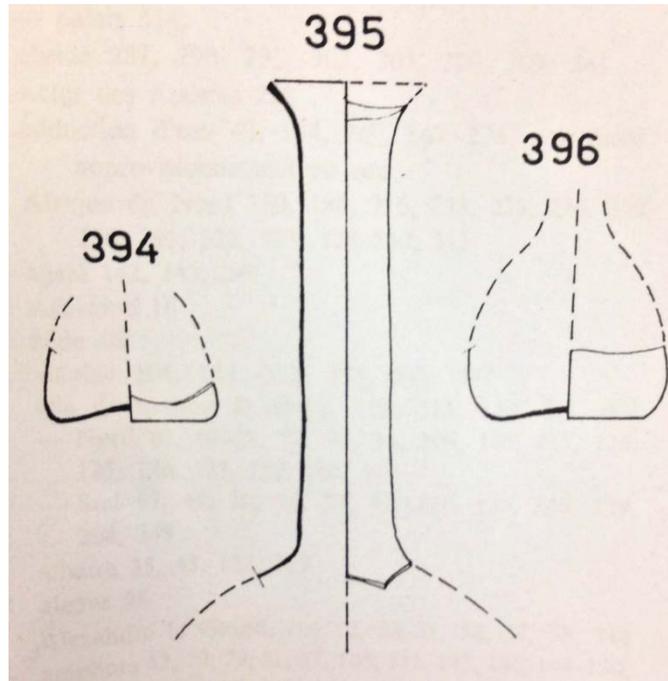
**FIGURE 10.** Aqaba-ware vessels recovered from Petra



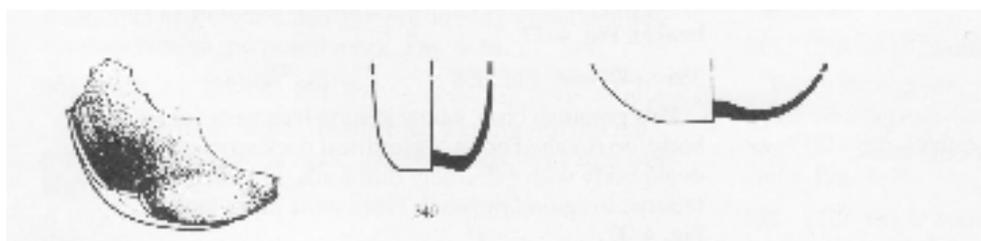
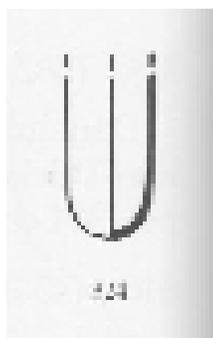
**FIGURE 11.** #267 Ceramic Piriform *Unguentarium* from Karanis



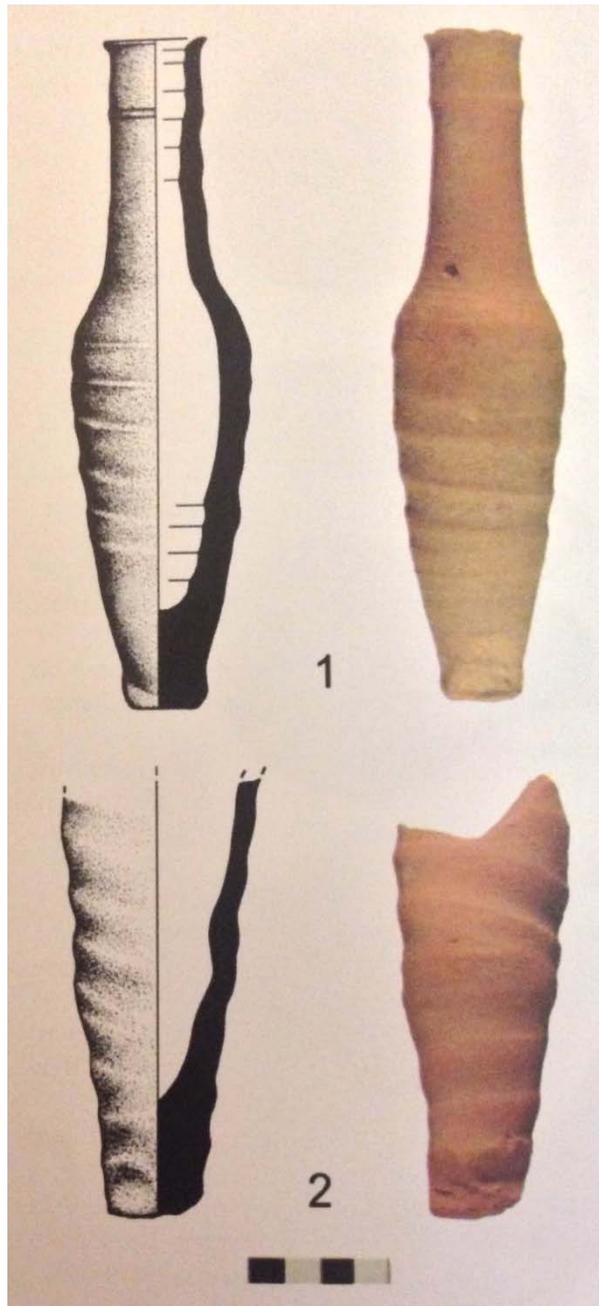
**FIGURE 12.** #668, #673, #674 Glass *Unguentaria* from Corinth



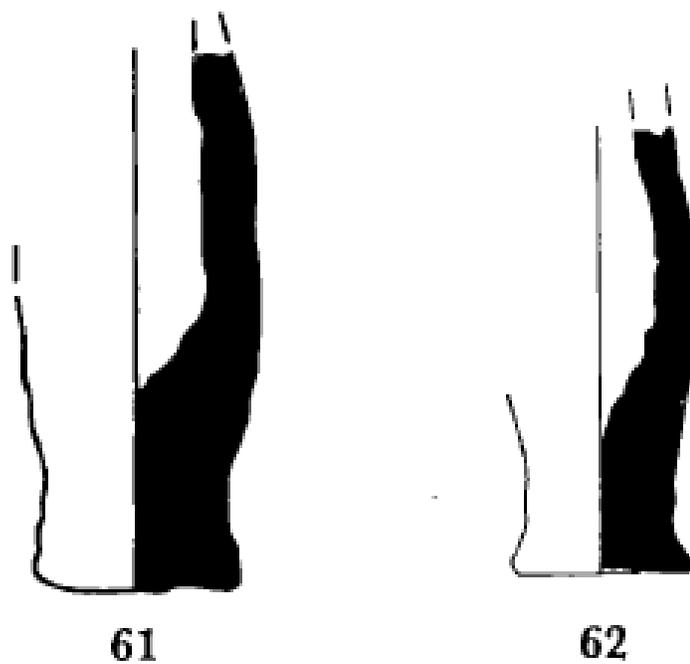
**FIGURE 13.** Possible Glass *Unguentaria* from Alexandria



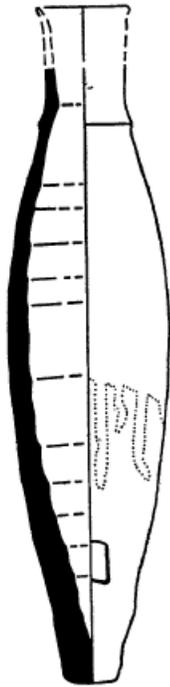
**FIGURE 14.** #324, #340, and #327 Glass *Unguentaria* from Jalame



**FIGURE 15.** Khairy's Sixth Century Fusiform *Unguentarium* from al-Katuteh in Petra



**FIGURE 16.** Roughly made Ceramic *Unguentaria* from Corinth



**FIGURE 17.** Hayes's Late Roman *Unguentarium*